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World Medical & Health Policy is a quarterly, peer-reviewed journal that considers the many factors shaping global health. We publish articles employing overlapping disciplines that include health policy and politics, political science, health economics, medical ethics, and public health. The journal's approach is unified by a thoroughgoing concern with critically examining the contexts within which policy is made, as well as more traditional considerations of processes, outcomes, and influences.

In converting empirical evidence into policy, ***World Medical & Health Policy*** helps policymakers design and promote programs that improve health outcomes, particularly for vulnerable populations. By bringing a global policy perspective to medical practice, the journal navigates the often-tangled world of global economic imperatives, international diplomacy, international agreements, the law, natural and humanmade disasters, humanitarian interventions, the social determinants of health, and local and international standards of care. The journal is committed to publishing practitioners' opinions and case studies alongside academic research articles.

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EDITORIAL

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Only One Earth: Global health and climate justice on world environment day and beyond

The COVID-19 pandemic has heightened and exposed existing health vulnerabilities and the race and class disproportionalities associated with health, economic, and social resource access. COVID-19 has revealed the depths to which inequities are entrenched in our everyday lives and local, national, and global structures. Negative health effects and harms associated with COVID-19 as well as climate change disproportionately impact under-resourced black, indigenous, and people of color. Climate change is characterized as the greatest global health threat of the 21st century (Romanello et al., 2021). Equity and justice in global health practice and policy regarding climate change require the removing all forms of supremacy within countries, between countries, and at global and planetary levels (Abimbola & Pai, 2020) (see Figures 1 and 2).

INEQUALITIES AND INEQUITIES IN INCOME AND CARBON EMISSIONS

The 2022 World Inequality Report notes an imperfect yet close correlation between inequalities on average carbon emissions and inequalities on average incomes by world region. Average US emissions are 3.2 times the world average, while the average US income is 3.0 times the world average, whereas Europe's emissions are less than 1.5 times the world average with an average income nearly twice the world average. Some regions are more successful than others in limiting emissions. Frischmann et al. (2022) emphasize deep historical inequities that contribute to the differentiated implementation of climate solutions and support the "common but differentiated responsibilities" principle formalized in the 1992 United Nations Framework Convention on Climate Change. Further, Patel (2021) introduces a collective impact culture to leverage collective power, wisdom, a shared vision, and mutual trust to address climate challenges and health inequities.

Carbon inequalities within regions are greater than carbon inequalities between regions. The wealthiest contribute the most carbon emissions, with one-tenth of the global population responsible for nearly half of all emissions. The figure on global carbon emissions inequality from 1990 to 2019, which is referred to as the "carbon elephant curve," depicts how the top 1% is responsible for 21% of emissions growth. The bottom half of the population in the wealthiest countries are already near Paris Climate Agreement 2030 emissions targets. The 2022 World Inequality Report notes deficiencies in the capacity of climate policies to address the very wealthy's large carbon footprints and suggests shifting the focus from consumers to asset holders. More resourced countries are well positioned to financially aid climate solutions given vast inequities and climate change's global reach (Frischmann et al., 2022) (see Figure 3).

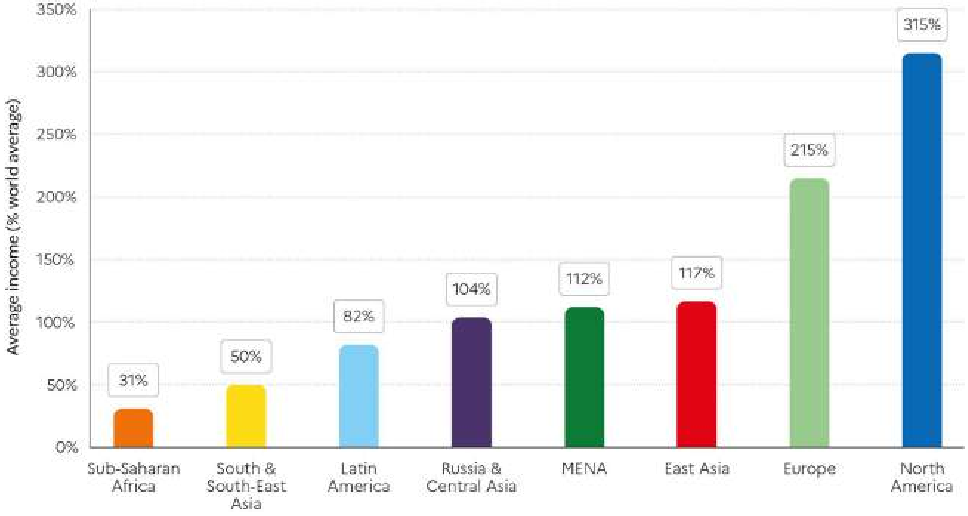


FIGURE 1 Average income across world regions, 2021. In 2021, the average income of North America is 315% of world's average income. *Source*: wir2022.wid.world/methodology

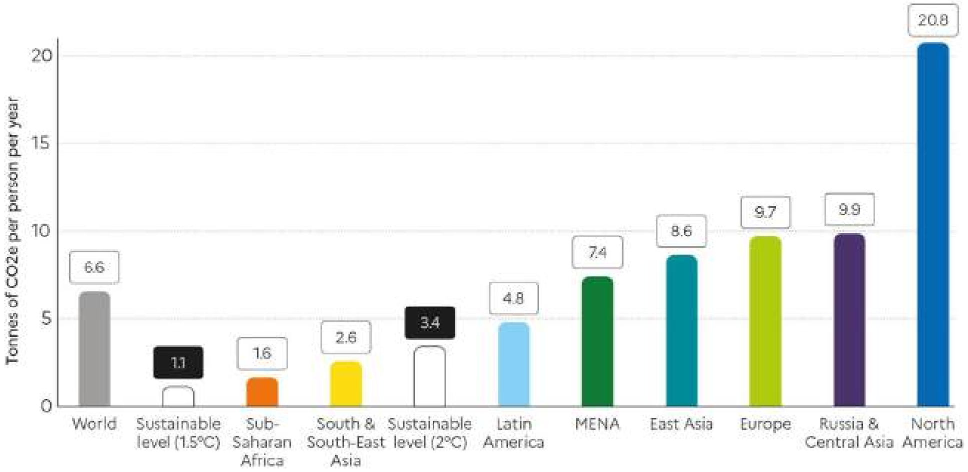


FIGURE 2 Average per capita emissions by world region, 2019. Values include emissions from domestic consumption, public and private investments as well as imports and exports of carbon embedded in goods and services traded with the rest of the world. A sustainable level corresponds to an egalitarian distribution of the remaining carbon budget until 2050. *Source*: wir2022.wid.world/methodology and Chancel et al. (2022).

GLOBAL HEALTH AND CLIMATE JUSTICE

The 2022 Intergovernmental Panel on Climate Change (IPCC) report outlines the dangerous and pervasive effects of climate change on nature, people, and infrastructure in every region of the world.[1] United Nations Secretary-General António Guterres states the report is "a code red for humanity. The alarm bells are deafening, and the evidence is irrefutable: greenhouse-gas emissions from fossil-fuel burning and deforestation are choking our planet and putting billions of people at immediate risk" (United Nations [UN], 2021). Climate change influences individual and population level health in complex, indirect, and multifactorial ways

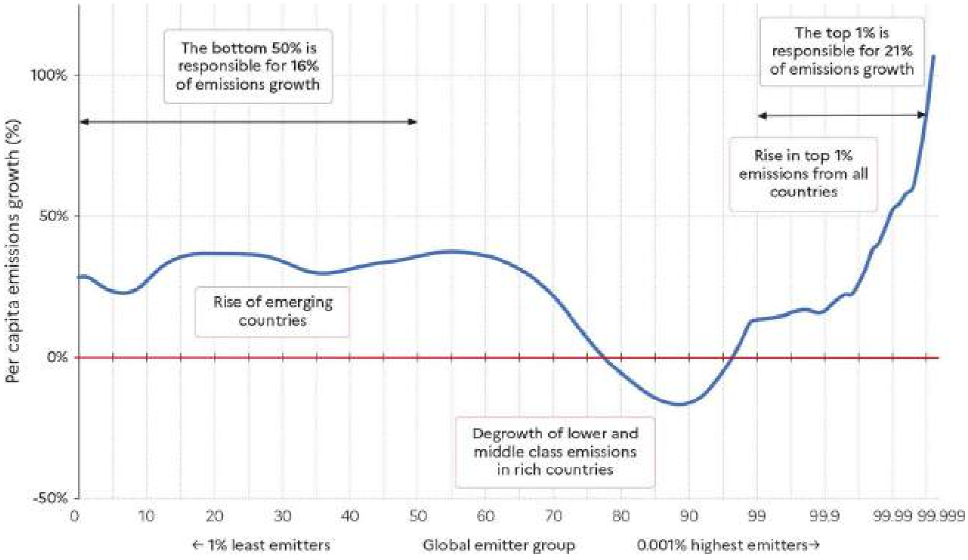


FIGURE 3 Global carbon emissions inequality, 1990–2019: the carbon elephant curve. Emissions of the global bottom 50% rose by around 20%–40% between 1990 and 2019. Emissions notably declined among groups above the bottom 80% and below the top 5% of the global distribution, these groups mainly correspond to lower and middle-income groups in rich countries. Emissions of the global top 1% and richer groups rose substantially. *Source*: wir2022.wid.world/methodology and Chancel et al. (2022).

(Ebi, 2022; IPCC, 2022). Human-induced climate change increases risk of weather and climate disasters and direct and indirect threats to the health of people and our planet (Horton et al., 2014). Climate change impacts and risks are becoming increasingly complex and more difficult to manage. Over the past 50 years, global disasters have increased by 500% and will further intensify in severity, frequency, duration, and unpredictability (Zhongming & Wei, 2021).

Twenty US weather and climate disaster events caused 688 fatalities and cost over $1 billion in 2021 (NOAA National Centers for Environmental Information [NCEI], 2022). Willison et al. (2021) discuss political determinants of disaster response and disproportionate aid to Puerto Rico and its fragile infrastructure during the 2017 hurricane season. Climate change outcomes, including disasters, migration, and extreme weather, touch the lives of everyone, yet not all are equally prioritized in climate disaster planning and response. Berger (2022) reviews the book, *All creatures safe and sound: The social landscape of pets in disasters* by Sarah DeYoung and Ashley Farmer, who analyze interview and survey data to assess disaster effects and recommend protection and safety policies. Golembeski et al. (2021) call for greater transparency, accountability, and human rights protections for people who are incarcerated in association with climate-induced harms, disasters, and emergencies.

Between 2010 and 2020, drought, storm, and flood attributable mortality was 15 times greater in highly vulnerable nations in comparison to those with very low vulnerability (IPCC, 2022). Kerala, India disproportionately experiences flooding as a very costly climate-induced natural disaster (IPCC, 2022). Varughese and Purushothaman (2021) cite the limitations of Kerala's flood-prevention preparedness, yet acknowledge how a decentralized and participatory public health system, coordinated public action, and civil society engagement improved upon climate-disaster health management. Including community rights, experiences, and voices in equitable climate change policy is one way to mitigate existing and intergenerational inequities (Méndez, 2020). In a recent book review, Daniel-Ulloa (2021, p. 164) remarks on how Michael Méndez's book, *Climate Change from the Streets,* "builds on the concepts of community-based participatory research and practice to develop equitable policies in climate change legislation, adoption, and implementation."

Changing environmental conditions are increasing conditions conducive to the transmission of water-borne, air-borne, food-borne, and vector-borne pathogens (Romanello et al., 2021). Aguirre et al. (2020) implore a truly transdisciplinary approach to addressing and preventing pandemics, while emphasizing the danger of viruses transmitted from animals to humans, largely due to lack of herd immunity. Collaborations among public health, conservation biology, and illicit trade scholars may prove key to addressing how supply chains, corruption, and trade contribute to zoonotic transmission and health risks relevant to wildlife trade practices. Overall, many plant and animal species face harms as well as extinction as a result of climate change, related effects, and new conditions to which they are unable to quickly adapt (IPCC, 2022)

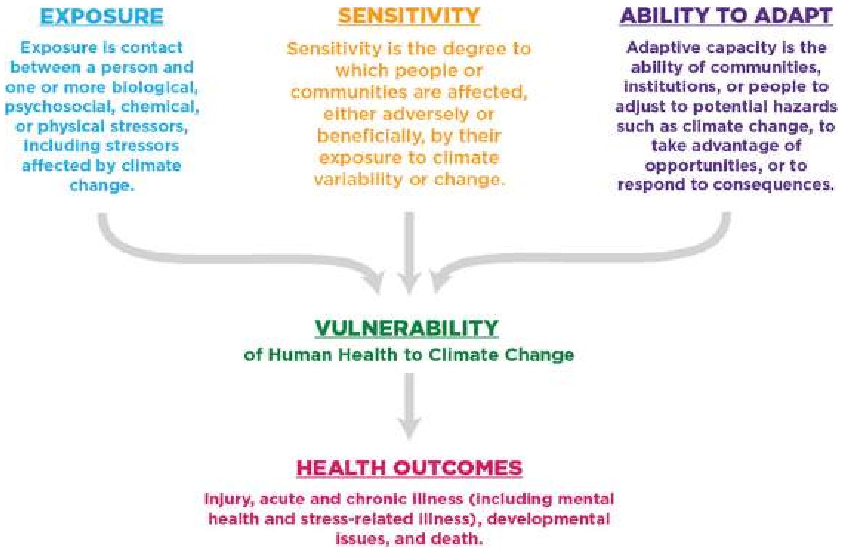
Krieger (2020, p. 8) urges public health and medical institutions, agencies, and organizations "to foster links between work supporting democratic governance, tackling the climate crisis, and health equity." Maibach et al. (2021) and Lauriola et al. (2021) underscore the individual and collective roles of health professionals and organizations in advancing equitable climate and health policies locally and globally. Rublee et al. (2021) systematically review efforts to build resilience against climate-related events in emergency units in low- and middle-income countries (LMICs) and provide policy recommendations for strengthening these emergency care systems to protect lives and advance health equity. Relatedly, medical equipment use itself is estimated to comprise 72% of the global healthcare climate footprint, including waste and greenhouse emissions. Rammelkamp et al. (2021) propose systems-level waste reduction and policies promoting environmental sustainability within hospitals.

CLIMATE VULNERABILITY

According to the IPCC, vulnerability is "the propensity or predisposition to be adversely affected and encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (2022). The social determinants of health as conditions, forces, and systems shaping daily life are relevant to climate vulnerability (Marmot, 2018) (see Figure 4).

Climate change is associated with new health challenges as well as exacerbating pre-existing health inequities between and within countries and regions (Friel, 2019). Inequities in climate change impact and response, as acknowledged by the IPCC, affect health as well as social factors, including quality of life, social service access, and livelihood opportunities. Additionally, the IPCC (2022) recommends feasible and effective climate adaptation approaches to deliver cobenefits, such as improved health outcomes or poverty reduction: social programs including equity and justice; ecosystem-based adaptation; and new technologies and infrastructure.

"Contextual vulnerability" accounts for interactions between changing environments and societies to evaluate how specific populations are disproportionately exposed to harm (Méndez et al., 2020). Vulnerability to climate exposure and risks is a consequence of structural inequality, power relations, and the "slow violence" that climate injustices gradually and less visibly unleash over time (Nixon, 2011; Méndez et al., 2020; Goldsmith et al., 2022). Inequity, conflict, and development challenges, including poverty, weak governance, and limited healthcare access intensify sensitivity to hazards and barriers to climate adaptability (IPCC, 2022; Méndez, 2020). Human variability to environmental hazards is influenced by



EXPOSURE

Exposure is contact between a person and one or more biological, psychosocial, chemical, or physical stressors, including stressors affected by climate change.

SENSITIVITY

Sensitivity is the degree to which people or communities are affected, either adversely or beneficially, by their exposure to climate variability or change.

ABILITY TO ADAPT

Adaptive capacity is the ability of communities, institutions, or people to adjust to potential hazards such as climate change, to take advantage of opportunities, or to respond to consequences.

VULNERABILITY

of Human Health to Climate Change

HEALTH OUTCOMES

Injury, acute and chronic illness (including mental health and stress-related illness), developmental issues, and death.

FIGURE 4 Determinants of climate vulnerability. Every person faces a risk of health impacts associated with climate change. Some people, however, face higher risks than others because of differences in the hazards to which they are exposed, their sensitivity to these hazards, and their ability to adapt. *Source*: epa.gov/climate-indicators/understanding-connections-between-climate-change-and-human-health and US Global Change Research Program (2016).

various physical, environmental, social, political, cultural, and economic factors operating at multiple scales (Méndez et al., 2020). Bhopal et al. (2021) assess how health dimensions of climate change are integrated into Ethiopia's Climate-Resilient Green Economy (CRGE), and cite CRGE as a leading example of a transformational, low-carbon, climate-resilient economic development agenda.

Only one earth

It is this understanding—*Only One Earth*—that prompted the United Nations General Assembly to designate June 5th as World Environment Day at the first United Nations Conference on the Human Environment in 1972. *Only One Earth*, World Environment Day's very first theme as well as this year's theme 50 years later, underscores that we all share this planet as our only home and must collectively protect earth's finite resources. Piketty frames climate and human concerns as nearly one and the same. “We will not be able to resolve environmental challenges unless we make the reduction of inequality central to political action” (Piketty, 2020, p. 1). The 2022 World Environment Day campaign *Only One Earth* calls for collective, transformative action on a global scale to celebrate, protect, and restore our planet.

The most recent IPCC report provides a “dire warning” regarding inaction to reducing emissions fueling climate change and safeguarding all species, particularly those most vulnerable (2022). Decisive action to avert climate catastrophe is also a global opportunity to envision and strengthen more equitable, sustainable, and just communities, economies, and systems (Friel, 2019; Krieger, 2020; Méndez, 2020). It is fitting that this virtual issue of *World Medical & Health Policy*, focusing on climate change and global health politics and policy, commemorates World Environment Day. *WMHP* has consistently published articles on topics spanning the globe relevant to *Only One Earth*. This virtual issue features articles on air pollution, energy justice, illegal wildlife trade, conflict, and vulnerable populations, plus how public health systems, institutions, and providers may protect against and respond to climate-induced harms. Join us for the 2022 *#WorldEnvironmentDay* because there is *#OnlyOneEarth*![2]

ENDNOTES

[1] The 2022 Intergovernmental Panel on Climate Change (IPCC) report is part of the sixth major assessment of climate science from the IPCC, which the World Meteorological Organization (WMO) created in 1988.

[2] Sweden is the host country for the 2022 World Environment Day campaign, which focuses on #OnlyOneEarth as its theme. The United Nations Environmental Program (UNEP) organizes World Environment Day each year with a specific theme and new host country. The official 2022 World Environment Day campaign website is: https://www.worldenvironmentday.global

Cynthia Golembeski
Michael Méndez

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EDITORIAL

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If democracy fails in the United States, it fails everywhere

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Abstract

In this editorial, the author argues that social and political values in a democratic United States of America have significant global impacts on the development of justice, human rights, and democracy. Abandoning these values in favor of national interests may result in the development of new undemocratic nations and facilitate the emergence of narcissistic sociopathic leaders.

KEYWORDS
民主, 美国, 正义, 伊朗, democracia, Estados Unidos, justicia, Irán,

There is a saying “If nothing goes right, go left.” This may be a good pun, but the fact is that “go left” is no longer a clear ideological directive, but depends on how individuals perceive the right path. Nobody goes left if right gives them what they need or want.

I began my medical studies in Iran at Shiraz University in 1977. Protests against the Shah had started and were becoming more frequent and violent. Increasingly, classes were canceled because of security concerns. When I got the chance along with other young Iranians to move to the United States before the 1979 revolution to further my studies, I left Iran with great hopes for the future. For decades, the United States has been a “promised land,” a paradise for myself and others. This was not because we thought the United States was perfect but because of the righteousness and the democratic values that the United States seemed to hold close to its heart. As we grew up, we could see the results of the wars in Korea, Vietnam, the Persian Gulf, and many others in which America has actively engaged. Having watched cowboy films at a younger age, there was no doubt in our mind that the United States stood on the right side of history, defending democracy for the poor, the repressed, and the victims of autocratic countries and blatant narcissistic leadership.

I was 19 years old in Iran when I realized I had to make major decisions to ensure a better future by moving to the United States. Unfortunately, and unexpectedly, at that time hostage situations in Iran made my stay, and those of many other students, increasingly unpleasant and risky. On arrival in the United States, filled with great hopes, I enrolled in the University of Nebraska to study Pre-Med and English. Unexpectantly, I was prohibited by overseas operators from calling my parents in Iran. We were frequently threatened by diverse groups at the university and regularly heard orders to go back to Iran. Many of us who were supposed to receive money from Iranian banks did not, so many of us sought work only to be denied work permits.

In 1980, there was a national investigation into Iranian students. Like others, I was open and honest with the immigration officers about my situation and our need to work, and yet I was to be deported (Goshko, 1979). President Carter announced that we could stay if we asked for asylum or married—both of which were not an option for me, so I reluctantly left for Europe, first Germany then, after 6 months, Sweden. Sweden, which was a more American-friendly country, granted me a student visa, thinking, thanks to my newly acquired American accent, I was a United States citizen. I was the only Iranian student in 1981 granted a student visa.

I am not sure if my Iranian background is the foundation of who I am today. It is more a result of my family's characteristics. In a general way, Iranians are very much like Americans. However, I am more—shall I say—globally dependent in my thinking, actions, and writings than most Iranians. I do not magnify my characteristics or efforts and try to live a non-luxurious and quiet life in peace. However, since early life and through the example of my parents, I am very much against all types of oppression. My family has given me the fundamental elements of humanity, to respect and be respected. Sweden has further given me the patience and fortified "live-by-knowledge" characteristics that have been my soul of academic teaching. Colleagues have recognized that this is ever present in my teachings and writings.

Getting older, now with gray hair and much-needed experience, many of us with similar histories realized that the bad boys of American cinema were not always who they appeared to be. The cowboys were not all heroes and the Indians were not always the bad guys. Sometimes, they were oppressed and forced to do what they did. We also learned that politics is complex and national interests are sometimes more important than global ones. This is odd since globalization has been on the agenda for a long time now. Obviously, we love to get a share of everything but not necessarily share what we have with others.

Current geopolitical changes create new battlefields everywhere. Every fight brings new forms of injustice, violence, and oppression to the people of the world (Khorram-Manesh & Burkle, 2022). Yet the United States is still the one we respect and turn to for help. This is not because America asks for it but because it purports to be the superpower with democratic values, conscience, and empathy; It is supposed to be the one with the right family values, the one that knows and understands what is right and how to achieve it. No American expects this from China or Russia.

There's another side to this, however. Being a superpower with a conscience and deserving the respect of most of the world population, the United States also has a unique responsibility. Other countries, large or small, still look to the United States to copy United States actions, guidelines, and instructions in politics, healthcare, economy, and any other socio-cultural, environmental, and global events. To remain respectful, there must be a gain; there must be evidence that things are going right, otherwise, people will go left.

The last decades of political wrongdoing have on several occasions resulted in the making of a hostile world, targeting several countries, with the United States often receiving the brunt due to its engagement in all aspects of global life. On the political side, uncertainty in United States political games in diverse regions has created a vacuum for opportunistic countries to increase their global impact. The way the United States is handling the situation in the Islamic Republic of Iran, for example, still negotiating on new hostages after the 1979 hostage drama in Tehran, and turning a blind eye to the violation of human rights and the oppression of Iranian women, is not easy to understand. Leaving Afghanistan and its people, especially the women and the children, to the repressive regime of the Taliban is another unresolved issue in the minds of many people who look to the United States for leadership. It is an excellent idea to fight for the freedom of the Ukrainian people, but leaving the people of Myanmar in the misery caused by an undemocratic, military government is a real concern. United States' indifference to the human rights violations in Gaza, even as it asserts Israel's right to defend itself, is another timely example. There are many places where United States leadership and help is needed. So why Ukraine but no other places in the world? What is the United States' global agenda?

This journal's focus--global healthcare—provides another example. With American experts placed at the frontline of new technologies and discoveries, and invited to diverse global meetings and conferences, it is important to spread the knowledge of global health and the need for international collaboration in a peaceful world. The damages caused by the former United States administration on global, environmental, and healthcare collaboration, are hopefully healing. Yet, as the Hawaiian island of Maui burned due to changes in land use, invasive grasses, climate change, and geological shifts, there is no doubt that environmental considerations and mitigation in the promised land are missing. And if that happens in the United States, then what can we expect from the rest of the world?

These disappointing events create both national and international dissatisfaction. They evoke a feeling of anger that is often expressed through violence. This feeling can be turned by opportunistic, narcissistic leaders who love to rule in chaos into strong demonstrations of terror targeting vulnerable people around the world. The societal costs of having such a leader with such personality traits are far too high. Not only do these leaders make vital decisions leading to conflicts, but they also impose their population to other risks and hazards, depriving them of a sound living environment, education, and healthcare. Educational initiatives and free journalism are necessary to raise public knowledge about this personality trait and its global consequences and to ensure a resilient global democracy (Khorram-Manesh & Burkle, 2023).

It is surely unfair to find the United States responsible for everything! However, as a major global player—the so-called “indispensable nation”—the world expects the United States, to be on the right side of history, and certainly not blind to what others do for the sake of United States national interests (Wilson Center, 2015).

The results of a recent survey show that Americans, irrespective of their political beliefs, share one belief: that they are failing as a nation (Igielnik, 2023). Whether it is true or not, every American also needs to know that as a superpower with a conscience and a democratic mind, the world expects the United States to stand on the right side of history, not for its own benefit and national interest but for showing how it can act as the keeper of righteousness, democracy, and the defender of those who live in poverty or are deprived of educational opportunity and basic human rights. It is for the sake of all women of the world living under religious or political oppression; for the sake of all children who are mentally and physically hurt by autocratic leaders and unjustified wars; and for the sake of a better global world where, collectively, we can fight injustice, climate change, and environmental damages.

My research reflects every aspect of my past and present life, and certainly influenced the development of my global health mindset (Khorram-Manesh, 2023). My writings on numerous transnational epidemics with global impacts over the last two decades have revealed numerous national and global weaknesses. For instance, during the current COVID-19 pandemic, the United States medical response system remained focused on individual patients, backed up by political leadership and an unprepared public health system that failed to address population health. Consequently, the 50 US states functioned as 50 different countries.

Meanwhile, the response to the pandemic did not differ among other nations, resulting in serious difficulties in managing disease spread, partly due to the struggling implementation of public health strategies among an unwilling public (e.g., difficulties in obtaining public cooperation with epidemiological contact tracing, mass disobedience in accepting quarantine orders), but also unaddressed operational failures and failed rational changes within unprepared healthcare systems, globally. In the United States, the public health system collapsed leading to the removal, firing, or replacement of over 800 public health experts. Twenty percent of public health leaders and workers resigned or were fired during the COVID-19 pandemic (Burkle & Devereaux, 2020; Leider et al., 2023). The World Health Organization failed to recognize and support the interaction between microbiological, epidemiological, and societal progressions—two crucial factors in the global management of any pandemic.

My research has focused on the multidisciplinary and interdisciplinary approach that facilitates global collaboration and information-sharing that must exist if pandemics of the future are to be discovered early and managed properly (Phattharapornjaroen et al., 2022). A collaboration at both the national and international levels is required to link ongoing data retrieval through a universal global public health database and new regional Centers for Disease Control and Prevention. Such a process requires daily facts and data, which would continuously be updated in emergency and nonemergency times, to oversee the needs, to invent new steps, and to allocate new resources, products, and policies for control and prevention. Whereas the development of equally managed regional World Health Organization Centers for Disease Control and Prevention must serve the entire global population, realistically only cooperative leadership—especially from the United States and the EU—will drive its successful development (Burkle et al., 2021; Khorram-Manesh & Burkle, 2023). We must all start talking about "global public health."

If Americans are worried about the future of both democracy and global public health they must also be concerned about global democracy, which is what we require to guarantee a better and safer world for everyone, including Americans. I can't imagine what would make America greater, and Americans prouder, than pursuing a world with no refugees, no war, and the end of political corruption.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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All data included.

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Not applicable.

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ORIGINAL ARTICLE

Inequalities in hospitalizations for ambulatory care sensitive conditions in New York City before and after the affordable care act

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Abstract

The Patient Protection and Affordable Care Act (ACA) was signed into law by U.S. President Obama in 2010 and fully implemented in 2014. The ACA expanded health insurance by expanding the Medicaid program, creating health insurance exchanges (now called "marketplaces") in which people with incomes between 139% and 400% of the federal poverty level, could purchase subsidized insurance coverage, and by regulating health insurance to eliminate practices such as denying coverage to people with pre-existing conditions, or basing premiums on health status. We investigate the effects of the ACA's implementation on access to ambulatory health services in New York City by comparing rates of hospitalizations for ambulatory care-sensitive conditions (ACSC) before and after the full implementation of the law. Although the ACA was associated with a significant decrease in the rate of ACSC in NYC, we find that there continue to be systemic inequalities by gender, race, ethnicity, income, and insurance status. We argue that the broader social and economic inequalities at the national and state levels, including tax and spending policies that have led to increased income and wealth inequalities, help explain why we see persistent inequalities in hospitalizations for ACSC.

KEYWORDS

Affordable Care Act, inequality, New York City

Key Points

- Advocates hoped that the full implementation of the Affordable Care Act would reduce inequalities in access to health care.
- We find that, after the implementation of the Affordable Care Act in New York City, there are still large

inequalities in hospitalizations for ambulatory care-sensitive conditions.
- Broader social and economic inequalities at the national and state levels help explain why we see persistent inequalities in hospitalizations for ambulatory care sensitive conditions.

INTRODUCTION

The Patient Protection and Affordable Care Act (ACA) was signed into law by U.S. President Obama in 2010 and fully implemented in 2014. The complex law made extensive changes to the U.S. health care system, but its primary goal was the expansion of health insurance coverage (Marmor & Gusmano, 2018). To do so, the ACA used three primary strategies. The first was to expand the Medicaid program, particularly for childless adults, for individuals with incomes up to 138% of the federal poverty level. Second, the law created health insurance exchanges (now called “marketplaces”) in which people could purchase health insurance and receive subsidies if their income is between 139% and 400% of the federal poverty level (FPL). Third, it regulated insurance to eliminate some common practices, for example, denying coverage to people with pre-existing conditions, or basing premiums on health history. The state Medicaid expansions, which were allowed by the Supreme Court's decision in N*ational Federation of Independent Business* (NFIB) v. *Sebelius*, and implementation of the marketplaces and subsidies, were not implemented until 2014. Since that time, the law has led to a significant expansion of insurance coverage among people with lower incomes, especially in states that agreed to expand their Medicaid programs (Courtemanche et al., 2017; Frean et al., 2017; Golberstein et al., 2015; Mazurenko et al., 2018).

THE ACA AND THE GOAL OF REDUCING HEALTH CARE INEQUALITIES

Although critics often highlight the limits of the ACA's incremental approach, the significant increase in health insurance coverage through the expansion of Medicaid, the creation of ACA marketplaces, subsidies for the purchase of insurance, and regulations that made insurance available to those who had been excluded from coverage, were clearly designed to reduce existing inequalities in the health care system. As Jamilia Mitchner argues, a major focus of the law was to “reduce health inequities based on race and ethnicity” (Mitchner, 2020). As she points out, there are multiple references to “discrimination,” “non-discrimination,” “racial,” “race,” “ethnicity,” and ethnic throughout the text of the law (Mitchner, 2020). The reduction in racial and ethnic inequalities in health insurance coverage was a key goal of the law and it has clearly succeeded in doing so. Several studies have found that the law not only reduced racial and ethnic inequalities insurance coverage, it has reduced inequalities in access to and the use of health care services (Buchmueller et al., 2016; Chen et al., 2016; Gutierrez, 2018; Lipton et al., 2019; McMorrow et al., 2016; Park et al., 2018; Renna et al., 2021).

Because the Supreme Court's decision *NFIB v. Sebelius* made Medicaid expansion optional for the states, numerous studies have compared expansion and non-expansion states to better understand the effect of the ACA on a variety of outcomes. Nearly all published studies indicate that the law improved insurance coverage and access to health care services for people with lower socioeconomic status. Several studies have found that the differences in insurance coverage by income fell much more in Medicaid expansion states than in nonexpansion states (Griffith et al., 2017; Sommers et al., 2015).

Beyond insurance coverage, Medicaid expansion has also led to improvements in other self-reported measures of access, including access to a personal physician and the ability to access prescription drugs (Sommers et al., 2015). In addition to these self-reported measures of access to care, other studies relying on mortality and other sources of data have found that the ACA helped reduce inequalities in health outcomes. A systematic review of the literature through the end of 2017 found that Medicaid expansion "was associated with increases in coverage, service use, quality of care, and Medicaid spending" (Mazurenko et al., 2018). One study found that the law's expansion of access to health care contributed to a reduction in infant health inequality (Rauscher & Rangel, 2020). Another found that, by the end of 2018, states that had expanded Medicaid experienced significantly fewer premature cancer deaths than states that had not expanded Medicaid. The authors concluded that, by providing more affordable coverage to lower-income people, the ACA has helped reduce the cancer mortality gap "between those of higher and lower SES" (Song et al., 2021). Supporting this conclusion, another study found that insurance expansion under the ACA has improved access to cancer surgery across the United States (Eguia et al., 2018).

The ACA and hospitalizations for ambulatory care-sensitive conditions (ACSC)

While there is significant evidence that the ACA has improved access to health care services, relatively few studies have examined the law's effect on hospitalizations for ACSC. These are hospitalizations for which access to timely and appropriate outpatient care (primary care services as well as specialty services for the management of chronic disease), should decrease or avoid the need for hospital admission. Examples of such diagnoses include congestive heart failure, asthma, and diabetes. High rates of hospitalization for ACSC, among residents of an area, often reflect barriers to health care (Pappas et al., 1997). ACSC is broadly recognized as a valid indicator of access to ambulatory care, an important dimension of health system performance (Ansari et al., 2012; Casanova & Starfield, 1995; Gusmano et al., 2017; Mercier et al., 2015; Sanderson & Dixon, 2000; Thygesen et al., 2015). One study comparing expansion and nonexpansion states found that Medicaid expansion results in significant reductions in ACSC hospitalizations (Wen et al., 2019). Another found that Medicaid expansion reduced hospitalizations for diabetes with short-term complications, which is one of the ACSC conditions (Mondesir et al., 2019).

Overall, the finding that the ACA expanded insurance and improved access to health care is well established in the literature. Fewer studies, however, have examined the impact of the ACA within particular states or cities. A study that examined the impact of Medicaid expansion in Nevada found that Medicaid expansion had little impact on hospital admissions for ACSC and that additional efforts would be needed to reduce these admissions (Mazurenko et al., 2018). Our primary focus in this article is on whether the ACA helped improve access to outpatient care and reduced inequalities in the use of outpatient care (as reflected in hospitalizations for ACSC) *within* a city, in a state that fully implemented the ACA and expressed a clear policy commitment to reduce healthcare inequalities. An analysis of ACSC in New York City before the implementation of the ACA, found that, despite efforts at the city and state level to expand access and reduce inequalities, racial, ethnic, gender, and income inequalities in hospitalization rates for ACSC remained unchanged between 1999 and 2013. In light of these persistent inequalities, is it plausible to think that the ACA would reduce inequalities in ASCS within New York City?

Even before the adoption of the ACA, New York State had one of the most generous Medicaid programs in the country (Fossett, 1993), so the expansion of Medicaid was not as dramatic within the state as in states with more limited Medicaid eligibility criteria. Nevertheless, the combination of Medicaid expansion and creation of the state marketplace with federal subsidies for insurance did increase health insurance coverage within the state. Since the adoption of the ACA, almost 400,000 people have gained Medicaid coverage in New York and nearly 200,000 people have enrolled in Marketplace coverage. Between 2013 and 2019, the percent of New Yorkers without insurance fell from 10.7% to 5.2% (U.S. Department of Health and Human Services, 2021). In NYC, these gains in insurance appear to have increased access to clinical services. In 2013, year before the full implementation of the ACA, about 81% of NYC residents reported that they had one or more personal care providers, but by 2017, that increased to nearly 85%. Similarly, in 2013, just over 11% of NYC residents reported needed medical care, but did not get it, but by 2017, that fell to just over 10% (calculated by the authors using the NYC Community Health Survey 2013 and 2017).

Along with the expansion of insurance, there is preliminary evidence that the ACA was making changes that could be expected to lead to reductions in inequalities in hospitalizations for ACSC. Specifically, the full implementation of the ACA after 2014 was associated with a "significant reduction in the asthma EMS dispatch rate" (Peters et al., 2020). The reduction in the use of emergency services for asthma led the authors of this study to conclude that the ACA's insurance expansion in New York may have helped reduce emergency services for ambulatory care–sensitive conditions in New York City (Peters et al., 2020). In terms of racial and ethnic inequalities, however, the situation is less clear. There were gains in Medicaid and ACA private insurance coverage by non-Hispanic Whites, Hispanics, and non-Hispanic Blacks in New York (Garrett & Gangopadhyaya, 2016), but insurance gains were significant among Whites (Denham & Veazie, 2019). There is also some evidence that insurance expansion was strongest among those with at least a high school education versus those without (Denham & Veazie, 2019). So while it is possible that the ACA may have reduced hospitalizations for ACSC, it is also plausible that, despite the goals of the ACA, racial and ethnic disparities in these hospitalizations did not decrease.

This article builds on an analysis of hospitalizations for ACSC in New York City that was published before the implementation of the ACA (Gusmano et al., 2017). This study found large and persistent inequalities in these hospitalizations within New York City. Although one might have expected that implementation of the ACA in New York City would reduce these inequalities, we find that whether they are analyzed by gender, race and ethnicity, income or insurance status, they are as large as they were before the law's implementation.

MATERIALS AND METHODS

Measuring access to ambulatory care

To compare rates of hospitalization for ACSC within New York City before and after the implementation of the ACA, we use the definition of the indicator developed by Weissman et al. (1992), which has been validated by previous studies (Backus et al., 2002; Gusmano et al., 2017; Pappas et al., 1997; Parchman & Culler, 1994). The Weissman definition includes pneumonia, congestive heart failure, asthma, cellulitis, perforated or bleeding ulcer, pyelonephritis, diabetes with ketoacidosis or coma, ruptured appendix, malignant hypertension, hypokalemia, five immunizable conditions, and gangrene.

Age adjustment and data sources

We calculated hospital discharge rates of AHC for age-adjusted cohorts, employing the direct standardization method using the 2000 U.S. population to calculate adjustment weights (Klein & Schoenborn, 2001). We restricted the analysis to the population 18 years and over. Hospital data are from the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project's State Inpatient Database for New York State. This database includes individual-level data for all patients discharged from nonfederal hospitals in New York State, excluding the population cared for in Veterans Administration hospitals. The HCUP data includes approximately 97% of the hospital discharges in New York City. To calculate the population denominators for the descriptive statistics, we rely on U.S. census estimates.

Regression model

To identify the factors that explain differences across and within New York City, we rely, for both the 2011–2013 and 2014–2017 periods, on multiple logistic regression models, to estimate effects of selected variables on the odds of hospitalization for ASCS. In both models, the independent variables are age, sex, race/ethnicity, primary payers, and number of diagnoses on the record (as a measure of morbidity). The model also controls for a number of neighborhood variables at the ZIP code level: income quartile, and dummy variables for ZIP codes in which more than 15% of the households are linguistically isolated and more than 40% of the adult population does not have a high school degree.

We ran a model with secondary payers and interactive terms relating race and ZIP code, income and race, and the percent of population with health insurance. Since the inclusion of these additional variables did not change the results, we relied on our original model. Because observations on individuals from the same neighborhood might be correlated, we tested for bias attributable to unobserved neighborhood-level heterogeneity by estimating the models with a dummy variable for each ZIP code as a replacement for neighborhood-level variables. The parameter estimates for the individual characteristics were not appreciably different from those generated by these models (Figure 1).

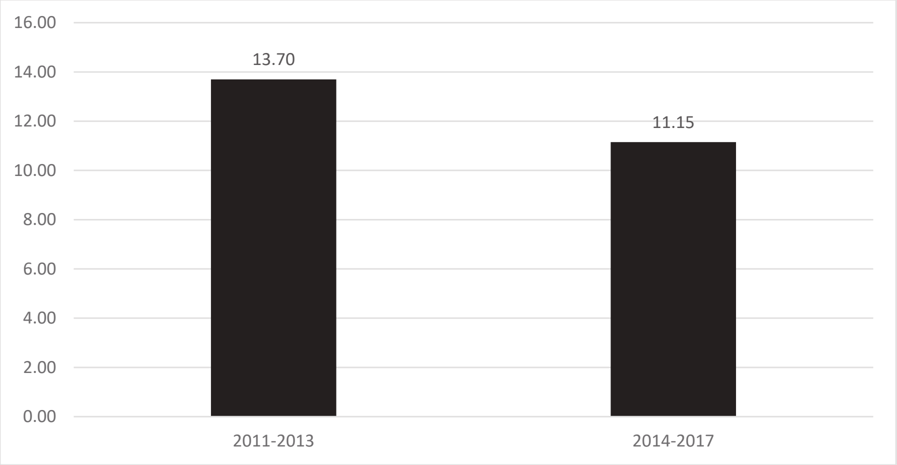

FIGURE 1 Age-adjusted rate hospital discharge of AHC per 1000 in New York City, 2011–13 and 2014–2017. *Sources*: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Database for New York State; 2011–13 and 2014–2017; U.S. Census.

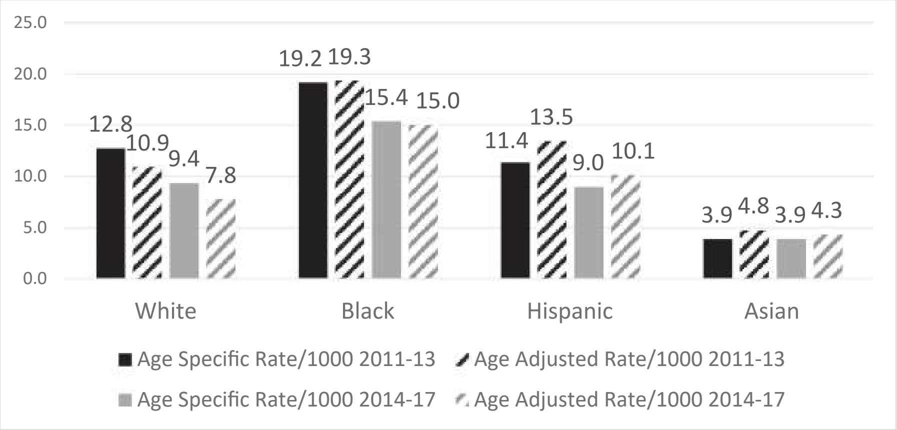

FIGURE 2 Age-specific and age-adjusted rate hospital discharge of AHC by race/ethnicity per 1000 in New York City, 2011–13 and 2014–2017.
Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Database for New York State; 2011–13 and 2014–2017; U.S. Census.

RESULTS

When we compare the age-adjusted rates of hospitalization for ACSC in New York City during the 2011–2013 and 2014–2017 periods, we find that the age-adjusted rates fell from 13.7 to 11.15 per 1000 following the full implementation of the ACA. This is a decrease of over 18%. When we compare the age-specific and age-adjusted rates of hospitalization for ACSC in New York City during the two time periods by race and ethnicity, we find that there were decreases among those who identify as White, Black, Hispanic, and Asian (Figure 2). The largest decrease in age-adjusted rates, however, was experienced by White patients, for whom the rate fell by about 28%. In contrast, the age-adjusted rate decreased by about 22% among Black patients, about 25% among Hispanic patients, and about 10% among Asian patients.

We found that, in both time periods, age, insurance status, race, ethnicity, gender, number of diagnoses, and zip code residence are all associated with statistically significant odds ratios for ACSC (Tables 1 and 2). The odds ratios for those who are uninsured, or who are covered by Medicare or Medicaid, are slightly lower during the 2014–2017 (Table 2) period than they were during the 2011–2013 period (Table 1).

In both periods, patients who identified as non-Hispanic Black, Hispanic, or were members of an “other” race, were significantly more likely to be hospitalized with ACSC than patients who identified as non-Hispanic White. Similarly, residents in the low-income zip-code quartiles were more likely to be hospitalized with an ACSC than those in the highest-income zip-code quartiles, women were significantly less likely to be hospitalized with ACSC than among men (Tables 1 and 2). Patients living in zip codes that are more linguistically isolated were more likely to be hospitalized with these conditions, but a patient's number of diagnoses on the record, the zip code level measure of education, and number of physicians per 1000 in a zip code had little impact on hospitalizations for ACSC.

TABLE 1 Factors that predict inpatient hospitalizations for ASCS in New York City, 2011–2013

	Exp(B)	Sig.	95% CI for EXP(B)	
			Lower	Upper
Age in years at admission	1.016	0.000	1.015	1.016
Female	0.877	0.000	0.859	0.895
Black	1.292	0.000	1.256	1.329
Hispanic ethnicity (as received from source)	1.230	0.000	1.201	1.260
Asian	.910	0.000	0.893	0.927
Other Race	1.128	0.000	1.099	1.157
Medicare	1.231	0.000	1.188	1.275
Medicaid	1.358	0.000	1.313	1.406
Uninsured	1.796	0.000	1.699	1.898
Lowest Household Income Quartile Zip	1.291	0.000	1.237	1.348
Second Quartile Household Income Zip	1.485	0.000	1.395	1.581
Third Quartile Household Income Zip	1.128	0.000	1.1091	1.166
Percent linguistically isolated Zip	.977	0.196	0.944	1.012
Over 40% with No HS Diploma	1.083	0.000	1.040	1.127
Constant	.018	0.000		

Abbreviation: CI, confidence interval.

Sources: AHRC, HCUP NYS SID 2011–2013; U.S. Census.

DISCUSSION

In comparison with the ACSC rate in New York City before the full implementation of the ACA, we found significant improvements during the 2014 through 2017 period. Between the earlier period, 2011–13 and 2014–2017, the ACSC rate decreased by over 18%. Some of this decrease may reflect decreases in the prevalence of disease associated with ACSC. There were declines in the prevalence of congestive heart failure and pneumonia during this time period (Li et al., 2019). For other conditions that are components of ACSC, however, the rate of illness either remained constant, or increased slightly, during the same time period. For example, the percentage of the population reporting that they had asthma remained constant at 13% between 2012 and 2017, and the percentage of the population reporting that they had diabetes increased from 11% to 12% during that time period (NYC Health, 2022). Although it is possible that improvements in population health that were unrelated to the ACA explain the reduction in ACSC we document, it is unlikely that improvements in the underlying population health are solely responsible. The fact that there was a growth in health insurance coverage *and* the percentage of city residents reporting that they had a usual source of care suggests that the implementation of the ACA, reinforced by New York State's Medicaid reform efforts, was at least partly responsible for the overall decrease in hospitalizations for ACSC.

Although we find that AHC rate declined, in New York, disparities among these rates, by insurance status, race, ethnicity, and neighborhood, did not change over this period (Tables 1 and 2). The New York Community Health Survey reinforces this finding with data on disparities among New Yorkers, which indicate that racial and ethnic differences in

TABLE 2 Factors that predict inpatient hospitalizations for ASCS in New York City, 2014–2017

	Exp(B)	Sig.	95% CI for EXP(B) Lower	95% CI for EXP(B) Upper
Age in years at admission	1.021	0.000	1.021	1.022
Female	0.797	0.000	0.791	0.803
Black	1.484	0.000	1.468	1.501
Hispanic ethnicity (as received from source)	1.390	0.000	1.374	1.407
Asian	0.910	0.000	0.893	0.927
Other Race	1.173	0.000	1.159	1.187
Medicare	1.259	0.000	1.243	1.275
Medicaid	1.306	0.000	1.290	1.321
Uninsured	1.520	0.000	1.483	1.559
Lowest Household Income Quartile Zip	1.265	0.000	1.246	1.284
Second Quartile Household Income Zip	1.157	0.000	1.142	1.173
Third Quartile Household Income Zip	1.145	0.000	1.132	1.159
Percent linguistically isolated Zip	0.997	0.000	0.996	0.997
Over 40% with No HS Diploma	0.997	0.000	0.996	0.997
Constant	0.029	0.000		

Abbreviation: CI, confidence interval.

Sources: AHRC, HCUP NYS SID 2014-2017; U.S. Census.

self-reported health and the incidence of most acute and chronic illnesses were largely the same in 2017 as they were in 2002 when the survey was launched. As we have argued previously (Gusmano et al., 2017), we believe that this inertia reflects our inadequate investments in social programs that address the broader social and economic determinants of health (Bradley et al., 2010). National policies that produce inequalities in wealth and income, and offer inadequate protection against racial and ethnic injustice. Our analysis documents one important consequence of these political decisions.

LIMITATIONS AND BIAS

Analysis of AHC is based on hospital administrative data that do not include clinical information allowing for risk adjustment. Although we attempt to adjust for morbidity by including number of secondary diagnoses on the record, this is a limited measure. In addition, the hospital data do not include individual-level measures of income or education. Third, although our datasets include approximately 97% of all hospital discharges in New York City, the exclusion of Veterans Administration hospitals may bias the findings. Although we test for bias by estimating models with a dummy variable for each ZIP code, it is still possible that our regression models are biased due to unobserved neighborhood-level heterogeneity.

It is important to recognize that, although we find an association between the decline in hospitalizations for ACSC and the implementation of the ACA, our analysis does not allow us to attribute these findings to the ACA. Our models include endogenous variables as independent variables and including them in the model results in biased estimates. Medicaid and Uninsured are endogenous variables because they were affected by the ACA. The composition of people who have Medicaid insurance changed after the ACA went into effect. Also, the composition of people who were uninsured changed. These changes in composition of the populations may influence the estimates for the other variables in the models. Similarly, the number of diagnoses on the record is endogenous because it could be influenced by the ACA if population health improved.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The implementation of the ACA insurance expansion in 2014 was associated with improved access to outpatient care as measured by a reduction in hospitalizations for ACSC in New York. However, since the ACA focused on insurance expansion, it included only modest efforts to improve outpatient care and did not focus on the primary sources of health and health care inequalities. Furthermore, it did nothing to address payment differences between public and private insurance plans, so there was very little chance that it would have reduced the large differences in outcomes between patients with public insurance and those with private insurance. As a result, the ACA's insurance expansions, alone, are insufficient to address the persistent inequalities in health and health care, by race, ethnicity, and neighborhood, which our analysis has documented.

New York State's “Redesigning Medicaid” initiative, started in 2014, also sought to reduce AHC rates. Under the state's 1115 Medicaid waiver, New York committed to reducing these rates and avoidable emergency department visits by 25% over a 5-year period. To accomplish this, New York established 25 “Performing Provider Systems” (PPS), led by public or other (safety-net) hospitals (Gusmano & Thompson, 2015). Although we cannot determine whether these efforts contributed to the outcomes we document, the reduction in ASCS in New York City are consistent with the state's goals.

Beyond the limits of the ACA, it is possible that the broader social and economic inequalities in the nation, including tax and spending policies that have led to increased income and wealth inequalities (Menasce Horowitz et al., 2020), may help to explain why we see the persistent inequalities in hospitalizations for ACSC. The ACA was successful at expanding insurance coverage and improving access to ambulatory care, but it continues to operate in the context of policies that have expanded, rather than narrowed, racial, ethnic, and neighborhood-level inequalities of income and wealth.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

The research presented in this manuscript was based on hospital administrative data and census data at the zip code level. It was exempt from IRB approval.

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Picturing the populations who could benefit from health insurance access expansions: An analysis of US health insurance television ads airing in 2018

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Abstract

Efforts to expand access to health insurance in the United States are key to addressing health inequities and ensuring that all individuals have access to health care during the coronavirus disease 2019 pandemic. Yet, attempts to expand public insurance programs, including Medicaid, continue to face opposition in state and federal policymaking. Limited policy success raises questions about the health insurance information environment and the extent that available information signals both available resources and the need for policy reform. In this study, we explore one way that consumers and policymakers learn about health insurance—television advertisements—and analyze content in ads that could contribute to an understanding of who needs health insurance or who deserves to benefit from policies to expand insurance access. Specifically, we implement a content analysis of health insurance ads airing throughout 2018 on broadcast television or national cable, focusing on the depictions of people in those ads. Our findings indicate that individuals depicted in ads for Medicaid plans differ from those in ads for non-Medicaid plans. Groups that comprise large populations of current Medicaid enrollees, children and pregnant people, were more likely to appear in ads for non-Medicaid plans than in ads for Medicaid plans. This has implications for potential enrollees' understanding of who is eligible as well as the general public's and policymakers' perspectives on who should be targeted for current or future policies.

KEYWORDS
health reform, media, Medicaid

Key points

- Individuals and family structures depicted in television ads for Medicaid health insurance plans differed from those depicted in ads for non-Medicaid insurance plans.
- Further, television ads for Medicaid plans airing in 2018 did not depict the breadth of populations that may be eligible for the Medicaid program.
- Medicaid pays for slightly less than half of all births in the United States and yet pregnant people were not depicted in any ads for Medicaid plans.

INTRODUCTION

Media—encompassing advertising, news, social media, and entertainment—play a complex role in shaping public understanding of health and social policy. Research reveals that media outlets provide cues to the public about interpreting and forming attitudes about policy (Jensen & Petersen, 2017; Rose & Baumgartner, 2013). Further, the media can initiate or reinforce beliefs about who deserves policy benefits (Brady & Sniderman, 1985; Gilens, 1999). In the context of health care policy in the United States, the media may depict populations in need of one specific type of policy benefit—access to health insurance—and the media may also shape the public's attitudes about who deserves new or existing policies, such as Medicare for All or state-level expansions to the Medicaid program. If media depict policy beneficiaries (such as current or potential health insurance plan enrollees) as those commonly perceived by the public as deserving—such as the elderly, pregnant women, and children (A. L. Schneider & Ingram, 2005)—public opinion may reflect support for policy reform. Counter to this idea, if media show individuals and family structures viewed as undeserving of policy benefits—including people who are not working, single parents, or individuals with a history of criminal activity (Appelbaum, 2001)—public opinion may reflect less support for policy change.

In this study, we examine data from one high-volume media type: advertisements from public and private sponsors marketing health insurance plans, including Medicaid plans, aired in the United States in 2018. The objective is to describe the messages this media type explicitly and implicitly conveyed about who has and deserves health insurance in 2018, a time when US policy debates about health insurance and the Medicaid program were dynamic and contested. Medicaid is a federal entitlement program administered by states to provide health insurance coverage to eligible adults with low incomes, children, pregnant women, elderly adults, and individuals with disabilities (Centers for Medicare & Medicaid Services, 2021b). We seek to extend evidence of how the media socially construct target populations in the context of health care policy by exploring how health insurance advertisements depict Medicaid plan enrollees, and by extension, those who benefit from Medicaid. By examining the content of depictions of target populations receiving health insurance in a high-volume media type, this study contributes insights into the influences on public opinion of one element of ongoing health insurance reform efforts, such as expansions of state Medicaid programs.

BACKGROUND

The role of media in social constructions of target populations

Lippman (1922) posited that the mass media play a large role in shaping "the pictures in our heads" and our understanding of reality (van Doorn & Bos, 2017). Through print or visual depictions of individuals or groups in connection with content related to public policy, media also establish and reinforce ideas of who could or should benefit from policy. Media thus contribute to the social construction of target populations. Social constructions refer to the "…stereotypes about particular groups of people that have been created by politics, culture, socialization, history, the media, literature, religion, and the like" (A. Schneider & Ingram, 1993; p.335). In the context of the individuals or populations targeted by public policies, social constructions reflect "the cultural characterizations or popular images of the persons or groups whose behavior and well-being are affected by public policy" (A. Schneider & Ingram, 1993; p.334). It follows that the rhetoric surrounding and images of policy beneficiaries appearing in media related to health care policy could influence public opinion on the need for and possibility of policy reform.

Abundant previous work has examined how media depict target populations of social policy topics. For example, Gilens (1999), in his ground-breaking studies of poverty-related media, illuminated how the news media were more likely to depict Black individuals as poor and how this did not align with data about who was actually poor. Another study analyzed the photographs that accompanied stories on poverty in five US-based news magazines from 1993 to 1998. Similar to Gilens' earlier work, the authors found that Black individuals were disproportionately portrayed as poor and largely overrepresented in stories that detailed the poor in stereotypical ways, such as stories on the cycle of dependency on welfare programs (Clawson & Trice, 2000). These and other studies offer evidence of the ways media misrepresent poverty and related social issues, and disproportionately focus on people of color. Such misrepresentations introduce and reinforce racist ideas that manifest in structural racism, which is "the totality of ways in which societies foster racial discrimination through mutually reinforcing systems of housing, education, employment, earnings, benefits, credit, media, health care, and criminal justice" (Bailey et al., 2017; p. 1453).

Research exploring the intersection of racialized and gendered media, including analysis of depictions of the stereotypical "welfare queen," is a prominent example of how media systematically establish ideas of who benefits from public policy and how these ideas inform perceptions of who deserves to benefit (Gilens, 1999). Ronald Reagan popularized the term "welfare queen," although it originally appeared in *The Chicago Tribune* in the 1970s as a way of describing suspected fraud in public assistance programs and perpetuating racist stereotypes (Gilman, 2014; Levin, 2013). The effects of racialized and gendered television news coverage about welfare on public attitudes about policy reform have been tested empirically, including with one experiment centered around the fictional story of a mother on welfare, Rhonda Germaine. In this study, participants viewed a portion of a fake newscast with Rhonda's story. Some were shown a newscast which depicted Rhonda as a Black woman, which reinforced the "welfare queen" stereotype, whereas others were exposed to a newscast where Rhonda was depicted as a White woman or where no visual cue was provided. Among White participants, exposure to a Black Rhonda increased opposition to welfare spending by 5% and was associated with a 10% rise in an attribution of the cause of poverty to individual failings (Gilens, 1999). These findings suggest the power of media in initiating the images in our heads and how these images can contribute to false and racist ideas of poverty and its causes, as well as ideas of who should benefit from programs seeking to reduce poverty.

Relevant research on health care policy-related media

The aforementioned research was not focused on health care policy beneficiaries. In the present study, we explore media content related to health care policy—specifically, the Medicaid program—and discuss the potential for content to influence ideas of who deserves access to health insurance. Below, we provide context on current US health care policy and politics, and a review of existing evidence on health care policy-relevant media.

The Patient Protection and Affordable Care Act (hereafter, the ACA) was passed in March 2010 during the Obama presidency and has been one of the most significant health care policy achievements of the twenty-first century. More than 20 million people gained access to health insurance coverage through the ACA (Center on Budget and Policy Priorities, 2019), many due to state-level expansions to the Medicaid program (Kaiser Family Foundation, 2020). The politics of health care, however, remain increasingly racialized and thus limit the potential for health outcomes proportionate to the significance of this policy achievement (Michener, 2021). Specifically, large segments of the public remain resistant to ideas of expanding access to health insurance (Kaiser Family Foundation, 2021) and scholars have provided evidence of how Americans' racist attitudes affect public opinion of the need for health care policy reform (Mitchell & Dowe, 2019), perceiving reform as less of a priority when populations of color benefit (Knowles et al., 2010; McCabe, 2019). Republican policymakers at all levels of government have opposed expansions to the Medicaid program (Cassidy, 2017) and many have been part of efforts to propose restrictive and racist policies such as work requirements that limit eligibility, disproportionately burden individuals of color, and play to partisan fallacies about work and health (Alker et al., 2018; Grogan & Park, 2017; Haeder et al., 2021).

The media have both reflected and reified this dynamic political environment surrounding health care. Reviewing multiple media types (including local news and advertising), Gollust et al. (2019) synthesized 10 years of media messaging about the ACA and concluded that messaging has been complex and competitive, partisan, and of variable volume over time. In one previous study analyzing local news specifically, researchers provide evidence that coverage during the early years of ACA implementation was more likely to focus on political disagreement than on benefits of the law that might encourage enrollment, or on the populations who might benefit (Gollust et al., 2017, 2019).

Few studies have looked specifically at individuals depicted in ACA-related media content and what this suggests for public opinion of health care reform efforts to expand access to insurance. In one study, Viladrich (2019) analyzed *New York Times* articles published before and after the passage of the ACA, to understand how media frame access to health care for undocumented immigrants and suggest how these frames could influence perceptions of the need to include undocumented immigrants in future health care reform efforts. Analyzing content printed between 2009 and 2017, Viladrich concludes, "…as portrayed by the NYT stories reviewed in this article, undocumented immigrants must prove their deservingness for public health benefits on the basis of their moral worth, vulnerability, and need" (p.1455). This content could suggest that access to health insurance is a benefit that should be extended only to select populations, and conditionally so (Viladrich, 2019).

Looking specifically at the content of health insurance television advertisements aired during the first three open enrollment periods associated with the ACA (fall 2013 through spring 2016), Barry et al. (2018) examined who was depicted in ads, focusing on demographic depictions of up to five people per ad: female or male; race; life stage (e.g., child, young adult, older adult); disability; and body type, specifically whether they were overweight or obese (p.968). They found that Spanish ads were "…more likely (than English ads) to include non-White people, females, children and young adults, people exercising and people receiving medical care," (p.7). Less frequent depictions of people of color and children in English-language ads could send the implicit signal that these are not the populations in need of health insurance, although recent data suggests otherwise. People from marginalized racial groups, including those who identify as Hispanic but may not speak Spanish (and as so, not receive information presented in Spanish-language ads) are at greater risk of being uninsured compared with their White non-Hispanic counterparts and more than a third (35%) of Hispanic children are uninsured (Tolbert & Orgera, 2020).

It is important to add that although many have gained coverage as a result of the ACA and expansions to state Medicaid programs, not all individuals who are eligible for program benefits enroll in Medicaid (Collins et al., 2016). Of the individuals who are eligible for Medicaid and remain uninsured, more than half (59.9%) are nonelderly adults and the remaining (40.1%) are children. Considering the uninsured and eligible nonelderly adults, the largest proportion are Hispanic (40%), followed by individuals who identify as White (35.2%), Black (15.8%), or respond with "Other" (9.0%) (Orgera et al., 2021). The reasons for limited enrollment are many: the administrative complexity of the program, of applying for, receiving, and maintaining benefits; perceptions of stigma associated with enrolling in a public program; as well as a lack of knowledge about available health insurance options and enrollment-related resources (Stuber & Bradley, 2005; Wright et al., 2017). In discussing the opportunities to increase enrollment among eligible populations, Wright and co-authors note, "These potential barriers suggest that targeted outreach that raises awareness …. might increase take-up," (p.839). In their 2020 study, Shafer et al. (2020) find a relationship between health insurance advertising and health insurance enrollment, including a strong correlation between airings of private-sponsored ads mentioning Medicaid and enrollment in the Marketplace. This evidence, combined with other studies (e.g., Gollust et al., 2018; Karaca-Mandic et al., 2017) demonstrates the importance of health insurance advertising and enrollment, and motivates our study on the content of advertising. Ads about the Medicaid program may be one opportunity to increase awareness of the program among eligible populations, not only because of their direct messages urging enrollment (see, e.g., Pando et al., 2022) but also because of the images they provide about who is (and is not) an enrollee. In addition to providing information about the program and direct messages about enrollment (see, e.g., Pando et al., 2022), advertisements provide images about who is—and is not—an enrollee; accurate depictions of the populations enrolled in and eligible for coverage could contribute to bolstering program uptake.

Study motivation and research questions

The current study contributes to previous health insurance policy-related media content analysis studies in a few key ways. First, we examine more recent advertising content (2018) during a time of political uncertainty around health insurance; specifically, this was a time of concerted administrative efforts to erode the impact of health insurance expansions, including through eliminating federal advertising completely (Kliff, 2017), and during a political campaign season characterized as the "health care election" following failed Congressional attempts to repeal and replace the ACA (Cillizza, 2018). Second, we compare advertisements specifically mentioning Medicaid to content that does not mention Medicaid. Existing studies have primarily analyzed media content when the ACA was relatively new—when the federal government (under the Obama administration) invested in health insurance television advertising and outreach in an effort to increase access to health insurance. As noted above, the federal government under the Trump Administration drastically reduced their investment in marketing for the 2018 open enrollment period (the period relevant to the analyses presented in this paper) (Gollust et al., 2018). With such reduced federal investment, most advertisements aired (and thus in this study) were instead sponsored by private insurance companies promoting their health plans (whether on the individual market or not). With regard to Medicaid plans in particular, a large proportion of private sponsors promoted Medicaid-managed care plans. These predominantly private entities were effectively shaping the "pictures" in the public's heads—to borrow from Lippman (1922)—of who currently deserves access to health insurance through Medicaid and who could benefit as result of expansions to the ACA or other policies, all during a period when the federal government's support for health insurance was particularly unpredictable.

Our first research question asks whether the individuals depicted in ads for Medicaid plans differ from those depicted in other ads' content. Our second research question asks whether those depictions align with the populations currently enrolled in Medicaid.

MATERIALS AND METHODS

Data

This study used data from Kantar/Campaign Media Analysis Group (CMAG), which we obtained from the Wesleyan Media Project (https://mediaproject.wesleyan.edu/dataaccess/). Kantar/CMAG tracks 936 predominantly English-language television stations across all 210 designated market areas (DMAs) and 108 Spanish-language television stations across 38 DMAs in the United States (Pintor et al., 2020). Kantar/CMAG had data for 1723 health insurance-related advertisements that aired 877,318 times between January 1 and December 21, 2018, on broadcast television or national cable across all DMAs. Data from 2018 were the most recent complete data available to our team at the time of this analysis. In the text that follows, we refer to individual advertisements as a creative; this term is used by the data provider and within the advertising industry. We excluded Medicare-focused creatives as they were not relevant to our research questions. This left us with 960 advertisements that aired 489,489 times during this period, which is broader than but encompasses the 2019 Healthcare.gov open enrollment period, November 1–December 15, 2018.

Our sample was drawn to allow for maximum content variability. Although this analysis does not present differences in ad content by language spoken, our sample does contain all the Spanish-language creatives ($N = 189$) for this time period. To maximize the variability of content, as well as to make the best use of available resources, we developed and implemented the following sampling strategy. First, we drew a random sample of 46% of the total ads (English and Spanish language) furnished by the top three most common private sponsors. Ads sponsored by these insurers—Blue Cross/Blue Shield, United Healthcare, and University of Pittsburgh Medical Center—supplied more than a third (37%; $N = 358$ creatives) of the total unique ads in the data set. Our decision was justified, because we observed during the pilot coding stage that many of these ads were duplicative and included only subtle distinctions, which were not relevant to our research interests (e.g., referring to different locations plans were available). Creatives sponsored by the three largest sponsors in our sample aired an average of 496 times each, whereas creatives sponsored by other sponsors aired an average of 517 times each (this difference was not statistically significant; *t* test $p = 0.8070$). This means that consumers were no more exposed to content we excluded. Next, we included all ads sponsored by the less common entities (those ranked as the fourth most prevalent or less in the total data set; $N = 560$ creatives), which included less frequent private sponsors and state-based marketplaces. After accounting for these sampling decisions, our sample contained 78% of all possible creatives ($N = 749$ total creatives), which encompassed 81% of all available health insurance ad airings (non-Medicare) during this timeframe.

We applied additional exclusion criteria similar to the process implemented by Pando et al. (2022) to focus on ads for health insurance-related products. We eliminated ads that did not offer a health insurance product, ads focused on Medicare products (that were missed in the primary exclusion stage), ads for health insurance products in Mexico (but aired in overlapping US and Mexico markets), ads not aired in 2018 (that were incorrectly included in the data set), and ads where more than half of the ad information was missing because of a technical error.

Considering our primary aim, which was to understand how insurance ads depict populations that could benefit from health insurance access (specifically Medicaid expansions) for individuals younger than 65 years, we also excluded ads that mentioned Medicaid in the context of "dual-eligible" Medicare and Medicaid plans. The target population for these plans is distinct from those who could enroll in the Medicaid program. After applying all exclusion criteria, the final analytic sample included 437 English- and 140 Spanish-language creatives that were aired 306,976 times on local television or national cable in 2018.

Codebook development and key measures

A subset of the authors used an inductive process to develop a codebook implemented in Qualtrics. The team met regularly to watch ads from the sample, review themes that emerged, and discuss how to operationalize different aspects of ads into variables that related to our research questions. Team members reviewed previous codebooks from studies examining ad content (Barry et al., 2018; Pintor et al., 2020) and then adapted and added variables to reflect our interest in the populations depicted in ads. The team also coded each ad for various elements, including the ad language, ad objective, ad sponsor, and any reference to the Medicaid program (these measures are described below). Lastly, Kantar/CMAG provided information about ad length, ranging from 10 to 120 s, which was used to adjust the analyses, also described below. More detailed descriptions of each measure are found in Appendix A.

Our interest was in capturing content that could signal current or future policy beneficiaries, so we developed an exhaustive set of variables describing people. We created variables for the individual and family structures we thought could or should appear in ads (for a list of variables and how each was defined, please see Appendix 1).

Ad objective distinguishes ads that provide any information to a viewer about how to enroll in a plan—coded as an enrollment objective—and those that instead promote an insurer's reputation—coded as a branding objective. Some ads may have mostly been about branding but included a short appeal with information about how to enroll in a plan; these were coded as enrollment ads. Ads focused on raising awareness about a health condition or service separate from health insurance (e.g., breast cancer screenings) akin to a public service announcement were coded as branding/public service announcement.

Ad sponsor included the private sector (e.g., private health insurance, integrated insurance, and health delivery systems, or insurance brokers), states, and the federal government. We identified two federally sponsored ads (aired 141 times) that advertised the Children's Health Insurance Program and the NIHSeniorHealth.gov website separately. Unsurprisingly, there were no federal government ads for Healthcare.gov during this period. We created a public sponsor category that combined federally and state-sponsored ads, which we introduce after Table 1.

We identified ads for Medicaid plans as those that included an explicit or implicit reference to Medicaid, either audibly or visually. Ads may have exclusively referred to a Medicaid plan—what we considered a Medicaid-focused ad—or mentioned a Medicaid plan in addition to other offerings from the ad's sponsor. For the purpose of this analysis, we combined ads explicitly focusing or briefly mentioning Medicaid into a single sample of ads for Medicaid plans. Our motivation for this collapse was that ads with either a narrow focus or brief mention of Medicaid both provide a viewer with exposure to Medicaid. Coders also identified content that advertised a Medicaid plan but did not explicitly refer to it as such, referred to as “Implicit Medicaid” (a common strategy of Medicaid plans, see, e.g., Tallevi, 2018). Coders were instructed to leverage their health policy expertise and use publicly available materials (e.g., websites) to ascertain this implicit Medicaid content. This led to three possible categories of ads: those that did not reference Medicaid; those did reference Medicaid, either explicitly or implicitly; and, within the latter category, those that explicitly referenced Medicaid.

Three authors double-coded a random sample (18.3%) of English-language ads to assess interrater reliability. A single coder coded all of the Spanish-language ads and a sample of English-language ads. To ensure reliability, coders completed instrument training together and communicated regularly to compare and discuss ad coding. All variables in this study exceeded conventionally accepted levels of interrater reliability ($\varkappa > 0.65$). $\varkappa$ for each variable are listed in Appendix 1.

Data analysis

In accordance with similar studies, we analyzed data at the airings level (vs. the creative level) to consider the number of times the depictions—each ad image—were aired on TV. Each creative was aired a variable number of times over the study period both within and across study markets (i.e., some ads were aired as few as 1 time, others were aired as many as 23,921 times). In essence, estimating the frequency of content featured at the airing level weights depictions by how often they were available to the public, so depictions featured in frequently aired ads have higher volumes than depictions featured in less frequently aired ads. Previous research analyzing advertisement content has used a similar approach (see, e.g., Barry et al., 2018).

As the first step in our analysis, we compare the individuals and family structures depicted in ad airings for Medicaid plans to those for non-Medicaid plans. For Medicaid plans, we include two categories as noted above. Next, we report the differences in depictions by sponsor. In analyses testing for statistical differences by sponsor, we adjusted for ad length because we observed systematic differences in length of ad by sponsor type. Longer ads can include more individuals and family structures as part of their additional content.

Last, to make comparisons between the demographics of Medicaid populations in ads compared to the real world—and thus to analyze how accurately or not the images in ads depicted potential enrollees—we drew from the Medicaid and CHIP Payment and Access Commission (MACPAC) analysis of 2018 National Health Interview Survey data (MACPAC, 2020). In 2018, more children under the age of 18 and individuals of color were enrolled in Medicaid as compared with private insurance plans (see Table 4).

TABLE 1 Characteristics of advertisement airings, by Medicaid focus

	All ads (*N* = 306,976 | % of sample)	Non-Medicaid ads (*N* = 253,095 | 82.5% of sample)	Explicit mentions (*N* = 39,814 | 13.0% of sample)	Explicit and implicit: Medicaid mentions (*N* = 53,881 | 17.6% of sample)
Language spoken				
English-Spoken Ads	256,538 (83.6)	208,843 (82.5)	36,198 (90.9)	47,695 (88.5)
Spanish-Spoken Ads	50,438 (16.4)	44,252 (17.5)	3616 (9.1)	6186 (11.5)
Sponsor type				
Federal sponsor	141 (0.1)	2 (0.0)	139 (0.4)	139 (0.3)
State sponsor	67,435 (21.9)	62,998 (24.9)	3710 (9.3)	4437 (8.2)
Private sponsor	239,400 (78.0)	190,095 (75.1)	35,965 (90.3)	49,305 (91.5)
Private sponsor type				
Insurance company	204,676 (85.5)	157,122 (82.7)	34,366 (95.6)	47,554 (96.5)
Insurance company and health system	31,497 (13.2)	31,119 (16.4)	378 (1.0)	378 (0.8)
Insurance broker/Insurance agency	3227 (1.3)	1854 (1.0)	1221 (3.4)	1373 (2.8)
Objective				
Enrollment	189,695 (61.8)	146,284 (57.8)	34,685 (87.1)	43,411 (80.6)
Branding	103,581 (33.7)	93,111 (36.8)	5129 (12.9)	10,470 (19.4)
Branding/Public service announcement	13,700 (4.5)	13,700 (5.4)	0 (0.0)	0 (0.0)
Ad length				
<30 s	29,429 (9.6)	24,198 (9.6)	3613 (9.1)	5231 (9.7)
30–60 s	277,489 (90.4)	228,839 (90.4)	36,201 (90.9)	48,650 (90.3)
90–120 s	58 (0.02)	58 (0.02)	0 (0.0)	0 (0.0)

RESULTS

Summary of sampling frame

Table 1 is a breakdown of the final analytic sample, looking at the distribution of key variables among all ads: those for non-Medicaid plans, those explicitly mentioning Medicaid, as well as the combined category of those explicitly and implicitly mentioning Medicaid. Across all ads, more content aired in English than in Spanish. Less than 10% of ad airings explicitly mentioning Medicaid were in Spanish, compared with close to 20% of non-Medicaid ads. Most airings (78%) were privately sponsored and among private sponsor types, the largest sponsor type across groups were insurance companies. More ad airings overall had an enrollment objective, although we observed differences in the distribution of ads by objective when comparing non-Medicaid and Medicaid content. Whereas slightly less than two-thirds of all ad airings (61.8%) had an enrollment objective, over 80% of airings mentioning Medicaid plans made an enrollment appeal (87.% and 80.6%, respectively, for explicit references vs. the more inclusive explicit and implicit references).

Individuals depicted in ads, by reference to Medicaid

Results presented in Table 2 display the frequency of individuals and family structures appearing in ads. Considering the sample overall, most ad airings (71%) included depictions of people of color as a patient or potential plan enrollee and more than half included at least one depiction of an individual adult female or male (55.2% and 51.8%, respectively). Just over a quarter of all ads (25.5%) included children and fewer depicted a presumed family structure of two adults with a child (11.6%). These trends were similar among ad airings not mentioning Medicaid. Among content with any reference to Medicaid plans, fewer ads included an individual of color depicted as a patient: 51.7% of ads explicitly mentioning Medicaid and 64.7% of ads either explicitly or implicitly mentioning Medicaid included an individual of color depicted as a patient or plan enrollee. Fewer ads mentioning Medicaid included depictions of two individuals and a child (3.9% and 3.4% for both groupings, respectively) compared with ads not referencing Medicaid plans. Few ads overall included pregnant individuals (4.4%) and no ad airings explicitly mentioning Medicaid included this depiction. All differences between the non-Medicaid versus Medicaid categories were statistically significant, from χ^2 tests.

Individuals depicted in ads, by reference to Medicaid and by sponsor type

Table 3 reports the individuals and family structures depicted in the overall sample, as well as ads for non-Medicaid plans and Medicaid plans, stratifying by private and public ad sponsors. Privately sponsored ads for non-Medicaid plans included more depictions of two adults and a child, individual adult females and males, and individuals perceived to be in a couple than ads for Medicaid plans. Considering privately sponsored content for Medicaid plans—either explicitly referenced or explicitly and implicitly—there were more depictions of children and individual adult females with a child. Among publicly sponsored ads, non-Medicaid content included a greater percentage of children depicted (53.3%), as well as individual adult females and males (42.6% and 41.0%, respectively). Many of the individual and family structures only appeared in privately sponsored Medicaid content: there were no

TABLE 2 People depicted in health insurance advertisement airings, by Medicaid references in ads

	Overall sample ($N = 306,976$)	Non-Medicaid ads (253,095)	Explicit Medicaid (39,814)[b]	Explicit and implicit Medicaid (53,881)[c]
Variable				
Non-White individual depicted as a patient[a]	141,349 (71.0)	117,413 (72.4)	12,277 (51.7)	23,936 (64.7)
Adult female	169,485 (55.2)	151,591 (59.9)	14,225 (35.7)	17,894 (33.2)
Adult male	159,016 (51.8)	140,754 (55.6)	15,833 (39.8)	18,262 (33.9)
Child/children	78,145 (25.5)	64,241 (25.4)	8,168 (20.5)	13,904 (25.8)
Two adults and a child	35,666 (11.6)	33,863 (13.4)	1559 (3.9)	1803 (3.4)
Adult female and child	63,175 (20.6)	43,552 (17.2)	12,168 (30.6)	19,623 (36.4)
Adult male and child	29,028 (9.5)	27,599 (10.9)	1328 (3.3)	1429 (2.7)
Two individuals perceived to be in a relationship	54,656 (17.8)	52,796 (20.9)	1370 (3.4)	1860 (3.5)
Two individuals perceived to be in a nonheterosexual relationship[a]	953 (1.7)	48 (0.1)	905 (66.1)	905 (48.7)
Pregnant individual	13,361 (4.4)	10,047 (4.0)	0	3314 (6.2)
Older adult	66,138 (21.6)	60,073 (23.7)	3309 (8.3)	6065 (11.3)
Injured or disabled individual	5163 (1.7)	5158 (2.0)	0	5 (0.01)

Note: Percentages do not add up to 100, because there is overlap of populations depicted in ads and not all ads include people.

[a] These variables were asked only of relevant ads and reflect a smaller denominator (e.g., the LGBTQ couple variable was asked only of ads with a couple depicted.)

[b] All p testing the difference between ads explicitly focusing on Medicaid plans compared with ads for non-Medicaid plans were statistically significant ($p < 0.05$).

[c] All p testing the difference between ads explicitly or implicitly focusing on Medicaid plans compared with ads for non-Medicaid plans were statistically significant ($p < 0.05$).

depictions of an individual adult male with a child or individuals perceived to be in a couple in any publicly sponsored ad airings for Medicaid plans.

In Table 4, we describe the demographic characteristics for populations enrolled in Medicaid in 2018, as well as those enrolled in a non-Medicaid private health insurance plan, without insurance, or enrolled in Medicare. More than half of the individuals enrolled in Medicaid (50.3%) were ages 0–18 years. Among individuals enrolled in non-Medicaid private plans, the majority (66.3%) were adults ages 19–64 years. This was also true of individuals without insurance: 85.8% were ages 19–64 years. Females represent a larger proportion of Medicaid enrollees (55.7% compared with 44.3% identifying as male) and this trend is true of those enrolled in non-Medicaid private plans too. Looking at available racial data, the proportion of Medicaid enrollees who do not identify as white is greater than that among non-Medicaid private health insurance plan enrollees. Among Medicaid enrollees, close to a third identify as Hispanic (32.1%); just over 10% (13.1%) of individuals in non-Medicaid private plans identify as Hispanic. Close to one-fifth of Medicaid enrollees identify as Black, non-Hispanic; half as many are enrolled in non-Medicaid private plans (10.1% of enrollees in these plans identify as Black).

TABLE 3 People depicted in health insurance advertisement airings, by reference to Medicaid and sponsor type

			Private sponsor ($N = 239{,}400$)			Public sponsor ($N = 67{,}576$)		
	Private sponsor ($N = 239{,}400$)	Public sponsor ($N = 67{,}576$)	Non- Medicaid ($N = 190{,}095$)	Explicit Medicaid ($N = 35{,}965$)	Explicit and implicit Medicaid ($n = 49{,}305$)	Non-Medicaid ($N = 63{,}000$)	Explicit Medicaid ($N = 3849$)	Explicit and implicit ($N = 4576$)
Variable								
Non-White individual depicted as a patient[a]	120,727 (68.1)	20,622 (94.7)	98,254 (69.3)	11,339 (49.7)	22,473 (63.2)	19,159 (94.4)	938 (100.0)	1463 (100.0)
Adult female	142,394 (59.5)	27,091 (40.1)	124,737 (65.6)	14,124 (39.3)	17,657 (35.8)	26,854 (42.6)	101 (2.6)	237 (5.2)
Adult male	132,835 (55.5)	26,181 (38.7)	114,916 (60.5)	15,796 (43.9)	17,919 (36.3)	25,838 (41.0)	37 (1.0)	343 (7.5)
Child/children	43,374 (18.1)	34,771 (51.5)	30,673 (16.1)	7239 (20.1)	12,701 (25.8)	33,568 (53.3)	929 (24.1)	1203 (26.3)
Two adults and a child	31,099 (13.0)	4567 (6.8)	29,421 (15.5)	1559 (4.3)	1678 (3.4)	4442 (7.1)	0 (0.0)	125 (2.7)
Adult female and child	59,008 (24.7)	4167 (6.2)	40,230 (21.2)	11,323 (31.5)	18,778 (38.1)	3322 (5.3)	845 (22.0)	845 (18.5)
Adult male and child	28,558 (11.9)	470 (0.7)	27,129 (14.3)	1328 (3.7)	1429 (2.9)	470 (0.8)	0 (0.0)	0 (0.0)
Two individuals perceived to be in a relationship	49,927 (20.9)	4729 (7.0)	48,067 (25.3)	1370 (3.8)	1860 (3.8)	4729 (7.5)	0 (0.0)	0 (0.0)
Two individuals perceived to be in a nonheterosexual relationship[a]	909 (1.8)	44 (0.9)	4 (0.01)	905 (66.1)	905 (48.7)	44 (0.9)	0 (0.0)	0 (0.0)
Pregnant individual	9765 (4.1)	3596 (5.3)	6456 (3.4)	0 (0.0)	3309 (6.7)	3591 (5.7)	0 (0.0)	5 (0.1)
Older adult	64,977 (27.1)	1161 (1.7)	58,936 (31.0)	3309 (9.2)	6041 (12.3)	1137 (1.8)	0 (0.0)	24 (0.5)
Injured or disabled individual	4768 (2.0)	395 (0.6)	4768 (2.5)	0 (0.0)	0 (0.0)	390 (0.6)	0 (0.0)	5 (0.1)

Note: Statistical tests between Medicaid-related ads were calculated using logistic regression with non-Medicaid ads as the reference group, controlling for the length of an ad. All p for tests of difference in characteristics by Medicaid versus non-Medicaid were statistically significant ($p < 0.05$).

[a] These variables were asked only of relevant ads and reflect a smaller denominator (e.g., the LGBTQ couple variable was asked only of ads with a couple depicted).

TABLE 4 Characteristics of noninstitutionalized US individuals by health coverage, 2018

	Total	Medicaid or CHIP (% of total)	Private (% of total)	Uninsured (% of total)	Medicare (% of total)
Age (years)					
0–18	24	50.3	21.2	13.3	0.7
19–64	60	42.4	66.3	85.8	13.8
65+	16	7.3	12.5	0.9	85.5
Gender					
Male	48.9	44.3	49	55.1	45.6
Female	51.1	55.7	51	44.9	54.4
Race					
Hispanic	18.4	32.1	13.1	37.1	9.3
White, non-Hispanic	61.3	38.9	68.7	41.9	75
Black, non-Hispanic	12.6	21.2	10.1	14.1	10.3
Other non-White, non-Hispanic	7.7	7.8	8.1	7	5.4

Note: MACPAC, analysis of NHIS data.

Abbreviations: MACPAC, Medicaid and CHIP Payment Access Commission; NHIS, National Health Interview Survey.

DISCUSSION

Our results provide evidence that the individuals depicted in advertisements for Medicaid plans differ from those depicted in advertisements for non-Medicaid plans and depictions in Medicaid ads do not reflect populations proportionate to those currently enrolled in the program. Advertisements for Medicaid plans included a greater proportion of single adult females with children and a smaller proportion of two individuals with a child; the latter could be perceived as individuals who parent together and the former, a single mother. These differences could suggest to viewers, which may include policymakers, that the populations who enroll in a Medicaid plan differ from those who enroll in non-Medicaid plans in ways other than eligibility criteria of financial need or health conditions. These depictions may also deter an eligible individual from enrolling in Medicaid if they perceive the program serves select populations, such as single mothers.

Advertisements for Medicaid plans also depicted populations that differ from those currently enrolled in the program and who are eligible for Medicaid but remain uninsured. As so, ads could contribute to the social construction of a target population for Medicaid that is different from the populations enrolling in or who could benefit from public policy benefits. Although children represent the largest group of individuals enrolled in Medicaid (50.3%) and more than 40% (40.1%) of the uninsured who are eligible for coverage, they were depicted in just over one-fifth of any ads explicitly mentioning Medicaid plans. Pregnant people did not appear in any ads for Medicaid plans, yet Medicaid covered 43% of all births in 2018 (MACPAC, 2020). Individuals perceived as male were more commonly included than those perceived as female, yet a larger proportion of Medicaid enrollees identify as female. If you consider health insurance plans as products, it is curious that, in the case of ads for Medicaid plans, the people who were visualized as users of the product differ from those who use the product. Ads for Medicaid plans did not disproportionately include groups commonly perceived as poor and in need of government resources (e.g., Black mothers; see, e.g., Gilens, 1999); this may be an effort to counter stereotypes and expand ideas of who uses and could benefit from the program. This could be an intentional or unintentional choice by those who create advertising content. Additional research is needed to illuminate the process of developing health insurance advertising, including the goals of insurers in promoting their products and what, if any, influence they believe they have on policymaking.

Given the observed differences in the individuals and family structures depicted in publicly and privately sponsored content, it is worth discussing the role of the private sector in health insurance advertising in 2018. The majority of all ads in our sample were sponsored by private entities, which included insurance companies, and more than 90% of ads for Medicaid plans were privately sponsored. In the absence of federal investment in health insurance advertising, the private sector assumed a larger role in 2018 than in prior years (Barry et al., 2018). The submerged state, or the "…conglomeration of federal social policies that incentivize and subsidize activities engaged in by private actors and individuals" and that "…have shrouded the state's role, making it largely invisible to most ordinary citizens, even beneficiaries of existing policies," is relevant to consider in light of the private sector filling a void left by reduced federal spending (Mettler, 2010; p.804). Advertisements for Medicaid-managed care plans comprise the bulk of privately-sponsored content for Medicaid plans in our sample and these offer one example of the submerged state. State Medicaid programs contract with private insurance companies to deliver health benefits to Medicaid enrollees based on a per-member, per-month payment (Centers for Medicare & Medicaid Services, 2020). State programs incentivize private insurers to offer a federal social policy benefit and many enrollees are unaware they are receiving a publicly subsidized benefit, limiting their own ability to recognize the personal relevance of public policy (Tallevi, 2018). This has implications for the perceptions current program beneficiaries have of who could or should benefit from health care policies focused on expanding access to Medicaid and, as a result, beneficiaries may be less inclined to add their voices to debates about key health insurance expansions that may benefit them or people within their communities (Michener, 2018).

LIMITATIONS

These findings should be considered with key limitations in mind. First, we included a broad variable capturing individuals of color in ads; as so, we are unable to make specific inferences about the racial and ethnic characteristics of individuals depicted in Medicaid ads. This limits our ability to add to the evidence of how media disproportionately and systematically depict individuals who identify with a specific racial or ethnic group (e.g., Black women) in public policy or as welfare beneficiaries. Second, there are limitations with our sample: these data include ad airings on broadcast television and national cable, but do not include ad airings on local cable. Our focus was also on television advertisements and we did not analyze the content of health insurance ads airing on other platforms, such as digital ads displayed on social media, radio spots, or those featured in print or on billboards, but these depictions may also contribute to social constructions of insurance beneficiaries. We also did not code all the ads from the three largest private insurance companies in our sample and instead coded what we believe was a representative sample of ads from these insurers. This limits our ability to speak to all depictions in privately sponsored TV ads that viewers may have been exposed to. Further, this study does not assess the impacts to consumers of exposure to the content in advertising. We cannot and do not claim that exposure to specific populations in ads definitively shapes ideas individuals hold of the populations who benefit or could benefit from the Medicaid program. People are exposed to a variety of information that may shape their beliefs and values about who deserves access to health care; we suggest that health insurance advertising is one of many influences on these beliefs and values. There is a need for additional research to explore whether and how health insurance advertising and other forms of media affect attitudes and beliefs about health insurance and if individuals' ideas of who should receive public policy benefits differs as a result of exposure to content.

CONCLUSIONS

The Medicaid program is the single largest source of health coverage in the United States (Centers for Medicare & Medicaid Services, 2021a) and its role as a source of health coverage for those with fewer resources may only grow. At the time of this writing, individuals in the United States are encumbered with the coronavirus 2019 pandemic and the resulting economic shocks have left many without employment and employer-sponsored health insurance. In the Spring of 2021, the Biden administration allocated significant resources for health insurance outreach and enrollment support (The White House, 2022). Medicaid, which was a focus of the administration's efforts, may be one option for those in need of health insurance, and increasing public knowledge of and support for the program is critical to advance lasting federal- and state-level action that will expand program eligibility and allow more to benefit (Park et al., 2021).

Television advertisements for Medicaid plans offer one way to inform public opinion on the need for policy change to expand access to Medicaid. Our results provide evidence that the populations depicted in ads for Medicaid plans do not reflect the populations currently enrolled or who may be eligible for Medicaid benefits. Additional research is needed to explore the content of recent health insurance advertising, especially given the Biden administration's focus on increasing health insurance outreach and enrollment (Keith, 2021), and to understand the populations depicted, the messages conveyed, and the opportunity for ad content to bolster public support for policy reform.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

This study did not involve human subjects and was not subject to requirements of applicable Institutional Review Boards.

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APPENDIX

TABLE A1 Intercoder reliability values and variable definitions

Variable	Kappa	Definition
Language spoken		
English	0.00	Content is primarily delivered in English.
Spanish	0.00	Content is primarily delivered in Spanish.
Sponsor type		
Federal	0.84	Ad is either Medicare or CHIP.
State	0.84	Ads focus on enrollment in individual health insurance plans from a State based Marketplace or traditional Medicaid or CHIP. There may be also be mention of small business insurance run by the state.
Private	0.84	Any ad for an insurance company (can be for-profit or non-profit), insurance agency, broker, health care system, or managed care organization.
Private ad sponsor type		
Insurance company	0.75	Any seller of an insurance plan including for-profit companies and nonprofit organizations.
Insurance company and health system	0.75	Includes organizations like Kaiser Permanente, UPMC, etc. that offer insurance and operate health care facilities.
Insurance broker	0.75	Includes ads for a service that will connect a consumer to insurance. The company does not actually offer insurance. These may be individual brokers or agents, or they may be a company that matches consumers to a variety of plans from other companies.
Ad objective		
Enrollment	0.70	Ads explicitly mention, audibly or visually, enrolling in a health insurance plan and may provide details about the plan(s).
Branding	0.70	Ads provide the insurer name and potentially their market (e.g., Blue Cross Blue Shield of Illinois) but do not provide any appeal to enroll or any explicit information about plans.
Branding/Public service announcement	0.70	Ads provide information to the viewer about issues or resources broader than the health plan. Examples include information presented in celebration of or to raise awareness about a particular cause (e.g., heart health). Message of a Branding/PSA ad will primarily focus on an issue or resource rather than on the insurer or the plan(s) they offer.
People depictions		
Child/children	0.80	The ad includes an individual 18 years old or younger.
Two individuals and a child	0.68	The ad includes two individuals with a child younger than 18, leading the viewer to believe they are parents. This includes LGTBQ parents (prompt to select yes if so). This includes grandparents (prompt to select yes if so).

TABLE A1 (Continued)

Variable	Kappa	Definition
Individual adult female and child/children	0.73	The ad depicts a single adult female together with a child or children. Ads including an adult female and a child in separate parts of the ad would not be coded here unless they are also depicted in the same scene. If the same child is depicted earlier or later alone, but is also shown in the company of the parent (or vice versa) only count the paired structure – do not also double-count the child as a child alone and the parent alone.
Individual adult male and child/children.	0.64	The ad depicts a single adult male together with a child or children. Ads including an adult male and a child in separate parts of the ad would not be coded here, unless they are also depicted in the same scene. If the same child is depicted earlier or later alone, but is also shown in the company of the parent (or vice versa) only count the paired structure – do not also double-count the child as a child alone and the parent alone.
Adult female	0.74	The ad depicts an adult female, understood to be between the ages of 18 and 65.
Adult male	0.83	The ad depicts an adult male, understood to be between the ages of 18 and 65.
Two individuals perceived to be in a relationship	0.73	The ad includes people perceived to be in a romantic relationship. An example would two individuals walking together holding hands. A couple with a child would not be coded here, but as two parents and a child. This code includes LGTBQ couples.
Pregnant individuals	0.90	The ad depicts an individual or group of individuals who are visibly pregnant.
Older adults	0.84	The ad depicts individuals understood to be over the age of 65 or mentioned as seniors or older adults.
Injured or disabled individual	0.65	The ad depicts an individual with an injury or disability. Example include individuals on crutches or in a wheel chair.
Non-White individual depicted as a patient	0.78	A non-White individual depicted as a patient, including pictured with a health care provider or in a health care setting.

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Identification and prioritization of indicators of hospital bed allocation in Iran

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Abstract

The distribution of hospital beds can be used as an indicator to assess the distribution of health services. This study aimed to determine and prioritize indicators of hospital bed allocation in Iran. In the first phase of the study, we used a scoping review to identify criteria affecting hospital bed allocation. Then, we applied an expert panel and the Delphi method to localize the criteria. Finally, we carried out Analytic Network Process method based on Decision Making Trial and Evaluation Laboratory technique (DANP), to determine the weight and importance of indicators and to evaluate the causal relationship between them. Based on the scoping review, we identified 75 criteria that influence bed allocation. In 2 Delphi cycles, 28 criteria were selected and included in the DANP phase. The population, the presence of a reference hospital in the region, the type of hospital, the common diseases in the region, and the presence of home care services were the variables that had the most interaction with other variables. The variable of home care services was at the highest level of the causal chain. Bed occupancy rate, average length of stay, waiting list, as well as type and level of the hospital had the highest priority in the allocation of hospital beds. Furthermore, given the importance of home care services, policies should be adopted to expand these services nationwide. The indicators identified in this study will be useful for the development of policies aimed at an equitable allocation of hospital beds.

KEYWORDS

bed, criteria, distribution, hospital, Iran, resource allocation

Key Points

- The authors identified 75 criteria affecting the distribution of beds through scoping review.

- The criteria with the highest level of interaction were population, existence of a reference hospital in the area, the type of hospital, common diseases in the area, and existence of home care services.
- The variable of home care services was at the highest level of the causal chain.

INTRODUCTION

Today, health care reforms seek to provide access to universal and equitable health care in countries. However, inequality in the geographical distribution of health care resources has limited the sustainable health care development, health outcomes, and economic efficiency (Laokri et al., 2018; Ursulica, 2016; T. Zhang et al., 2017). Inequalities in the distribution of medical facilities and equipment are mainly seen in government hospitals in many countries (Tofighi et al., 2010). Meanwhile, the increase in the number of known treatable diseases and the high cost of new equipment, technologies, and treatment methods, as well as growing public expectations on the one hand and the limited available resources on the other, underline careful decision in allocating resources (Aghazadeh, 2002).

As healthcare costs rise, policymakers are focusing on hospital services as the most expensive sector of health systems. Hospital services often account for half of total health sector costs. Therefore, efforts should be made to increase efficiency, reduce costs, and utilize the potential capacity of inpatient centers (Panis et al., 2003).

Nowadays, researchers and policymakers are paying increasing attention to the distribution of health resources such as beds, physicians, and equipment as indicators of public health (Asl et al., 2015). However, the heterogeneous and inappropriate allocation of these expensive resources has resulted in a waste of resources in health systems (Miao et al., 2007). Of these resources, the number of hospital beds is the most important indicator for estimating the ability of a given geographic area to provide medical services and, therefore, as a measure of the allocation of other necessary resources, including human resources, medical equipment, and support facilities (Aghamohamadi, Jahangiri, Hajinabi, Asl, et al., 2018). In this regard, the distribution of hospital beds can be used as one of the indicators to evaluate the distribution of health services (Lai et al., 2008). Therefore, considering the importance of allocating hospital resources based on the number of beds in each ward, the distribution of beds is one of the most critical aspects in hospital management (McClain, 1978). Studies suggest several criteria for bed allocation, including population size, age and sex structure of the population (Aghamohamadi, Jahangiri, Hajinabi, Asl, et al., 2018; Nishiura et al., 2004), hospital bed occupancy rate, number of staff (Ordu et al., 2020), demand for services, the effect of home care packages (Needham et al., 2003), the average length of stay (Farrokhyar et al., 2019), and type of diseases (Goldacre & Harris, 1980).

Improper bed distribution presents hospitals with many challenges and can lead to limited access to health services and an imbalance in the distribution of nurses, physicians, and medical equipment (Ward, 2004). Overcrowding of hospital wards and lack of adequate beds lead to reduced staff-to-patient ratio and can potentially reduce patient safety and satisfaction, and may increase the risk of job burnout due to increased workload (Holm et al., 2013). A study in Norway revealed that patient overcrowding and bed shortages reduce both the quality of care and the time spent with each patient, increasing the risk of medical malpractice, accidents, and infections (Larsen et al., 2000).

The development of hospital beds has different dimensions. It is therefore necessary to identify the factors influencing the distribution of hospital beds and determine their importance, to provide a comprehensive view of the issue. This perspective would be useful for developing priority-based plans and avoiding the waste of vital resources through more effective bed allocation policies. Considering these factors by health policymakers and managers for the allocation of inpatient beds increases the efficiency of limited and expensive of health sector resources.

In Iran, despite many developments in the country's healthcare system, there are still many challenges related to inequality in the distribution of resources (Shamsi et al., 2014). Many studies have been conducted nationwide, which show that the distribution of hospital beds is unfair in some provinces (Mojiri & Ahmadi, 2022; Mosadeghrad, Dehanavi, et al., 2020). The study by Mosadeghrad, Dehanavi, et al. (2020) showed that hospital beds are mainly concentrated in provincial centers and not fairly distributed in other cities. Furthermore, the mentioned study showed that most of the hospital beds were located in central Iran and near Tehran province, so that about 22% of the hospital beds were concentrated in the country's capital (Mosadeghrad, Janbabaei, et al., 2020). Despite the importance of this issue in the country, the criteria used for the allocation of beds have been examined in few studies and limited indicators have been taken into consideration (Abbasi et al., 2018; Aghamohamadi, Jahangiri, Hajinabi, Masoudi, et al., 2018; Haghdoost et al., 2018). It is therefore undeniable to modify the process of allocating hospital beds according to precise and comprehensive criteria.

Accordingly, this study aimed to identify bed allocation indicators in Iran and to prioritize them using Analytic Network Process (ANP) method based on Decision Making Trial and Evaluation Laboratory technique (DANP). DANP, as a multi-criteria decision-making method, can help increase the transparency of the resource allocation process and ensure its efficiency. Therefore, the findings of this study can be used as comprehensive evidence for the country's bed allocation policy.

METHODS

Study setting

This study was performed in four steps, including scoping review, expert panel, Delphi method, and ANP approach based on DANP technique. The main objective of this study was to determine the local indicators for the allocation of beds in the country and to evaluate the weight, importance, and relationship between the indicators.

The first phase of the study was aimed to identify the factors affecting the distribution of beds in a region through a scoping review. The second and third phases were carried out to adapt the indicators to local conditions using expert panels and the Delphi method. The fourth phase was conducted to determine the weight and importance of the indicators and to assess the causal relationship between them for policy objectives.

Scoping review

In this phase, the factors influencing the distribution of hospital beds were determined using the scoping method. The scoping revision method allows for the evaluation of studies of different designs and could therefore provide a comprehensive perspective regarding the key determinants of hospital bed distribution. In this study, scoping review was performed using a five-step approach proposed by Arksey and O'Malley (2005), as follows.

Determining research question

The aim of the review study was to answer the question: what are the factors that influence the distribution of hospital beds?

Searching and extracting studies

We went through four steps to find relevant articles. (1) First, before conducting a comprehensive review, we searched different scientific databases to make sure there was no similar review. (2) The search terms have been identified and the search strategy developed. We extracted relevant keywords related to the concept using the Medical Subject Heading database. Then, depending on each database, the appropriate search strategy was developed. The search terms categorized into two groups. The search terms in each group were combined with the logical operator "OR" and the groups were combined using the logical operator "AND." We carried out the search in three fields, including title, abstract, and keywords. (3) We searched six main databases, including PubMed, Scopus, Web of Science, ProQuest, ScienceDirect, and Embase. Accordingly, related articles were retrieved based on the study question. (4) Other publications were searched on the websites of scientific associations, the World Health Organization and the World Bank. The search strategy of the study is shown in Table 1. We used EndNote software to manage references.

Selection of related studies

Because of translation limitations, only studies with full text in English were included. No time limit was considered for the inclusion of articles in the study.

To formulate the main question of the review and also at all stages of the appraisal and inclusion of the articles, the three main criteria of the scoping review studies were applied. In this regard, hospital beds, factors that influence the distribution of beds, and the different geographical regions in all countries of the world were considered as Population, Concept, and Context, respectively.

A three-step appraisal process was performed to select the relevant studies. Using the search strategy, we retrieved 82,964 reports. First, the titles were scanned and after removing duplicates deletion, 2526 articles entered the evaluation phase. Next, abstracts of the selected articles were reviewed by two researchers and the articles that did not meet the research objective were removed. Finally, 26 articles were selected for the final analysis. We used the "Critical Appraisal Skills Programme" (CASP, 2019) checklists and the "Strengthening the Reporting of Observational Studies in Epidemiology" (Von Elm et al., 2007) tools to evaluate the quality of the articles. At all stages of the assessment, disagreements were reviewed by a third researcher.

Data charting

In the fourth phase of the scoping review, two researchers jointly extracted the content and tabulated them. To become more familiar with the reports, each article was read at least

TABLE 1 Search strategy of the review study

Searching databases	PubMed, Scopus, Web of Science, ProQuest, ScienceDirect, Embase
Limitations	Language: Articles with full text in English Time: Unlimited
Search strategy	#1 AND #2
#1	"Hospital bed" OR Bed OR "Inpatient bed" OR "In-patient bed"
#2	Distribution OR Allocation

twice by each researcher. In this phase, content was extracted from the articles according to the research question. The extracted data were summarized in a table.

Collating and summarizing the data

In the final phase of the scoping review, two researchers jointly proceeded to extract the criteria that influence the allocation of hospital beds. To systematize the data, we used a descriptive representation of the content based on conceptual relevance (Arksey & O'Malley, 2005). The information extracted from the studies was used to develop a map of evidence on the factors affecting distribution of hospital beds.

Expert panel

At this stage, an expert panel meeting was held with the participation of six experts in the field of health services management. As some of the criteria obtained from the scoping review phase were repetitive, overlapping, or had the same results, they had to be revised. Therefore, the criteria were provided to the experts in the form of a list and they were asked to adapt the list according to the context of the country.

All relevant ethical considerations were considered for conducting the panel. All participants were informed about the study objectives and filled out an informed consent form. Participants were also assured of confidentiality of information and anonymous transmission of study results. We applied a purposeful sampling method to select the participants. Inclusion criteria were considered to be willingness to participate in the study and having relevant research activities.

Delphi

We used a two-cycle Delphi method to adapt hospital bed allocation the indicators to local conditions. In this study, the Delphi method was used as a consensus building technique. We applied a purposeful sampling method to select the experts. Participants included individuals with research, teaching, and managerial experience in healthcare system. Characteristics of Delphi participants are listed in Table 2.

We used an electronic Delphi method to collect the data, because this method facilitates access to experts from different locations and guarantees the anonymity of the participants. Therefore, an online questionnaire was designed and provided to the experts. The questionnaire contained demographic information and key questions on the criteria influencing bed distribution. Participants answered 40 questions in the form of yes or no.

Forty-four and 38 participants, respectively, took part in the first and second Delphi rounds. The participants were experts in the fields of health services management, health policy, health economics, and various medical specialties. In both Delphi cycles, the level of agreement for each criterion was assumed to be 70%. In the first cycle of Delphi, criteria with a score of less than 50% agreement were eliminated, and those with a score between 50% and 70% agreement were considered for the second round. To reach a consensus, the experts were invited to participate in the second round.

DEMATEL-based on ANP (DANP)

Resource allocation decisions are generally based on limited criteria. At the macro level, the allocation of health resources is usually based on the historical patterns and the bargaining

TABLE 2 Demographic characteristics of Delphi participants

Characteristics	Number (%)
Gender	
Male	28(63.6)
Female	16(36.4)
Level of education	
Doctor of Philosophy	42(95.5)
Master of science	1(2.3)
Bachelor	1(2.3)
Field	
Health management and economics	21(47.7)
Health policy	3(6.8)
Specialist physician	8(18.1)
General physician	5(11.3)
Pharmacology	3(6.8)
Other fields	4(9.0)

power of different stakeholders or different regional authorities. Therefore, the use of multi-criteria decision-making methods can help increase transparency in the resource allocation process and ensure its effectiveness (Nouri et al., 2020).

In this phase of the study, factors influencing bed allocation were examined for causal relationships and their relative importance. For this purpose, the DANP technique was used as one of the multi-criteria decision-making methods. The DEMATEL technique is used to create Influential Network Relations Map (INRM), but cannot determine the weight of individual criteria, where the ANP method is useful. In cases where the evaluation criteria are varied and complex, the ANP method can determine the priority of the criteria and their relationships (Pai, 2014). The DANP method takes the output of DEMATEL and calculates the weights of the effective variables using the basic concept of the network analysis process (ANP) (Saaty, 1996). DANP is a practical tool that can be used to identify the interrelationships between criteria and sub-criteria (Wang & Tzeng, 2012; Yang & Tzeng, 2011).

Data collection

We developed a 28 in 28 DEMATEL matrix using criteria obtained through the Delphi method. The matrix was completed by 15 experts in the field of health services management. A purposeful sampling method was used to select the experts. Relevant research and teaching experience were considered as inclusion criteria. The experts determined the effect of row variables on column variables based on the scoring method (no effect = zero, very low effect = 1, low effect = 2, high effect = 3, very high effect = 4).

Steps of the DANP method

The method steps are as follows: Büyüközkan and Güleryüz (2016); Hsu et al. (2012); Supeekit et al. (2016).

Step 1: Creating a direct relationship matrix (*A*): This matrix consists of a simple average of respondents' opinions, called matrix *A* (Additional File 1).

$$a_{ij} = \frac{1}{k}\sum_{k=1}^{k} p_{ij}. \tag{1}$$

Step 2: Calculating the normalized direct relation matrix (*D*): Matrix *D* is obtained by normalizing matrix *A*.

$$D = [d_{ij}]_{n\times n}. \tag{2}$$

Matrix *D* is calculated as follows:

$$D = S \times A, \quad S > 0, \tag{3}$$

$$[d_{ij}]_{n\times n} = S \times \quad [a_{ij}]_{n\times n}, S > 0, i, j \quad \in \quad \{1, 2, ..., n\}, \tag{4}$$

$$S = \text{Min} \quad \left[\frac{1}{\underset{1 \le i \le n}{\max} \sum_{j=1}^{n} a_{ij}}, \frac{1}{\underset{1 \le j \le n}{\max} \sum_{i=1}^{n} a_{ij}} \right]. \tag{5}$$

Step 3: Extracting the complete matrix of direct and indirect effect (*T*): This matrix is calculated from the following equation:

$$T = D(I - D)^{-1}. \tag{6}$$

If the sums of rows and columns in the matrix *T* are represented by the vectors *r* and *d*, respectively, we have:

$$T = [t_{ij}]_{n\times n}, \tag{7}$$

$$R = [r_i]_{n\times 1} = \left(\sum_{j=1}^{n} t_{ij}\right)_{n\times 1}, \tag{8}$$

$$D = [d_i]_{1\times n} = \left(\sum_{i=1}^{n} t_{ij}\right)_{1\times n}. \tag{9}$$

The vector r_i represents the sum of the cells of row *i* in the matrix *T* and the vector d_i represents the sum of the cells of column *i* in the same matrix. The parameter $r + d$ represents the degree of interaction that one criterion has with other criteria and determines its degree of importance. Moreover, the parameter $r - d$ represents the influence degree of one criterion. The positive value of $r - d$ indicates that the criterion have influence on others and the negative value represents that the criterion is under influence of other criteria.

Step 4: Adjusting the threshold value and draw the effect-communication map: To reduce the complexity of the effect-communication map, decision makers should set a threshold value for the impact levels. Accordingly, only elements whose effect level in the matrix *T* is greater than the threshold value can be selected and displayed in the graph. The threshold value was obtained from the mean score of the elements of the total effect matrix and then the INRM was drawn.

Step 5: Reliability: In this step, the convergence of expert opinions is examined. In this regard, the following equation is used, the value of which should be compared with 0.05.

$$\frac{1}{n(n-1)}\sum_{i=1}^{n}\sum_{j=1}^{n}\frac{\left|g_c^{ijp} - g^{ij(p-1)}\right|}{g_c^{ijp}} \times 100\%. \tag{10}$$

Step 6: Calculating the internal dependency matrix: The sum of each column in the total relation matrix with the normalization method is equal to 1. ANP is commonly used to create a weightless super matrix to determine the weight of the criteria. The ANP questionnaire is difficult to understand. Instead, the NRM and the total effect matrix (matrix *T*) are derived from DEMATEL to reflect the interrelationships between the factors. The combined method can be described in the following steps.

Step 1: Comparing the criteria throughout the system to form a super matrix. The general shape of the super matrix can be described as follows:

$$W = \begin{array}{cc} & \begin{array}{cccc} C_1 & C_2 & & C_n \\ e_{11}\cdots e_{1m_1} & e_{21}\cdots e_{2m_2} & \cdots\cdots & e_{n1}\cdots e_{nm_n} \end{array} \\ \begin{array}{cc} C_1 & \begin{array}{c} e_{11} \\ e_{12} \\ \vdots \\ e_{1m_1} \end{array} \\ C_2 & \begin{array}{c} e_{21} \\ e_{22} \\ \vdots \\ e_{2m_2} \end{array} \\ \vdots & \vdots \\ C_n & \begin{array}{c} e_{n1} \\ e_{n2} \\ \vdots \\ e_{nm_n} \end{array} \end{array} & \left[\begin{array}{cccc} W_{11} & W_{12} & \cdots & W_{1n} \\ W_{12} & W_{22} & \cdots & W_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ W_{n1} & W_{n2} & \cdots & W_{nn} \end{array}\right] \end{array}$$

In such a way that *Cn* represents cluster *n*, *enm* represents the element m^{th} in cluster *n*, and *Wij* represents the main eigenvector of the effect of elements in cluster *j* compared with cluster i^{th}. In addition, if cluster *j* has no effect, so *Wij* = [0].

Step 2: By multiplying the normalized matrix, which is derived from the DEMATEL method, the weighted super matrix is obtained (Additional File 2). Using the matrix *T* and the threshold value *p* from DEMATEL, we created a new matrix. The values of the clusters in the *T* matrix are set to zero if their values are less than *p*. The new matrix with *p*-cut is called the total effect matrix *T* alpha.

$$T_\alpha = \begin{bmatrix} t_{11}^{\alpha} & \cdots & t_{1j}^{\alpha} & \cdots & t_{1n}^{\alpha} \\ \vdots & & \vdots & & \vdots \\ t_{i1}^{\alpha} & \cdots & t_{ij}^{\alpha} & \cdots & t_{in}^{\alpha} \\ \vdots & & \vdots & & \vdots \\ t_{n1}^{\alpha} & \cdots & t_{nj}^{\alpha} & \cdots & t_{nn}^{\alpha} \end{bmatrix} \longrightarrow d_1 = \sum_{j=1}^{n} t_{1j}^{\alpha}$$

The matrix *T* alpha should be normalized by division using the following formula

$$d_i = \sum_{j=1}^{n} t_{1j}^{\alpha}. \tag{11}$$

The normalized total effect matrix T_s can be obtained by the following equation

$$T_s = \begin{bmatrix} t_{11}^{\alpha}/d_1 & \cdots & t_{1j}^{\alpha}/d_1 & \cdots & t_{1n}^{\alpha}/d_1 \\ \vdots & & \vdots & & \vdots \\ t_{i1}^{\alpha}/d_2 & \cdots & t_{ij}^{\alpha}/d_2 & \cdots & t_{in}^{\alpha}/d_2 \\ \vdots & & \vdots & & \vdots \\ t_{n1}^{\alpha}/d_3 & \cdots & t_{nj}^{\alpha}/d_3 & \cdots & t_{nn}^{\alpha}/d_3 \end{bmatrix} = \begin{bmatrix} t_{11}^{s} & \cdots & t_{1j}^{s} & \cdots & t_{1n}^{s} \\ \vdots & & \vdots & & \vdots \\ t_{i1}^{s} & \cdots & t_{ij}^{s} & \cdots & t_{in}^{s} \\ \vdots & & \vdots & & \vdots \\ t_{n1}^{s} & \cdots & t_{nj}^{s} & \cdots & t_{nn}^{s} \end{bmatrix}$$

Matrix T_s and weightless super matrix W calculate the weighted super matrix W_w using Equation (11). Equation (11) shows the effect level values as the basis of normalization for the determination of the weighted super matrix

$$W_w = \begin{bmatrix} t_{11}^{s} \times W_{11} & t_{21}^{s} \times W_{12} & \cdots & \cdots & t_{n1}^{s} \times W_{1n} \\ t_{12}^{s} \times W_{21} & t_{22}^{s} \times W_{22} & \vdots & & \vdots \\ \vdots & \cdots & t_{ij}^{s} \times W_{ij} & \cdots & t_{ni}^{s} \times W_{in} \\ \vdots & & \vdots & & \vdots \\ t_{1n}^{s} \times W_{n1} & t_{2n}^{s} W_{n2} & \cdots & \cdots & t_{nn}^{s} \times W_{nn} \end{bmatrix}$$

Step 3: We limit the weighted super matrix by rising it to a perfectly large exponent k, as in Equation (12). This step continued until the super matrix converges and becomes a long-term stable super matrix to receive ANP weights

$$\lim_{k \to \infty} W_w^k. \tag{12}$$

Total weights are calculated using the above steps to obtain a stable super matrix.

Findings

In the review phase, we retrieved 82,964 reports and, finally, 26 articles were included in the analysis (Figure 1).

Most of the articles were published in the European countries before 2000. A large number of articles were done using a qualitative method. Table 3 shows the characteristics of the included studies and their corresponding references.

In the review study, we identified 75 criteria for the distribution of hospital beds (Table 4). Population size (six studies), average length of stay (five studies), and bed occupancy rate (five studies) were the most frequent criteria.

The expert panel phase resulted in the development of 6 main topics and 39 subtopics. These criteria were evaluated in the next phase using the Delphi method (Table 5).

In the first round of the Delphi, 24 criteria were selected with a score higher than 70%. The second round involved 38 experts who received a questionnaire with 12 criteria. In this round, four criteria were selected with a score above 70%. The result of 2 Delphi cycles was the extraction of 28 criteria affecting the allocation of hospital beds (Figure 2). At this stage, the socioeconomic dimension of the society was eliminated due to disagreements in the two cycles.

In the last phase, the importance of the criteria obtained through the DANP method. The results showed that based on the $r+d$ score, the population, the presence of a referral hospital in the region, the type of hospital (general/specialized), the type of common diseases in the region, and the existence of home care services, respectively, had the greatest interaction with other variables, and therefore have the most importance. The $r-d$

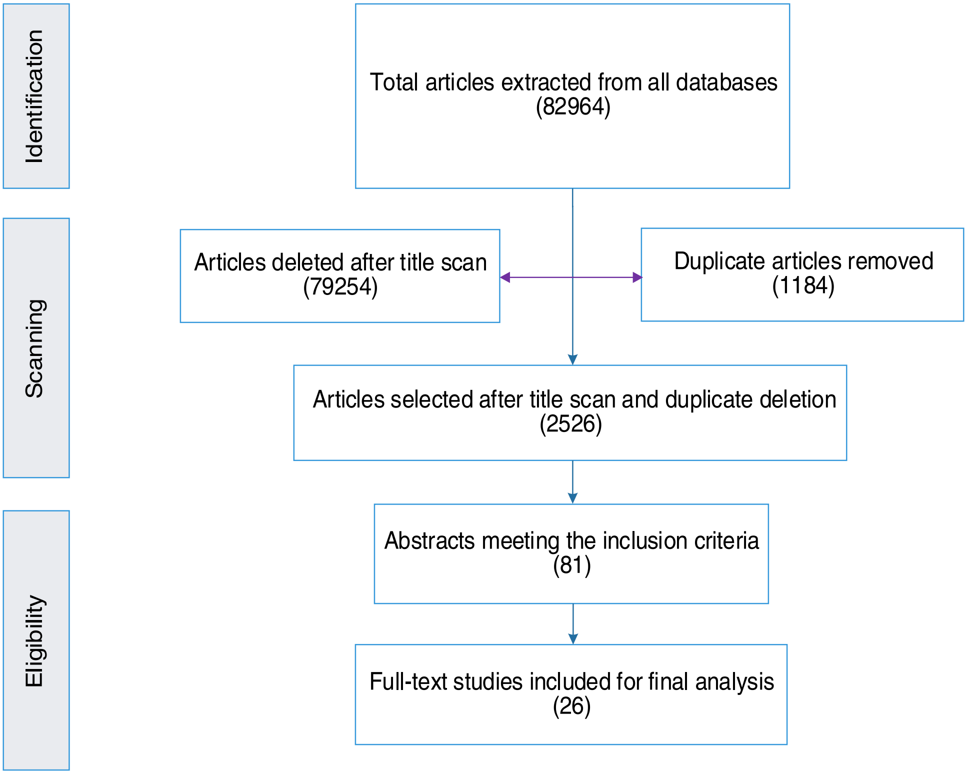

FIGURE 1 PRISMA flowchart of the scoping review

scores showed that the most influential variables were the presence of home care services, the annual cost of maintaining a usable bed, the gender distribution of the population, the geographical distance from the services, and the number of beds in public or private hospitals in the neighboring cities. Being urban or rural area, the mortality rate, age distribution of the population, bed occupancy rate, and travelers flow into the region were strongly influenced by other variables (Table 6).

Moreover, the results of the DANP method showed that among the five main dimensions, the hospitalization dimension had the highest weight. Additionally, of the 28 variables, the presence of home care services had the highest weight, followed by population size and geographic distance from services. In this study, we also determined the intra-dimensional weight. The number of general practitioners in the region in the dimension of workforce, the criterion of home care services in the dimension of health facilities and equipment, population size in the dimension of population, type of hospital (general/specialized) in the dimension of hospitalization, and the annual cost of maintaining a usable bed in the economic dimension were of the highest importance and weight.

DISCUSSION

Resource allocation in the health system is rarely focused on regions with greater needs, but is often influenced by political interests (Shinjo & Aramaki, 2012). In many cases, resource allocation is mainly based on past allocations and preferential allocations due to the pressure from interest groups (Hellervik & Rodgers, 2007). However, better resource

TABLE 3 Characteristics of studies included in the scoping review

Characteristics	Number (%)	References
Publication year		
Before 2000	9 (34.61)	Aspden et al. (1981); Barnett et al. (1980); Bay and Nestman (1984); Carstairs and Morris (1989); Clark et al. (1980); Goldacre and Harris (1980); Rabadi (1988); Roemer (1960); Zwarenstein and Price (1990)
2005–2000	6 (23.07)	Bennema-Broos et al. (2001); Chu and Chu (2000); Côté (2005); Horev et al. (2004); Needham et al. (2003)[1]
2010–2006	3 (11.53)	Giles et al. (2009); Govind et al. (2008); Hellervik and Rodgers (2007)
2015–2011	2 (7.69)	Barbosa and Cunha (2011); J. Zhang et al. (2013)
2016 to present	6 (23.07)	Dlouhý (2017); Gordon et al. (2018); Matejic (2017); Ordu et al. (2021); Pan and Shallcross (2016)
Publication type		
Journal article	23 (88.46)	Nishiura et al. (2004); Needham et al. (2003); Goldacre and Harris (1980); Aspden et al. (1981); Barnett et al. (1980); Clark et al. (1980); Carstairs and Morris (1989); Bay and Nestman (1984); Roemer (1960); Zwarenstein and Price (1990); Horev et al. (2004); Côté (2005); Bennema-Broos et al. (2001); Chu and Chu (2000); Giles et al. (2009); Govind et al. (2008); Hellervik and Rodgers (2007); Barbosa and Cunha (2011); Ordu et al. (2021); Pan and Shallcross (2016); Zhu et al. (2020); Gordon et al. (2018); Matejic (2017)
Conference proceeding	3 (11.54)	Dlouhý (2017); Rabadi (1988); J. Zhang et al. (2013)
Study setting		
Europe	13 (50)	Aspden et al. (1981); Barnett et al. (1980); Bay and Nestman (1984); Bennema-Broos et al. (2001); Carstairs and Morris (1989); Giles et al. (2009); Goldacre and Harris (1980); Hellervik and Rodgers (2007); Matejic (2017); Needham et al. (2003); Ordu et al. (2021)
America	8 (30.76)	Clark et al. (1980); Rabadi (1988); Roemer (1960); Horev et al. (2004); Côté (2005); Govind et al. (2008); Barbosa and Cunha (2011); J. Zhang et al. (2013)
Asia	4 (15.38)	Chu and Chu (2000); Nishiura et al. (2004); Pan and Shallcross (2016); Zhu et al. (2020)
Africa	1 (3.84)	Zwarenstein and Price (1990)

[1] ibid para 8.

utilization is possible by managing the allocation process. In this regard, it is crucial to identify the factors that influence the allocation of resources, especially hospital beds, as one of the most expensive resources in the health system.

The results of our scoping review showed that there are many criteria (75 criteria) influencing the allocation of hospital beds. For Iran, 28 criteria were selected and classified into six dimensions, including health care workforce, population, hospitalization, health facilities and equipment, the economic dimension of the hospital, and the socioeconomic dimension of society. The DANP model then ranked the criteria for allocating hospital beds according to their weight and influence status. In this regard, the hospitalization dimension

TABLE 4 Criteria influencing the distribution of beds in a region

	Criteria		Criteria		Criteria
1	Physician distribution	2	Age and sex distribution of the population	3	Availability of community care and nursing home care
4	Number of general physicians	5	Morbidity	6	Length of stay
7	Number of special physicians	8	Government revenue (per capita)	9	Number of patient days
10	Area size	11	Saving per capita	12	Distance of population from hospital
13	Proportion of urban population	14	Number of beds in nearby counties	15	Quality of care
16	Expected revenue of the hospital	17	Local economic development	18	Patterns of urbanization
19	Insurance type	20	Mortality	21	Number of beds in private hospitals
22	Waiting time	23	Public sector investment	24	Fee-for-service hospitals
25	Disease epidemiology	26	Political system	27	Number of beds in industrial hospitals
28	Seasonal flu	29	Political pressure	30	Number of short-term care beds
31	Lack of available medical staff	32	Types of treatment services	33	Location of hospital
34	Population growth	35	Political decisions	36	Proportion of admissions to hospital, which came from a certain geographic area
37	Population in the state	38	Existence of medical school in the area	39	Annual maintenance cost of a bed
40	Number of beds (per capita)	41	Flow of travelers	42	Level of hospitals (secondary and tertiary)
43	Economic prosperity	44	Percentage of elderly	45	Districts with university-affiliated hospitals
46	Number of nurses	47	Type of healthcare systems	48	Number of specific medical specialties
49	Size of a hospital	50	Bed occupancy rates	51	Number of admitted and discharged nonelective patients at specialty
52	Number of admitted and discharged elective patients at specialty	53	Level of deprivation in area	54	Hospital readmission

(Continues)

TABLE 4 (Continued)

	Criteria		Criteria		Criteria
55	Number of consultants	56	Population growth over the age of 80 years	57	Marital status
58	Geographical distribution of the population	59	Length of stay for an elderly patient	60	Employment rate
61	Number of people with access to private services	62	Percentage of beds for age-related diseases	63	Level of education
64	Diseases related to socioeconomic status	65	Equity in access	66	Previous allocations
67	Growing tendency of rural and small-town residents to look to large urban centers for medical care.	68	Tendency to use a given hospital	69	Preferential allocation
70	Metropolitan	71	Number of occupied bed-days	72	Type of hospital (General or specialized, individual or complex)
73	Number of long-stay beds	74	Service tariff	75	Family size

TABLE 5 Dimensions of Criteria and Delphi scores

Dimension	Criteria	First round agreement score		Second round agreement score	
		Yes	No	Yes	No
Healthcare manpower	Number of general practitioners available in the region	9/65	1/34	7/73	3/26
	Number of special physicians available in the region	9/65	1/34	3/76	7/23
	Number of nurses available in the region	1/59	9/40	2/63	8/36
Health facilities	Existence and capacity of long-term care center or nursing home	4/61	6/38	4/68	6/31
	Existence of home care services	8/81	2/18		
	Current hospital beds to population ration	4/86	6/13		
	Presence of private centers in the target area	2/93	8/6		
	Existence of a medical school in the region or in the city	8/56	2/43	2/63	8/36
	Geographical distance from medical services	5/95	5/4		
	Number of beds in hospitals of other organizations	100	0		
	Number of beds in neighboring cities	9/90	1/9		
	Number of short-term medical care beds	6/88	4/11		
	Existence of a reference hospital in the region	5/95	5/4		
Population	Population	100	0		
	Age distribution of the population	7/97	3/2		
	Sex distribution of the population	7/97	3/2		
	Population growth	6/88	4/11		
	Flow of travelers	1/84	9/15		
	Mortality rate	5/70	5/29		
	Urban or rural area	7/72	3/27		

(Continues)

TABLE 5 (Continued)

Dimension	Criteria	First round agreement score		Second round agreement score	
		Yes	No	Yes	No
Hospitalization	Bed occupancy rates	7/97	3/2		
	Number of wards and variety of specialties in current hospitals	9/90	1/9		
	Types of common diseases in the region	9/90	1/9		
	Average length of stay	6/88	4/11		
	Readmission rate of current hospitals	8/56	2/43	5/60	5/39
	Admission rate of elective patients in the current hospital	5/95	5/4		
	Admission rate of urgent patients in the current hospital	5/95	5/4		
	Type of hospital (general/specialized)	5/95	5/4		
	Hospital level (secondary/tertiary)	9/90	1/9		
	Number of consultants in the current hospital	7/47	3/52		
	Waiting list of current hospitals	9/90	1/9		
The economic dimension of the hospital	Expected revenue of the hospital	2/68	8/31	8/65	2/34
	Service tariff	50	50	6/52	4/47
	Annual maintenance cost of a bed	1/84	9/15		
	The public sector investment in the region	3/52	7/47	7/73	3/26
Socioeconomic dimension of society	Deprivation rate	8/56	2/43	8/65	2/34
	Education status in the region	7/47	3/52		
	Marital status in the region	3/27	7/72		
	Family size	50	50	7/44	3/55
	Insurance coverage status	4/61	6/38	9/57	1/42

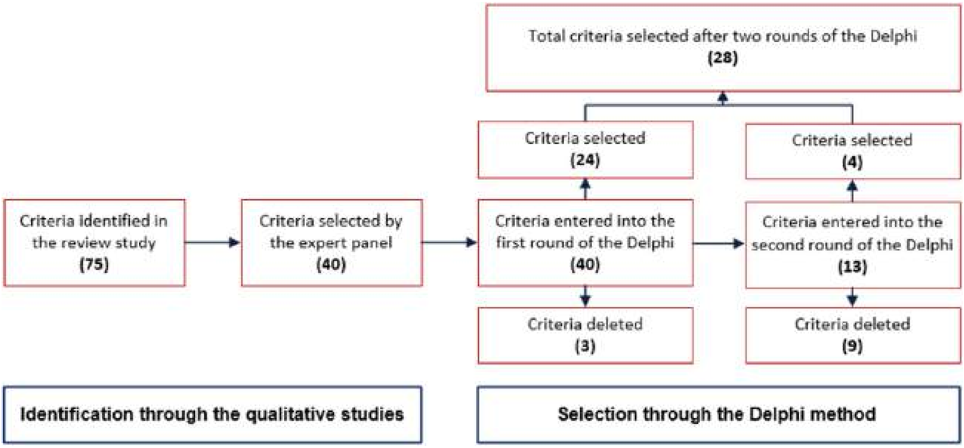

FIGURE 2 The process of selecting the criteria that influence the distribution of hospital beds

had the highest weight among the other dimensions. Therefore, variables in this dimension are more important for bed allocation and should be taken into account by policymakers in this area. The most important variables in this dimension are bed occupancy rate, length of stay, diversity of wards and services, waiting list, type of hospital, and the type of common diseases in the region.

The results showed that of the 28 variables, bed occupancy rate was strongly influenced by others. In the past, the bed occupancy index of existing hospitals has often been considered as the fundamental variable, to determine the capacity of hospital beds, both at the policy level and at the level of health center management. In this regard, a bed occupancy rate of 85% was considered the target value. This rate is suggested at 45% for small hospitals due to economic inefficiency and 75% for specialized centers. The main reason for setting this target was the timely supply of hospital beds and cost control (Green, 2002). In this context, Bagust et al. (1999) argues that with hospital bed occupancy rates approaching 85%, a delay in the supply of hospital beds is inevitable. Recent studies have shown that in determining hospital bed capacity, other important factors such as hospital size (Green & Nguyen, 2001), waiting time (Oh & Merenstein, 1997), epidemiological status of the region (Green, 2002), changes in demand and admission rate (Jones, 2010), and hospital performance criteria (Green, 2002) should be taken into account. In support of these findings, our study showed that the bed occupancy variable rate is actually an effect variable, so paying attention to the causes is of particular importance.

In the hospitalization dimension, the common disease type variable had a high interaction with other variables, indicating its importance. Numerous studies (Abbasi et al., 2018; Aghamohamadi, Jahangiri, Hajinabi, Masoudi, et al., 2018; Farrokhyar et al., 2019; McKee, 2004) have identified common diseases as an important factor in bed allocation. Over the past decade, the pattern of disease and causes of deaths around the world has changed. As predicted by the World Health Organization, the proportion of noncommunicable diseases such as cancer, cardiovascular disease, and accidents will increase as causes of death worldwide by 2030. In Iran, the projection of burden of disease by 2035 shows that endocrine diseases, nutrition and metabolism at 32%, cardiovascular diseases at 25%, as well as cancers and tumors at 20% will be the top three groups of causes of death in the country (Aghamohamadi, Jahangiri, Hajinabi, Asl, et al., 2018; World Health Organization, 2014). The epidemiological transition towards chronic diseases, therefore, has a significant effect on the future demands for hospital beds. It is also expectable that a chronic patient has a longer stay, which can lead to a longer waiting list and increased bed occupancy.

TABLE 6 Level of importance and influence of criteria influencing the allocation of hospital beds

Criteria			*R**	*D***	*R* + *D*[a]	*R* – *D*[b]
A	A1	Number of general practitioners available in the region	3.113	2.206	5.320	0.907
	A2	Number of special physicians available in the region	2.468	3.061	5.529	–0.593
B	B1	Existence of home care services	3.602	2.111	5.714	1.491
	B2	Current hospital beds to population ratio	2.758	2.892	5.650	–0.135
	B3	Presence of private centers in the target area	2.723	2.630	5.353	0.093
	B4	Geographical distance from medical services	3.287	2.386	5.673	0.901
	B5	Number of beds in hospitals of other organizations	2.789	2.619	5.408	0.170
	B6	Number of beds in neighboring cities	3.217	2.439	5.656	0.778
	B7	Number of short-term care beds	1.721	2.200	3.921	–0.480
	B8	Existence of a reference hospital in the region	3.203	3.001	6.205	0.202
C	C1	Population	3.542	3.529	7.071	0.013
	C2	Age distribution of the population	1.201	2.582	3.783	–1.381
	C3	Sex distribution of the population	2.792	1.609	4.401	1.183
	C4	Population growth	2.408	2.898	5.306	–0.491
	C5	Flow of travelers	1.479	2.107	3.586	–0.628
	C6	Mortality rate	0.749	2.276	3.024	–1.527
	C7	Urban or rural area	1.095	3.350	4.445	–2.255
D	D1	Bed occupancy rates	1.550	2.560	4.110	–1.010
	D2	Number of wards and variety of specialties in current hospitals	2.792	2.777	5.569	0.015
	D3	Types of common diseases in the region	2.898	2.890	5.788	0.009
	D4	Average length of stay	2.585	2.285	4.870	0.300
	D5	Admission rate of urgent patients in the current hospital	2.457	2.129	4.587	0.328
	D6	Admission rate of elective patients in the current hospital	2.223	2.352	4.575	–0.129
	D7	Type of hospital (general/specialized)	3.153	2.772	5.925	0.381
	D8	Hospital level (secondary/tertiary)	2.816	2.754	5.570	0.062
	D9	Waiting list of current hospitals	2.926	2.408	5.334	0.518
E	E1	Annual maintenance cost of a bed	3.342	1.967	5.310	1.375
	E2	The public sector investment in the region	2.730	2.829	5.559	–0.099

**R*: Sum of the cells of row *i* in the matrix *T*.

***D*: Sum of the cells of column *i* in the matrix *T*.

[a] *R* + *D*: Degree of importance of one criterion.

[b] *R* – *D*: The influence degree of one criterion.

The results indicated that the variable of hospital type (specialized or general) is very important because of its high weight and high interaction with the other variables. Therefore, the type of hospital should be taken into consideration by policymakers when allocating hospital beds. This is because general hospitals often differ from specialized hospitals in the number of beds, facilities, and, therefore, hospital indicators such as bed occupancy rates, average length of stay, waiting list, number of general practitioners and specialists. In his study, Zwarnstein and Price (1990) divides hospitals into several categories in terms of facilities. (i) University-affiliated hospitals with fully specialized facilities, specialized hospitals with comprehensive specialized services, and small hospitals with a single specialty. (ii) General hospitals with minimal medical, surgical, and diagnostic facilities, and hospitals that cannot perform the basic functions of a public hospital, such as hospitals for tuberculosis and infectious diseases (Zwarenstein & Price, 1990). Therefore, the type of hospital can be a determining factor in the allocation of beds.

The next dimension with the highest weight was the healthcare facilities. In this dimension, the variable of existence of home care services was the most important variable as it had the greatest weight and effect of all 28 variables. Therefore, it was placed at the highest level of the causal chain.

Most advanced healthcare systems have reduced the number of inpatient beds in recent years. Studies show that the number of hospital beds in organization for economic cooperation and development (OECD) countries has decreased. In England, changes in length of stay have reduced the number of general and acute care hospital beds by 43% and the number of maternity beds by around 51% (Ewbank et al., 2017). There has also been a widespread closure of neurology wards in the Britain, Northern and Western Europe, and the United States (Smith, 2015).

One of the reasons for reducing reliance on hospital beds in advanced health systems is the relocation of patients from the hospital and the provision of community-based medical services. By improving home care programs, many hospital beds can be saved. Although the evidence for cost savings varies by relocating care, it is beneficial to strengthen outpatient care, because early intervention and support can prevent costly hospital care, resulting in reduced opportunity cost to the patient (Edwards, 2014; Scott, 2010).

In this regard, evidence on hospital bed utilization based on appropriate criteria in Australia and Canada show that 70% of acute hospital bed days are due to inadequate access to home care services, insufficient rehabilitation services, poor social services, and inadequate family support (Scott, 2010). Any improvement in this area depends on the ability to provide adequate out-of-hospital care. The use of home care services is not yet common in Iran and, due to the aging population, proper planning and policies in this area are needed to meet the future needs of the elderly population.

The results showed that, in the health facilities dimension, the existence of the reference hospital and the geographical distance from the health services were important variables that had a great interaction with other variables and should be taken into account in the allocation of beds. The great geographical distance from hospitals reduces the possibility of utilizing medical services. This problem reinforces inequalities in the availability of hospital beds and access to inpatient services. This condition has the greatest impact on rural areas and vulnerable populations such as the elderly and the poor (McKee, 2004). Study of Mosadeghrad, Janbabaei, et al. (2020) showed that in Iran, in some southern and disadvantaged cities and provinces, such as Sistan Baluchistan and Bushehr, the distribution of hospital beds is not equitable, which affects access to medical care. This is in a situation where a study in China showed that an equal geographic distribution of hospital beds has reduced maternal mortality rates (Tian & Pan, 2021). Therefore, the needs of a geographic region should be assessed based on health outcomes to determine whether the needs of the population, especially vulnerable and marginalized groups, are being adequately met. In addition, the presence of a referral hospital in a region can reduce the flow of patients to major cities and gradually reduce travel costs. However, to meet the needs of the population in a region, the necessary measures must be taken to provide hospitals with sufficient beds.

Current research has shown that the next important dimension is the population. In this dimension, there were several important variables to consider when allocating hospital beds. Of which the population size had the greatest interaction with other 28 variables and had the highest weight after home care. In addition, the geographical context of the region (urban or rural), the mortality rate, and the age distribution of the population were the variables most influenced by other variables. In addition, the variable of the flow of travelers arriving for medical services must be considered in this dimension, because it can influence hospital indicators such as the demand for medical services, the average length of stay and the waiting list. In this regard, Stewart et al. (2002) also considered the number of nonresident patients in his study in Canada to predict beds at the hospital level.

Population has been reported in several studies as one of the determining factors in the allocation of health facilities and beds (Abbasi et al., 2018; Aghamohamadi, Jahangiri, Hajinabi, Masoudi, et al., 2018; Bay & Nestman, 1984; Farrokhyar et al., 2019; Jamali et al., 2012; Ravaghi et al., 2020). In this regard, bed distribution policy and planning should be based on the population structure, age and gender distribution of the population, geographic context, and mortality rates. Otherwise, health systems would face shortages of beds and reduced access to services, or the additional number of beds would reduce resource efficiency (Scott, 2010).

The population and its structure, such as the age distribution of the population, determine the demand for health services and can change the need for hospital beds at a time when the whole world is facing an aging phenomenon. The increase in the number of older people who need more health care is leading to increased demand for hospital care, emergency services, elective admissions, outpatient services, and diagnostic tests (Ravaghi et al., 2020). In this regard, Schofield and Earnest (2006) point out that aging will increase the demand for acute bed days between 70% and 130% by 2050. According to statistics, in 2050, 21.7% of the Iranian population will be over 60, which will affect the number of beds needed (Goharinezhad et al., 2016). According to the results of this study on the interrelationships of the variables influencing the distribution of beds, the sole consideration of the population factor cannot however be an appropriate criterion for deciding on the allocation of hospital beds.

Policy implications

The DANP model could provide precise evidence for policy and planning, as it determines the weight and importance of the factors influencing a decision-making case and assesses the causal relationship between them. Given the high impact of the variable "presence of home care services" in the distribution of hospital beds, it is necessary to develop policies to extend these services nationwide. By developing and strengthening these centers, in line with the needs and culture of the society, the health system can take measures to reduce dependence on hospital beds.

The population variable was the most common variable in hospital bed distribution studies and was the most important variable in Iran based on the DANP results. On the other hand, hospitalization has had the maximum weight among the other dimensions that affects the allocation of the bed. Policymakers need to consider the dynamics of these variables, along with the state of their effects and influence. This is because focusing only on demographic characteristics can lead to inaccurate estimates of the number of beds needed. Moreover, considering only the variables of the hospitalization dimension without taking into account demographic changes can lead to inaccurate policies, as the growth and aging of the population can affect the demand for hospital care. Finally, policymakers should consider regular revision of the factors influencing bed distribution and predict future bed needs based on environmental changes.

Limitation of the study

The main objective of this study was to determine effective criteria for allocating hospital beds in a region, so studies examining bed allocation between different wards of a hospital were not included in this study. Another limitation of the study was the high number of criteria obtained from the review phase, which made it necessary to reduce the number of variables due to the limitation of the matrices used in the DNAP method.

CONCLUSION

The result of the study, based on the influence status of the variables, showed that certain criteria, including bed occupancy rate, the average length of stay, waiting list, type and level of hospital, and diversity of wards and services in hospitals have the highest priority in the allocation of hospital beds. At the next level, health infrastructures such as the number beds in neighboring cities, the capacity of the private sector, and other institution, the type of healthcare centers (long-term or short-term) require the necessary attention. Subsequently, the demographic characteristics of the region, the mortality rates, the geographical context of the region, and the influx of patients into the region must be taken into account. Finally, it appears that the criteria identified in this study may be useful to policymakers for an equitable allocation of hospital beds, taking into account hospital bed efficiency criteria.

AUTHOR CONTRIBUTIONS

Seyedeh M. Najibi designed the study and its overall methodology; she also finalized the data synthesis and the article itself. Farhad Lotfi contributed in data analysis. Erfan Kharazmi contributed in data analysis. Payam Farhadi contributed in data analysis and edited the article. Payam Shojaei contributed in data analysis. Peivand Bastani contributed in data analysis. Zahra Kavosi designed the study and its overall methodology; she also finalized the data synthesis and the article itself. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data set is available.

ETHICS STATEMENT

This study is approved by the ethics committee of Shiraz University of Medical Sciences under the code SUMS-IR.SUMS.REC.1399.340.

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An analysis of policies to control tobacco use and alcohol consumption as risk factors of noncommunicable diseases: A case study of Iran

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Abstract

Control of noncommunicable diseases (NCDs) requires the management of behavioral risk factors such as tobacco smoking and alcohol consumption. Alcohol consumption and tobacco use are the main risk factors of NCDs and account for about 1% and 13% of total deaths in Iran, respectively. This study aimed to analyze policies regarding tobacco use and alcohol consumption and understand their content, context, process, and actors in Iran. We conducted a case study design guided by the Walt and Gilson Policy Analysis Framework. This study was conducted in two phases: A review of policy documents on tobacco and alcohol, and scoping review of studies related to the policies identified in the first phase. The contents of tobacco and alcohol control policies are mostly in line with international recommendations including, the MPOWER policy package for tobacco and recommended target areas proposed by World Health Organization (WHO) for alcohol. Political commitment to health promotion, social and religious values, joining international treaties, and the high prevalence of NCDs have been significant factors in the agenda-setting of alcohol and tobacco policies in Iran. Although the health governance structure and the primary health care system have provided opportunities for implementation of policies, weak cross-sectoral collaboration and the lack of some stakeholders' support, including the tobacco industry, pose challenges to the successful implementation of tobacco and alcohol policies. Thus, a multi-sectoral approach is essential to control NCDs in Iran.

KEYWORDS
alcohol, risk factors, tobacco

Key points

- The increasing prevalence of noncommunicable diseases, especially cardiovascular disease, political commitment to health promotion, and joining international treaties have been important factors in the formulation of policies to control tobacco use and alcohol consumption in Iran.
- Policies have been developed in line with the recommendations of international organizations, in particular the World Health Organization.
- Implementation of tobacco control policies has faced numerous challenges such as tobacco industry involvement in policymaking and lack of financial resources.
- Although service delivery systems such as primary health care centers, substance misuse centers, and hospitals are available to provide alcohol control services, the high stigma and cultural sensitivity may threaten the successful implementation of these policies.

INTRODUCTION

Noncommunicable diseases (NCDs) are the major health concerns in most developed and developing countries and pose many challenges for policymakers. These diseases cause the death of 57 million and are responsible for 71% of global deaths (WHO, 2015, 2018). Iran, as a developing country, faces this concern (Forouzanfar et al., 2014). NCDs are the leading cause of death in Iran and are estimated to account for 82% of all deaths (WHO, 2018). It is projected that NCDs will be the leading cause of DALY (Disability Adjusted Life Years) in Iran in 2025 (Khajehkazemi et al., 2013). Tobacco smoking and alcohol consumption have a significant role in the prevalence of NCDs in Iran. Disease burden and mortality attributable to smoking in ischemic heart disease in Iran are above 21% and 15%, respectively. Alcohol-attributable deaths per 100,000 people in Iran was 3.53 in 2019 (Institute for Health Metrics and Evaluation, 2019).

Control of these diseases requires the management of behavioral risk factors such as tobacco smoking and alcohol consumption. In Iran, alcohol consumption and tobacco use are the main risk factors for noncommunicable diseases and account for about 1% and 13% of total deaths, respectively. DALYs attributable to tobacco in Iran were about 44%, 26%, 17%, and 16% for chronic obstructive pulmonary disease, ischemic heart disease, diabetes, and stroke, respectively in 2019. Alcohol consumption also accounts for 20% of DALYs for cirrhosis and other chronic liver diseases (Institute for Health Metrics and Evaluation, 2019).

World Health Organization (WHO) has provided global strategies and best buys interventions to control these risk factors to address NCDs (WHO, 2010, 2017). WHO Framework Convention on Tobacco Control (FCTC) of 2004 (WHO, 2004) and the WHO strategy to reduce harmful alcohol consumption initiated in 2008 and endorsed in 2010 (WHO, 2010) were developed at the global level to guide the countries in their efforts to control NCDs. However, low and middle-income countries (LMICs) face various challenges, such as limited financial and human resources and political support to develop and implement policies addressing NCDs risk factors (Juma et al., 2018).

Iran has a long history of political commitment to control NCDs and as a member of WHO, has adopted various policies for control of their risk factors (Peykari et al., 2017a). Several studies have been conducted on tobacco and alcohol-specific policies in Iran including content analyses of alcohol policies and the effects and implementation challenges of tobacco control policies. For example, the study by Al-Ansari et al emphasized the content of alcohol control policies in Iran. The results showed that social-cultural factors and governance context significantly influence on adoption and implementation of alcohol policies (Al-Ansari et al., 2019a). However, the analysis of context, content, process, and actors for these policies has not been conducted.

In this paper, we analyze tobacco and alcohol-specific policies in Iran to understand the contents of alcohol and tobacco control policies and factors affecting the policymaking process.

MATERIALS AND METHODS

Study design

The study is a case study focusing on policies targeting the control of tobacco use and alcohol consumption in Iran. We intend to answer the following questions: what are the content (objectives and strategies) of policies to control tobacco use and alcohol consumption? What actors are involved in the policymaking process? What situational, structural, environmental, and cultural factors influence policymaking? In addition, what was the policymaking process? For this, we used the Walt and Gilson Framework for policy analysis.

This study was conducted in two phases: (1) a Review of policy documents on tobacco and alcohol and (2) Scoping review of the studies conducted on the policies identified in the previous Phase. Both phases were guided through the Walt and Gilson Framework of Policy Analysis (Walt et al., 2008) Components of the framework include content, context, process, and actors. The policy process was analyzed using the “stages heuristic.” This framework divides the policy process into four stages: agenda setting, policy formulation, policy implementation, and policy evaluation (Walt et al., 2008). Policy context analysis was undertaken based on Leichter's model (1979). This model proposes the following factors: situational, structural, cultural, and environmental. Situational factors refer to less permanent aspects such as the political environment and natural disasters. Structural factors include the more permanent elements of context such as the government's structure and the level of decentralization of health systems. Cultural factors include society values, religious rules, etc. environmental factors refer to factors that lie outside of the national political system (Leichter, 1979).

DATA COLLECTION AND ANALYSIS

Document analysis

We conducted a document analysis to understand the content of national policies, identify policy actors and examine policy processes. In this document review, our emphasis was on the national government policies aimed at tobacco and alcohol control. we did not include policy documents of the nongovernmental organizations and subnational levels. Reviewed documents include laws, regulations, government directives, instructions, and programs. To identify policy documents, we searched the website of the Parliament Research Center of Iran and professional organizational websites related to tobacco and alcohol such as the social organization of the Ministry of Interior and the Ministry of Health and Medical Education (MoHME) for the period from 1979 to 2021. We included national government policies related to the control of tobacco and alcohol. Documents of regional and drug control policies were excluded. We consulted with Decision-makers and experts of the Ministry of Health and Medical Education to ensure that all relevant documents were included. After screening the documents, we developed a data extraction form, and two reviewers coded the documents qualitatively using manifest content analysis. The data extraction form included variables, such as document type, approval date, approval reference, goals, strategies, and actors. We coded the data based on the components of the Walt and Gilson Framework.

The coded data were grouped into four categories: content, context, process, and actors. Then, extracted data were synthesized through descriptive and narrative synthesis.

Scoping review

After document analysis, we conducted a scoping review to examine the strengths and challenges of policies identified in the previous phase and understand the policymaking processes for tobacco and alcohol control. The review was guided by the five-step Arksey and O'Malley model (Arksey & O'Malley, 2005). We first identified the research questions. Second, we searched to identify studies related to the research questions. The studies were screened based on inclusion criteria then eligible studies were selected. we extracted the data of the included studies based on the research questions. Finally, the findings were analyzed, summarized, and reported. The search strategy is presented in (Table 1).

RESULTS

We identified 18 documents for tobacco and seven for alcohol. In addition, we also reviewed the constitution and the country's 5-year socioeconomic development plans.

TABLE 1 Search strategy

Database	Search strategy	Results
	PubMed ((tobacco[Title/Abstract] OR smoke[Title/Abstract] OR smoking[Title/Abstract] OR alcohol[Title/Abstract] OR ethanol[Title/Abstract]) AND (policy [Title/Abstract] OR law [Title/Abstract] OR regulation [Title/Abstract] OR legislation [Title/Abstract] OR rule [Title/Abstract] OR regulatory[Title/Abstract])) AND (Iran[Title/Abstract])	97
	Scopus(TITLE-ABS-KEY (tobacco OR smoking OR smoke OR alcohol OR ethanol) AND TITLE-ABS-KEY (policy OR law OR regulation OR legislation OR rule OR regulatory) AND TITLE-ABS-KEY (iran))	346
	Web of Science TOPIC: (smoke OR smoking OR tobacco OR alcohol OR ethanol) AND TOPIC: (policy OR law OR regulation OR legislation OR rule OR regulatory) AND TOPIC: (iran)	209
	Embase (tobacco:ti, ab, kw OR smoke:ti, ab, kw OR smoking:ti, ab, kw OR alcohol:ti, ab, kw OR ethanol:ti, ab, kw) AND (policy:ti, ab, kw OR law:ti, ab, kw OR regulation:ti, ab, kw OR legislation:ti, ab, kw OR rule:ti, ab, kw OR regulatory:ti, ab, kw) AND iran:ab, ti	100

We found 752 studies through the systematic search of databases and reviewed the title and abstracts of 581 studies after duplicate removal. Five hundred and two studies were excluded because they did not meet the inclusion criteria. We reviewed the full text of 79 articles. Finally, 27 studies were included in the review. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram is presented in (Figure 1).

In the following, the policies are analyzed based on the elements of the policy analysis triangle: context, content, process, and actors of policies.

Policy context

Tobacco

Political will as a situational factor has typically played an important role in the adoption of Iran's tobacco control policies. Before 2005 and Iran acceded to WHO Framework Convention on Tobacco Control (FCTC), most policies were implemented unsuccessfully because of inadequate political commitment and lack of prioritization of tobacco control for policymakers, although these policies were repeatedly held by parliament and the government. Environmental factors such as the ratification of the WHO Framework Convention on Tobacco Control (WHO FCTC) have an essential role in tobacco policymaking. Following Iran's accession to the convention, all previously poorly implemented strategies were outlined in the Comprehensive Tobacco Control law and the

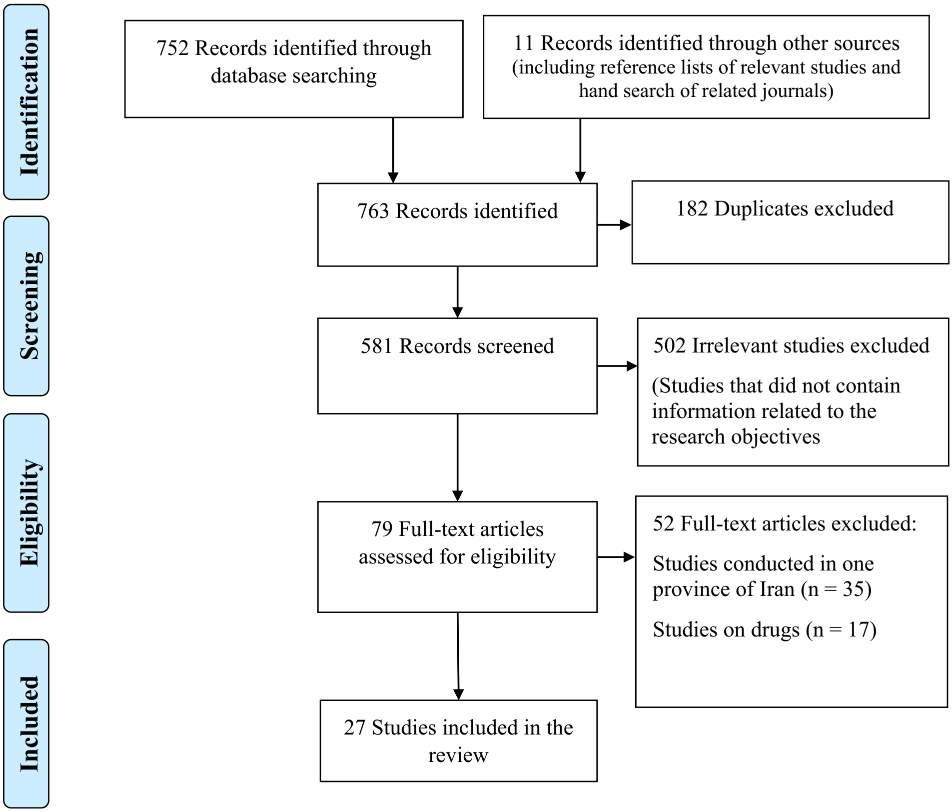

FIGURE 1 PRISMA flow diagram representing the study selection process

trustee agency was founded for strengthening inter-sectoral cooperation. Nevertheless, Structural factors especially the structure of Iran's state-owned tobacco company as the sole producer of tobacco products and the influence of the tobacco industry in policymaking remained major obstacles to the successful implementation of the tobacco control policies. Cultural factors have not played a significant role in tobacco policymaking.

Alcohol

Social and religious values as cultural factors and the regime of the Islamic Republic as a situational factor are the most important determinants of the adoption of alcohol control policies in Iran; Hence, the prevention of alcohol use in all governments, regardless of political orientation, has been emphasized (Al-Ansari et al., 2019a). Environmental and structural factors have not had a significant impact on policymaking.

Policy process

Tobacco

Agenda setting and policy formulation: In 1980, the "Law on the Price Increase of All Types of Cigarettes" was passed because Iran's economic conditions were not good, so cigarette tax revenue could help increase national income and reduce tobacco use. Months after the law was passed government implemented a policy of subsidizing cigarettes despite opposition from some politicians.

The content analysis of tobacco policies over different periods shows that tobacco control strategies were well-known but not implemented successfully because of low political commitment. So that the WHO FCTC was ratified in 2003 by the World Health Assembly, and Iran joined the convention in 2005. Subsequently, tobacco control was put to the attention of the Parliament and the government. In 2006, the "Comprehensive Tobacco Control Law" was passed, and its bylaws were established based on the MPOWER policy package. MPOWER is an acronym for a WHO proposed package and stands for Monitor tobacco use and policies; Protect people from secondhand smoke, Offer help to quit; Warn about the dangers of tobacco; Enforce bans on advertising, promotion, and sponsorship; and Raise taxes on tobacco products (World Health Organization, 2008). After 10 years, Iran joined the Protocol to Eliminate Illicit Trade in Tobacco Products approved by WHO. While before that, despite economic sanctions, there were no restrictions on the import of tobacco products and the expansion of multinational tobacco companies.

Policy implementation: Weak implementation of the tax increase policy and banning smoking in indoor public places is Iran's biggest problem in tobacco control. In recent years, increasing hookah smoking with less stigma has become a major problem and its control has not been successful (Alimohammadi et al., 2017; Banks et al., 2017; Heydari et al., 2015; Poorolajal et al., 2017). Tobacco industry involvement in policymaking and the governmental nature of tobacco production in Iran are the most important factors influencing the poor implementation of these policies (Alimohammadi et al., 2017; Sarrafzadegan et al., 2012; Sharifi et al., 2012). Thus, the government should implement advocacy programs to achieve consensus and increase cross-sectoral cooperation (Heydari et al., 2015).

Policy evaluation: Evaluation of tobacco control policies is a key step in clarifying the current situation (Alimohammadi et al., 2017; Sarrafzadegan et al., 2012, 2016). Evidence suggests that most tobacco control policies have been implemented successfully in recent years. Iran is in a favorable position compared to other countries in the WHO Regional Office for the Eastern Mediterranean (WHO EMRO) today (Heydari et al., 2012, 2018).

Alcohol

Agenda setting and policy formulation: Iran's first alcohol control policy was passed in 1953. According to this law, the production, purchase, sale, and consumption of alcoholic beverages are banned. Despite these bans, alcohol is made illegally, smuggled in, and distributed on the black market, indicating that the total ban on alcohol cannot be effective as the sole alcohol policy. Until the 2010s, alcohol consumption was denied, and there were no new policies to control alcohol (Lankarani & Afshari, 2014). However, the outbreak of methanol poisoning resulting from consumption of illegally produced alcohol revealed facts about alcohol abuse in the country and provided an opportunity for scientific discussion (Aghababaeian et al., 2019).

Highlighting the problem and the government's commitment to promoting health put the alcohol control policy on the agenda of health and social policymakers. Therefore, the National Committee for the Prevention and Fight against Alcohol was formed in the National Social Council.

Policy implementation: Although service delivery systems such as primary health care centers, substance misuse centers, and hospitals are available to provide these services, the high stigma and cultural sensitivity may threaten the successful implementation of these policies (Al-Ansari et al., 2019a; Shokoohi et al., 2019)

Policy evaluation: Because alcohol policies are relatively new, it is difficult to evaluate them precisely.

Policy content

Tobacco: The contents of Iran's tobacco control policies were coded according to the MPOWER policy package provided by the WHO. In 2008, the WHO formulated this package to meet the FCTC's goals, and the States Parties to the Convention implemented strategies based on this policy package. The strategies include (1) Monitoring tobacco use and prevention policies, (2) Protecting people from tobacco smoke, (3) Offering help with quitting smoking, (4) Enforcing bans on tobacco, (5) Promoting and sponsoring tobacco advertising, and (6) Raising taxes on tobacco.

Content analysis of the tobacco control policies in Iran shows that many of these strategies have been taken into account. Before the introduction of this policy package, strategies such as health warnings on cigarette packing, tax increases, and bans on advertising and tobacco use in public places were more or less raised but were expanded after the introduction of the package. Monitoring cigarette smoking and helping to quit smoking are strategies that have been bolded after the production of this package.

Monitoring tobacco use and prevention policies: Since the adoption of the FCTC in Iran, many surveys have been conducted to investigate the prevalence of tobacco use, but the Comprehensive Tobacco Control law and its Implementing Regulations have not explicitly emphasized this issue.

Protecting people from tobacco smoke: This strategy includes a ban on smoking in public places that protects people from second-hand smoke damage and reduces the likelihood of youth smoking. It is one of the most common control policies in Iran that has been the focus of policymakers in various laws and regulations since 1996 and implemented seriously since 2005 with the approval of the FCTC.

Offer help to quit tobacco use: Strategies for smoking cessation were introduced in 2001 and guidelines were developed to establish the "Tobacco Control Consultancy Centers." This policy has been followed seriously since the approval of FCTC in 2005 and the Anti-Drug Law in 2010.

Warn about the dangers of tobacco: Iran's tobacco company is required to implement health warnings on cigarette packs. In addition, government agencies publicly announce tobacco-warning messages. Tobacco packaging measures are highlighted in the FCTC and the comprehensive tobacco control act.

Enforce bans on tobacco advertising, promotion and sponsorship: Prohibition of tobacco advertising is one of the most prevalent smoking control strategies in Iran and was highlighted in several policies such as the program for tobacco reduction offered by Cabinet in 1994 and the Comprehensive Tobacco Control Law in 2006.

Raise taxes on tobacco: The tax increase is the first and most common tobacco control policy in Iran and has been reflected in many laws and regulations.

Alcohol: Iran's alcohol control policies are synthesized based on the following 10 recommended target areas proposed by WHO to reduce the harmful use of alcohol (World Health Organization, 2010). (1) leadership, awareness, and commitment (2) health services' response, (3) community action, (4) drink-driving policies and countermeasures, (5) alcohol availability, (6) marketing of alcoholic beverages, (7) pricing policies, (8) reducing the negative effects of drinking and alcohol intoxication, (9) reducing the public health impact of illicit alcohol and informally produced alcohol, and (10) monitoring and surveillance.

Leadership, awareness, and commitment: Due to the prohibition of alcohol use in the official religion of Iran (Islam), politicians have been committed to controlling alcohol in the country. In Iran, alcohol consumption, production, and trade are prohibited for Muslim citizens, and there are numerous penalties for alcohol-related offenses. Until 2010, there were no comprehensive strategies and main institutions or agencies to control alcohol use, although few interventions were implemented by the Office of Mental Health of the MoHME. However, after the release of statistics on alcohol abuse and methanol poisoning in Iran (Aghababaeian et al., 2019; Eskandarieh et al., 2014), the National Committee for the Prevention and Fighting of Alcohol Abuse was established and tasked with the responsibility of following up on national policies, strategies, and programs. A comprehensive program was introduced that included four strategies: (1) "Raising public awareness"; (2) "Providing prevention, screening and treatment services in the health care system"; (3) "Strengthening cross-sectoral collaboration" and (4) "Community participation."

Health services' response: Under the "National Alcohol Control Policy," the MoHME has advised a four-tier model of care that included, (1) providing screening and treatment services through the primary health care system, (2) providing opioid and psychostimulants treatment in substance misuse centers, (3) providing residential treatment and (4) providing specialized services in hospitals (Shariatirad et al., 2016).

Community action: Due to the alcohol consumption legal and religious prohibition in Iran, social strategies are very favored. However, in recent years, neighborhood-based actions have been mentioned in the national action plan with the participation of city and village councils and nongovernmental organizations.

Drink-driving policies and countermeasures: Effective intervention to prevent alcohol use while driving is being implemented in Iran (Al-Ansari et al., 2019a). According to the "Traffic Offenses Investigation Act," police officers are required to use breath-testing equipment to test alcohol-suspected drivers who, if proven guilty, are prevented from driving and are fined.

Availability of alcohol: Reducing the availability of alcohol is the first and most important alcohol control policy in Iran. Production, purchase, sale, and consumption of alcoholic beverages are prohibited, and various penalties are imposed for the offenses. Then, no other policies are adopted to regulate the production and distribution of alcohol and set an age limit for the sale of alcohol.

Marketing of alcoholic beverages: The law prohibits any marketing of alcohol in Iran.

Pricing policies: Due to the ban on alcohol in Iran, alcohol-pricing policies are redundant.

Reducing the negative effects of drinking and alcohol intoxication: Because of alcohol consumption prohibition, policies to reduce the negative consequences are not applicable in Iran.

Reducing the public health impact of illicit alcohol and informally produced alcohol:

No action is taken to regulate the sale of informally produced alcohol, impose taxes and issue health warnings on the alcohol packs.

Monitoring and surveillance:

Local and national monitoring is an essential measure for the successful implementation of other alcohol control policies. The Mental Health Department of the MoHME is the entity responsible for collecting and analyzing data on the extent and trend of alcohol injuries. However, due to legal and religious prohibitions against alcohol and the government's willingness to deny it, the results of the surveys are not published.

Policy actors

Tobacco: MoHME is the actor and trustee for tobacco control. In addition, the Ministry of Industry, Mine and Trade; Ministry of Economic Affairs and Finance; Ministry of Culture and Islamic Guidance; Iran Tobacco Company, and Broadcasting Organization are other actors involved typically in the policy implementation. The parliament, Expediency Discernment Council, and cabinet play substantial roles in policy formulation.

Alcohol: The Expediency Discernment Council, the MoHME, the National Social Council and the Health and Social Committees of parliament are leading policymakers in alcohol control. The adoption of a comprehensive program has been the most important measure of these entities in recent years. The police force, the MoHME, the Ministry of Education, and the Ministry of Culture and Islamic Guidance are influential institutions in the policy implementation. The MoHME plays a key role in providing alcohol prevention and screening services and treatment for alcohol abuse disorders within the primary health care system. The country's law enforcement agencies such as the Traffic Police and The Border Guard Command play an important role in enforcing drink-driving laws and controlling alcohol trafficking. Industry, the WHO country office in Iran, and nongovernmental organizations are other actors engaged in alcohol control. The role of alcohol researchers is limited to conducting surveys and investigating the status of alcohol use and its effects.

The summary of the main findings is presented in (Table 2).

DISCUSSION

Some studies have examined the content of alcohol-specific policies and the consequences of policies targeting tobacco and alcohol in Iran (Al-Ansari et al., 2019b; Banks et al., 2017; Meysamie et al., 2010). However, to our knowledge, no research has been conducted to analyze alcohol and tobacco-specific policies using the Policy Triangle Framework. In this study, we intend to examine situational, structural, environmental, and cultural factors influencing policy-making of tobacco and alcohol control; investigate policy processes and actors, and analyze the content of the policies in Iran.

TABLE 2 Main findings for each of the risk factors under each of the policy analysis triangle component

Risk factors	Content	Context	Process	Actors
	Alcohol policies leadership, awareness and commitment health services' response drinking-and-driving policies and counter measures monitoring and surveillance (Results from DR & SR)	Cultural factors (social and religious values) situational factors (the regime of the Islamic Republic) environmental and structural factors do not play a major role (Results from DR & SR)	Agenda setting and policy formulation: methanol poisoning outbreak and the government's commitment to promoting health are the key factors to the agenda-setting. Policy Implementation: policies implementation is challenging due *to* the high stigma and cultural sensitivity Policy evaluation: Given the newness of the comprehensive program and cultural limitations, it is not possible to evaluate policies. (Results from DR & SR)	MOHME, National Social Council, Health and Social Committees of parliament, Ministry of Education, Ministry of Culture and Islamic Guidance, Traffic Police and The Border Guard Command (Results from DR)
	Tobacco policies: Monitoring tobacco use and prevention policies protecting people from tobacco smoke offer help to quit tobacco use warn about the dangers of tobacco enforce bans on tobacco advertising, promotion and sponsorship raise taxes on tobacco (results from DR)	Situational factors (Political will) Environmental factors (the ratification of WHO FCTC) structural factors (the structure of the tobacco company) cultural factors do not play a significant role (results from DR & SR)	Agenda setting and policy formulationPolicy: The ratification of the WHO FCTC has been an important factor in the agenda-setting and policy formulating. implementation: Tobacco industry involvement in policymaking and governmental nature of tobacco production are the most important factors influencing poor implementation of tobacco policies especially the tax policy. Policy evaluationMost tobacco control policies have been successfully implemented in recent years and Iran is in a favorable position compared to other countries in the WHO EMRO today, but there is room for improvement.(Results from DR & SR)	MOHME, Ministry of Industry, Mine and Trade; Ministry of Economic Affairs and Finance; Ministry of Culture and Islamic Guidance; Iran Tobacco Company and Broadcasting Organization, parliament, Expediency Discernment Council and the cabinet (Results from DR)

Abbreviations: DR, Document Review; FCTC, Framework Convention on Tobacco Control; SR, Scoping Review; WHO, World Health Organization.

Process analysis

In 1979, the newly established government focused on bridging the gap between poor and wealthier sectors and achieving specific objectives such as health promotion (Lankarani, 2019). In that period, infectious diseases have been a top priority for the health system of Iran. After a few years, control of NCDs' risk factors became high on the agenda of policymakers due to the epidemiological transition from infectious diseases to NCDs (Lankarani et al., 2013). Undesirable health conditions and a high prevalence of NCDs have been significant factors in the agenda-setting of alcohol policies in Iran, however, tobacco policies were adopted when Iran joined international treaties such as FCTC in 2005 (Alimohammadi et al., 2017; Heydari et al., 2016).

Policies for controlling alcohol consumption and tobacco use have a long history. All governments regardless of political orientation were committed to enforcing it. Alcohol abuse and outbreaks of methanol poisoning in recent years caused by the consumption of homemade alcohol showed that a total ban on alcohol consumption is not an effective approach (Shariatirad et al., 2016). The lack of budget and the sensitivity of the issue of alcohol in the community threaten the successful implementation of this approach. Despite challenges to successful implementation, this approach is a positive step towards tackling alcohol-related problems and overcoming stigma (Al-Ansari et al., 2019a; Shokoohi et al., 2019). The political commitment of the government and the partnership of the alcohol industry and civil society institutions are key factors for successful alcohol control policies in most countries (Khan, 2017).

While evidence suggests that increasing tobacco tax and prices could reduce tobacco use and its prevalence (Chaloupka et al., 2011), the tobacco industry in Iran opposes this strategy with various arguments such as tax unfairness, the likelihood of an increase in illicit trade, and negative economic impacts such as rising unemployment (Smith et al., 2013). Many countries, including Argentina (Mejia et al., 2008), Nigeria (Oladepo et al., 2018), and the Philippines (Alechnowicz & Chapman, 2004), faced industry opposition and lobbying while implementation of tobacco control policies. The industry employs lobbying tactics, including providing campaign contributions to politicians and using trade and investment protections to challenge tobacco control policies (Saloojee & Dagli, 2000).

Context analysis

Over the past decades, the government's political commitment to controlling alcohol has been greater than other risk factors such as tobacco use. The Iranian government needs close cooperation between religious, political, and scientific communities to implement culturally acceptable policies to better control alcohol and tobacco (Shokoohi et al., 2019).

It is noted that social demands as a cultural factor have not significantly influenced policy adoption; because of low community participation in health policy-making in Iran (Damari et al., 2017). In recent years, increasing hookah smoking with less stigma has become a major problem. The results of the study by Roohafza et al. (2013) showed that social norms of hookah smokers and having smoking friends have significant effects on hookah smoking (Roohafza et al., 2013)

Content analysis

During recent decades, several policies have been adopted to control tobacco and alcohol pursued vigorously by policymakers to tackle these risk factors in Iran. For this purpose, the

Iranian NonCommunicable Diseases Committee was established and NCDs' national action plan was developed (Peykari et al., 2017b).

The content analysis of policies shows that tobacco control strategies were well-known but not implemented successfully because of low political commitment. For example, the raising tobacco tax policy has not been implemented for many years after its adoption, due to the tobacco industry lobby and insufficient political commitment (Banks et al., 2017; Chaloupka et al., 2011; Heydari et al., 2015; Mejia et al., 2008; Oladepo et al., 2018; Smith et al., 2013). Increasing the public's awareness of the health hazards of smoking, sensitizing policymakers to the impact of increased taxation on reducing tobacco use at opportune times when policy widows are created, and considering alternatives for employing tobacco industry practitioners are essential interventions for the success of tobacco control policies (Heydari et al., 2015; Sarrafzadegan et al., 2012).

Evidence demonstrates that strict government controls lead to a shift to the unrecorded market and increased consumption of homemade alcohol (Radaev, 2015; Thamarangsi, 2013). To address this challenge, the WHO recommends governments adopt interventions such as regulating sales of informally produced alcohol and bringing it into the taxation system and public warnings about health threats from informal alcohol (WHO, 2010). Although the Iranian government, with a total ban, is seeking to reduce alcohol availability, in recent years the public health approach has been addressed by health policymakers as an effective and accepted strategy. This approach includes alcohol screening and brief intervention in primary health centers. (Al-Ansari et al., 2019b; Shokoohi et al., 2019)

Actor analysis

The Ministry of health and medical education and the Ministry of Industry, Mine, and Trade are key actors and influential institutions in the adoption and implementation of tobacco and alcohol control policies in Iran. MoHME plays the main role in providing alcohol and tobacco prevention services within the primary health care system

CONCLUSION

Although the health governance structure and the primary health care system have provided opportunities for implementation of policies, weak cross-sectoral collaboration and the lack of some stakeholders' support, including the tobacco industry, pose challenges for the successful implementation of tobacco and alcohol policies. Thus, a multi-sectoral approach is essential to control NCDs in Iran.

LIMITATIONS

The main limitation of this study is that it did not analyze the policies from the perspective of the policy and decision-makers and experts at relevant ministries, and only focused on national programs and policies.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

All data analyzed during this study are available from the author on request via electronic mail.

ETHICS STATEMENT

We declare that this manuscript has not been published and is not currently being considered for publication elsewhere. The manuscript has been read and approved by all named authors. The authors declare that there is no conflict of interest.

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ORIGINAL ARTICLE

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Retaining clinicians in suburban areas: An experience from Iran's primary health care system reform

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Abstract

In June 2014, the first Health Complex was established in the suburban area of Tabriz, a northwest city of Iran. Health Complexes, as one of the decentralized models, have been formed based on universal health coverage principles. However, nearly two years after commencing work in the province, Health Complexes experience a high turnover of health care workers. This study aims to explore why primary health care workers set aside their roles in the health system and leave their jobs in opposition to the planned objectives. In this qualitative research, purposive and snowball sampling techniques were used for participants' selection. Data were collected through semistructured interviews and documentary review. Interviews were conducted with health officials, health care specialists, and other health workers who had left their jobs in Health Complexes in the suburban areas of Tabriz. Inductive and deductive content analysis was used to analyse data. The leading causes for health care workers leaving a job were divided into four main categories including organizational policies and regulations, financial and economic factors, sociocultural, and personal factors. Developing evidence-informed interventions and strategies to improve payment systems, provide job security and opportunities for professional development, and adopt cooperative leadership are essential to decrease the turnover rate of health care workers at Health Complexes.

KEYWORDS

health reform, health system research, health workers, human resources, turnover, suburban areas

Key points

- High turnover rates of medical practitioners and medical specialists is the main challenge in suburban areas.
- Developing evidence-informed polices is crucial for decreasing turnover rates among clinicians, but such policies are not included among policy makers' planned objectives.
- Organizational policies and regulations, financial and economic factors, socio-cultural and personal factors are the leading causes for leaving job by clinicians.

INTRODUCTION

Human resources are the foundation of service provision in health systems (Kabene et al., 2006) and play a key role in realizing health care system goals (Takian et al., 2011). They are the main source of competitive advantage and organizational capabilities (Ogunyomi & Bruning, 2016). Many scholars argue that human capital is more important than any other capital in the economic development process (Dussault & Dubois, 2003).

Health care provider retention and turnover are common measures of Human Resources Management (HRM) (Bhalla & Giri, 2014). Turnover rate is one of the main metrics for the evaluation of human resources operations in countries such as the United States, Canada, and Europe (Mello, 2014). Evidence implies that some factors such as perceptions of job security, compensation level, job satisfaction, organizational tenure, compensation level, and demographic variables such as education, age, gender, and organization commitment are predictive of staff departures (Mello, 2014). Sheriden (1992) found that perceptions of organizational culture influence turnover.

Within the health care system, changes in the quantity and quality of health care workers significantly affect costs, the speed of service delivery, and the overall quality of health care services (Asadi-Lari et al., 2004). There is a growing international perspective that the health outcomes and status of a community depend on its human resources. Though human resources have a major role in health promotion and improvement, this critical component is often neglected (Anand & Bärnighausen, 2004).

Since the Alma Ata Declaration, with the motto of “Health for All”, there has been a steady increase in appreciation by Iran's Ministry of Health and Medical Education (MoHME) of the importance of human resources to the health care system. (Doshmangir et al., 2020) Alma Ata especially emphasized the provision of primary health care to achieve the “Health for All” goal. It also highlighted the importance of establishing an equitable distribution of health care workers because there is a big imbalance in the geographical distribution of human resources as the main resources of the health care system (Gellert, 1996). This imbalance and the resulting shortage of human resources lead to huge differences between urban and rural areas regarding access to health care (Keley et al., 2016).

Therefore, in 2012, the MoHME initiated the urban Family Physician Plan in cooperation with the Iran's Health Insurance Organization to increase access to health care in urban areas (Doshmangir et al., 2019; Doshmangir et al., 2021; Jabbari Beyrami et al., 2019). Following this initiative, health facilities named Health Complexes were established in the East Azerbaijan province, Iran. The Health Complex was a model of public-private partnership and practical solution to address many of the problems (e.g., inequity in access to health services, poor quality health services, low motivation of public service providers, and high cost of providing services in the public sector) in the primary care system of the country (Joudyian et al., 2021).

In June 12, 2014, the first Health Complex was established in Tabriz (the capital city of East Azerbaijan), Iran. A Health Complex is an organization that provides health services under the principles and policies of MoHME. Establishing Health Complexes in urban marginal areas was a strategy for developing rural and urban family physician programs and achieving universal health coverage goals. The Health Complexes provide defined health services packages based on the population and per-capita estimations using the potential of public and private sectors. The other main aims of the Health Complexes are to encourage the private sector to provide health services in collaboration with the government, promoting public participation and improving public health.

The HC operates under the policies of MoHME, utilizing the public and private sectors' capacities. Each HC, based on population distribution and access to services, covers about 50–120,000 people, several health centers, and a single headquarter. It provides a defined service package, including prevention, screening, outpatient visits, and primary health care to a defined population in specific geographical areas.

The study of Tabrizi et al. (2019) and Gharaee et al. (2019) showed that factors such as lack of job security, long distance from the Health Complexes to the home of health care workers, lack of timely payment of salaries, high workload, lack of job advancement, low salaries, poor monitoring and evaluation, lack of independence in decision making, and instability in organizational guidelines and procedures designed by the public sector are influential on Health Complexes health care providers' turnover (Gharaee et al., 2019; Tabrizi et al., 2019). Dehnavieh in his study showed that the most important reasons for turnover in Health Complexes are lack of required facilities and equipment to provide services, lack of human resources resulting in high workload, unsustainable financial resources, and nontimely payment of salaries, and lack of public sector support for private sector personnel (Dehnavieh et al., 2018).

Through a public announcement, the Health Complexes recruited a considerable number of physicians, specialists, nurses, midwives, and public health and environmental health experts. Although the introduction of Health Complexes increased the total number of physicians recruited across the country, it has not necessarily led to employment of more physicians in deprived and less-developed regions; hence identification of factors that affect turnover and retention of human resources in these areas is necessary.

After about two years, some of the Health Complexes were faced with high rates of health worker turnover, especially physicians. According to a study conducted in Iran's Kerman Province in 2014, 26% of general practitioners in rural and deprived regions left their jobs, and 77.3% of the remaining GPs had turnover intentions (Amiresmaili et al., 2014). Retaining health care workers in these regions is one of the main challenges of health policymakers in Iran and their attempts to overcome this challenge do not seem to have come to fruition so far (Javanparast et al., 2011; Tabrizi et al., 2016). Figure 1 shows the structure of a Health Complex in Iran.

Objective

This paper explores the reasons for the turnover of health workers in public–private Health Complexes in the suburban areas of Tabriz, the capital city of East Azerbaijan Province in northwestern Iran. The lessons learnt from this experience may help policymakers, health planners, and researchers who seek to pursue similar policy interventions in their settings to retain human resources in suburban areas.

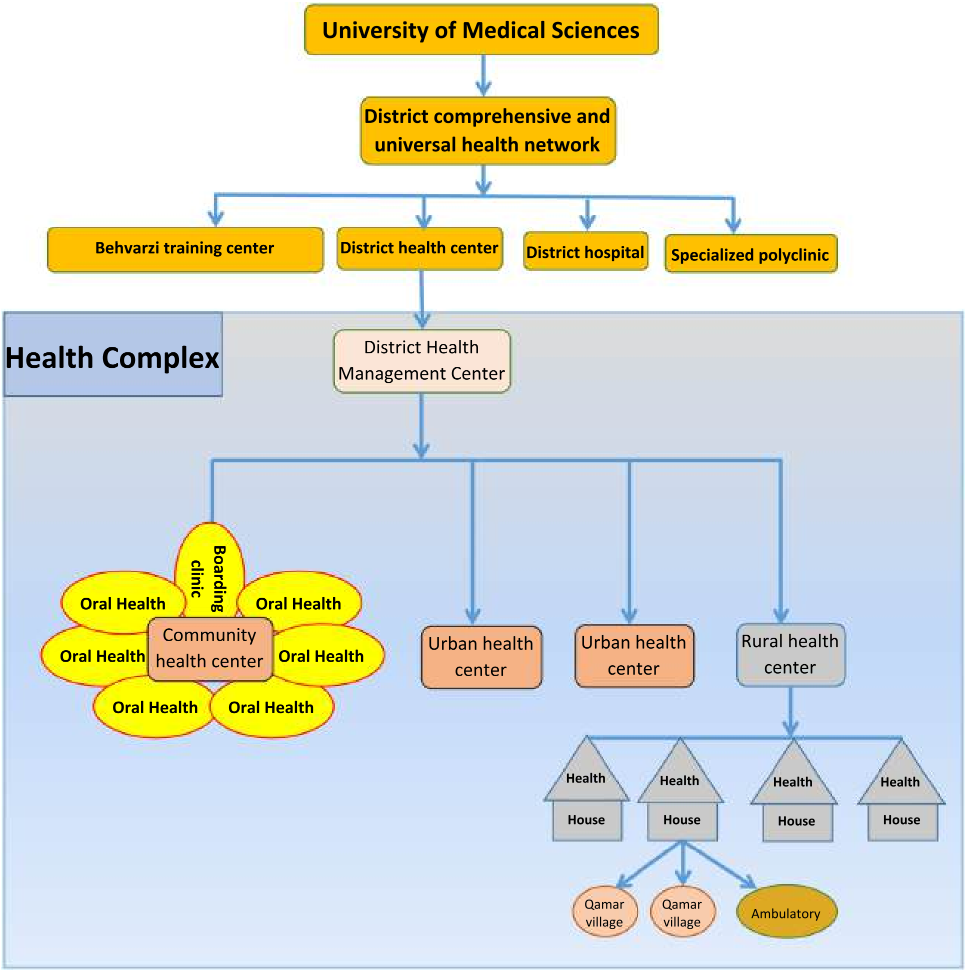

FIGURE 1 Health complex structure in Iran

METHODS

The study was qualitative exploratory using in-depth, face-to-face interviews. The COREQ criteria (consolidated criteria for reporting qualitative research) were used to report the research methodology (Tong et al., 2007). Participants were recruited by email or by phone. Purposive and snowball sampling techniques were used to achieve maximum heterogeneity and richer and deeper analysis. The participants were selected from the officials, physicians (GPs and specialists), and health care workers of private Health Complexes in suburban Tabriz. Overall, four officials, 11 specialists (six physicians and five public health care workers [called Moraghebe Salamat]), and six former specialists (three physicians and three public health care workers) were interviewed. The characteristics of participants have been presented in Table 1. The interviews were conducted face-to-face or over the phone, according to the participants' preferences, and lasted from 40 to 94 min. They continued until data saturation (the point at which no new information is discovered) was reached. All interviews were conducted after securing the consent of the participants and audio-recorded without any reference to the interviewees' names and other personal details. Interviews were immediately transcribed verbatim without any editing or change. We developed a

TABLE 1 Characteristics of interviewees

Variable	$N = 70$	Percent (%)
Gender		
Male	11	44
Female	14	56
Age		
29–40 years old	14	56
41–50 years old	7	28
51–60 years old	3	12
61 years and older	1	4
Education field (Specialty)		
Health services Management	2	8
Medicine	11	44
Midwifery	9	36
Nursing	2	8
Nutrition	1	4
Degree		
Bachelor of Science (BSc)	2	8
Master of Science (MSc)	11	44
GP	7	28
Specialist	4	16
Doctor of Philosophy (PhD)	1	4
Origin		
Indigenous	23	92
Nonindigenous	2	8
Marital status		
Single	2	8
Married	23	92
Work experience in deprived areas		
None	6	24
Under 3 years	10	40
3–5 years	5	20
5–8 years	4	16
1–3 years	13	52
4–6 years	6	24
7–9 years	6	24

(Continues)

TABLE 1 (Continued)

Variable	*N* = 70	Percent (%)
Position		
Health care worker	8	32
GP[a]	5	20
Specialist	4	16
Junior official	4	16
Senior official	4	16
Current situation		
L[b]	8	32
W[c]	17	68

[a] General practitioner.

[b] Practitioners who had left their jobs.

[c] Practitioners or officials working at Health Complexes.

generic interview guide for participants and used it reflexively for every individual to conduct tailored data gathering.

The interview guide (Appendix Table 1) was designed on the basis of the literature review and experts' comments and feedbacks from a pilot study conducted with two persons.

Ethical issues including the informed consent of the participants, plagiarism, and duplication are fully respected by the authors. The participants have been assured that the results of the study would be used only for the purposes of the study, and each person was allowed to leave the study at any stage without any questions being asked as to the reasons. Fourteen weeks after the article will be published, audio recordings will be destroyed.

Data analysis

Content analysis was used to analyze the data, which is a method for identifying, analyzing, and reporting patterns within the text and which is widely used in qualitative data analysis (Attride-Stirling, 2001). Qualitative data were analysed using inductive (remaining open to accommodate emerging themes) and deductive (using a predetermined coding framework) content analysis approach (Fereday & Muir-Cochrane, 2006). First, the text was carefully read several times and then it was coded. Coding and data analysis were conducted in two rounds, and inconsistencies were discussed to reach inter-coders' reliability and ensure accuracy in the interpretation of data. Third, the extracted codes were merged and classified, and then themes and subthemes were identified. MAXQDA 20 was used for data analysis.

RESULTS

Out of the 25 semistructured interviews, eight were conducted with officials, six with former practitioners who had left their jobs, and 11 with practitioners still working at private Health Complexes in suburban Tabriz. Out of the six former practitioners, three were physicians and three were health care workers; all were married, with the age range being 29–57 years; five were female and one was male. Out of the 11 practitioners still working in Health Complexes, six were physicians and five were health care workers, with the age range being 29–64 years; four health care workers were married and one was single, while among the physicians, five were married and one was single (Table 1).

Based on the findings, the reasons for the turnover intentions of health care workers in suburban private Health Complexes were classified into four main themes and 17 subthemes, including: organizational policies and regulations, financial and economic factors, sociocultural and personal factors (Table 2).

ORGANIZATIONAL POLICIES AND REGULATIONS

Health care provider involvement in organizational decisions and plans, the position of the health centers in the country's health system, recruitment contracts, transportation problems, professional issues, and monitoring and evaluation were the main issues related to organizational policies and regulatory factors that affected the retention of health workers in Health Complexes.

According to the participants, organizational factors such as excessive control and monitoring of the performance of health care workers, constant questioning, excessive focus by Health Complex managers and officials on statistical reports and documents, lack of health care provider involvement in decision-making and planning, and lack of independence of private companies were important considerations in their turnover intentions.

> "… When management is given to the private sector, it should be completed. I cannot be a toothless lion that has taken all my power and then expect my management to be excellent. When the control of the Health Complex is assigned to me, all the risks and authority must be with me…" (p. 19)

Another key issue, as stated by both officials and practitioners, was the lack of essential and all-inclusive support from outside the organization such as national health authorities.

> "The plans of Health Complexes are good plans, but require serious commitment and support by the university; unfortunately, I never witnessed this in my seven months of being there." (p. 10)

Participants listed factors such as excessive focus on quantity of services instead of quality and effectiveness, instability, constant changes in action plans, non-cooperation of out-of-health but related organizations, and instructions issued by the MoHME.

> "The monitoring should not be looking just for a score. It should look for quality, not quantity. Suppose I diagnosed 40 patients a day, how did I do that? I diagnosed 10 cancer patients, how did I control it? These are not in monitoring…" (p. 22)

Moreover, disagreements between the officials themselves in administration of Health Complexes and the fact that the position of these health centers is not well-established in the country's health system were other important factors that, over time, led to the physicians' and health care workers' dissatisfaction and willingness to leave.

TABLE 2 Themes and sub-themes related to the reasons for the high turnover of health workers in public–private Health Complexes in the suburban areas of Tabriz, Iran

Themes	Subthemes
1. Organizational policies and regulations	– Health care provider involvement in organizational decisions and plans – The position of Health Complex in the country's health system – Recruitment contracts – Transportation problems – Professional issues – Monitoring and evaluation
2. Financial and economic factors	– Relationship between payments and education level – payment of private sector – Payment period – Payment criteria
3. Sociocultural factors	– Trust between private sector health care providers – Trust in private sector – Quantity and quality of population – Patients' behaviors
4. Personal factors	– Interest in continuing education – Family responsibilities – Job insecurity
5. Organizational policies and regulations	– Health care provider involvement in organizational decisions and plans – The position of Health Complex in the country's health system – Recruitment contracts – Transportation problems – Professional issues – Monitoring and evaluation
6. Financial and economic factors	– Relationship between payments and education level – payment of private sector – Payment period – Payment criteria
7. Sociocultural factors	– Trust between private sector health care providers – Trust in private sector – Quantity and quality of population – Patients' behaviors
8. Personal factors	– Interest in continuing education – Family responsibilities – Job insecurity
9. Organizational policies and regulations	– Health care provider involvement in organizational decisions and plans – The position of Health Complex in the country's health system – Recruitment contracts – Transportation problems – Professional issues – Monitoring and evaluation
10. Financial and economic factors	– Relationship between payments and education level – payment of private sector – Payment period – Payment criteria

TABLE 2 (Continued)

Themes	Subthemes
11. Sociocultural factors	– Trust between private sector health care providers – Trust in private sector – Quantity and quality of population – Patients' behaviors
12. Personal factors	– Interest in continuing education – Family responsibilities – Job insecurity
13. Organizational policies and regulations	– Health care provider involvement in organizational decisions and plans – The position of Health Complex in the country's health system – Recruitment contracts – Transportation problems – Professional issues – Monitoring and evaluation
14. Financial and economic factors	– Relationship between payments and education level – payment of private sector – Payment period – Payment criteria
15. Sociocultural factors	– Trust between private sector health care providers – Trust in private sector – Quantity and quality of population – Patients' behaviors
16. Personal factors	– Interest in continuing education – Family responsibilities – Job insecurity
17. Organizational policies and regulations	– Health care provider involvement in organizational decisions and plans – The position of Health Complex in the country's health system – Recruitment contracts – Transportation problems – Professional issues – Monitoring and evaluation

> "They should not change the programs every three months. At least, if there are changes, announce them three months in advance, teach them, then three months later notify that we expect you to do this …" (p. 7)

Participants raised many issues related to the professional aspect, including high workload, stressful work, lack of job security and stability, lack of teamwork, and problems related to the online health information system (due to poor question design, server connection errors, and constant relocation of the online registration system).

> "Another challenge we had was that 3,000 people were defined per physician, but due to the shortage of physicians, this population was increased to 4,000, then to 6,000, and since last year, we have recruited one doctor for every

> 12,500. This made the services we expected from the doctors to be much more than they could handle.” (p. 23)

According to the physicians, another professional issue was that there are no opportunities for professional development and no field for improving one's clinical and medical skills due to the variety of patients that visit suburban Health Complexes.

> “In my opinion, the Health Complex wasn't a suitable environment for improving my medical skills and applying my medical knowledge.” (p. 14)

According to HC officials, the key issue in this domain was the short-term contracts made with the private sector, which prevent the private sector from demonstrating its capabilities and performance in the long-term.

> “The contracts period should not be one year. They must be contracted for at least 3-5 years…” (p. 21)

Transportation problems due to the suburban location of Health Complexes and the long distance between the place of residence and workplace posed another issue presented by the interviewees as the reason of job turnover.

> “The cost of transportation to the Health Complexes in suburbs is a lot. This means that per year their one-month salary must be paid for the transportation. Not a little money…” (p. 22)

One main issue mentioned by almost all the participants was the monitoring and evaluation. Different individuals had different perceptions of the (monitoring and evaluation) checklist, meaning that the grade one expert's evaluation was different from a different level expert's grade. Excessive ad rigid monitoring and evaluation and its long process were the main challenges of organizational and regulation polices. Inappropriate evaluation indicators and insufficient transparency of criteria of monitoring and evaluation were the other challenges mentioned by participants.

> “Sometimes the service providers do not even know what the monitoring and evaluation wants from them. For example, they do not know that he had to register a certain issue in the information system, and his score decreases in that part.” (p. 15)

> “Experts don't even know that a new process and a new system have been implemented and evaluation items have changed; they still monitor based on outdated principles and checklists and we get poor scores due to their mistakes. This is what we suffer from.” (p. 21)

FINANCIAL AND ECONOMIC FACTORS

Some of the reasons presented for job turnover can be categorized as financial and economic issues. The first subtheme in this field is delay in payment.

> "… Our reputation has been severely damaged. We now owe to our staff (healthcare workers) … Now their concern is whether they can get their monthly wage or not." (p. 23)

> There were many delayed payments that didn't get resolved even when I protested. (p. 1)

Another issue raised was the lack of full payment of a private sector fund.

> "At the end of the month, the district health center (public sector) takes our insurance vouchers and takes 10% as ransom (laughs of the interviewee), then pays the rest of the money to us…" (p. 24)

According to one health care manager, payments to human resources must increase annually by a considerable percentage based on the country's economic conditions, and they must be regular and timely.

> "According to the laws of the country, the salaries of the personnel should increase annually. Instead, they (public sector) reduce their wages by reducing the capitation gradually…" (p. 25)

Many participants cited incorrect payment criteria as one of the main reasons for job turnover.

> "They should not interfere in our work. For example, I have an employee that wants to work, for example, nine hours instead of eight hours. But unfortunately they (public sector) have set a ceiling on employee salaries…" (p. 2)

According to the participants, payments are not commensurate to work hours and working conditions in suburban and deprived regions.

> "The amount of money they paid didn't match the work we did." (p. 8)

> "… Compared the amount of work expected from the physicians, with the amount that the public sector is considering for them, physicians are not willing to continue…" (p. 22)

The disproportion payments and workload or education level and no difference between the incomes of Health Complexes in different socioeconomic areas were the main issues mentioned by participants.

> "On the suburb of the city, people go to the Health Complexes to receive the simplest health services for free, but this is not the case in the affluent areas. This will increase our workload, but it will not make any difference to our income." (Doc 6)

The final subtheme that was presented in the interview sections was the noncompliance of health care workers' wages with national work laws.

> "… The salaries of our employees are less than the minimum wages set in the national laws…" (p. 23)

Sociocultural factors

> One of the most important issues presented in this topic was the lack of trust in the private sector. "We still do not believe in the private sector … the public sector mainly looks at the private sector as a competitor. This view hurts our employees a lot. This view must be changed…" (p. 22)

Service providers also said that because they do not trust the private sector, they try to change jobs at the earliest opportunity.

> "The experience of privatization in Iran has not been successful. In the past, private companies typically exploited human resources, and this attitude has spread to society as a whole." (p. 25)

The other challenge for the participants was the lack of a culture of privatization in society.

> "…The culture of privatization is not yet in place. It has not yet taken root in the flesh and blood of officials, and the private sector is a part of the health system…" (Doc 6)

In addition to the lack of trust in the private sector, there is also a lack of trust in the public sector.

> "…We invited three health cooperatives (private companies) who worked with us in 1998 (health cooperative plan). Once they had been defeated, they had been lost at that time (stopping the plan). Therefore, they couldn't trust in current plan (Health Complex) and start with us again…" (p. 24)

According to some health care workers, risky behaviors of some patients due to addiction-induced emotional and psychological imbalance, and unscheduled visits due to free health care were other among the social and cultural issues that led to health care workers' dissatisfaction.

Personal factors

Several general practitioners required more time and opportunity to study due to their desire to enter more specialized fields while others expressed their desire to continue their activities in hospital and clinical environments or in health centers with a more varied patient base and a dynamic environment, to gain more work experience.

Interest in continuing education is one of the factors that forced some health care workers to leave their jobs. Based on the Health Complex regulation, a physician or other workers cannot work while being in education, thus presenting the main reason for some of them having to leave their jobs despite their interest in continuing their work.

One of the health care clinicians stated that she no longer wished to work at the Health Complex due to her husband's dissatisfaction while others left Health Complexes to care for their children. Lack of work experiences in deprived regions was another factor noted by some interviewees as they expressed their unfamiliarity with and lack of adaptation to these environments.

Participants cited lack of job security as another reason for having to leave their job in Health Complexes.

> “When a person is not sure whether he will have this job next month and whether he will get this salary or not, when he finds another job with more job security, he will definitely leave this job…”

DISCUSSION

Health care providers who leave the organization at the organization's request (involuntary turnover) as well as those who leave on their own initiative (voluntary turnover) can cause disruptions in operations, work team dynamics, and performance. Both types of turnover create costs for the organization (Tichy, 1981).

The ultimate decision for an Health care provider to voluntarily leave an organization is a function of whether (Kabene et al., 2006) the inducements to stay are sufficiently attractive and (Ehsani-Chimeh et al., 2018) the ease with which the Health care provider could depart and is willing to sever or rearrange established personal and social networks (Tichy, 1981).

The results of the present research showed that there are four categories of factors that affect physicians and health care workers' turnover intention: organizational policies and regulations factors, financial and economic factors, sociocultural factors, and personal factors. Each of these factors has direct or indirect effects that should be considered in-depth. The effect of various factors, like job satisfaction, job performance, leader membership, role stress, job autonomy, social support, occupational safety, job turnover, and ethical leadership behavior on turnover intension have been studied by different research worldwide (Butler, 2018; Demirtas & Akdogan, 2015; Saeed et al., 2014).

Hertzberg's Two-Factor Theory (Kobayashi & Takaki, 1992) has been used to explain certain factors in the workplace that cause job satisfaction and a separate set of factors that cause dissatisfaction. Hygiene factors or dissatisfactions are about job security, salary, fringe benefits, secondary working conditions, relationships with colleagues, physical workplace, and the relationship between supervisor and Health care provider. This study found that most interviewees were dissatisfied with the lack of security and job stability, low payments, and inappropriate treatment of managers and officials with health care providers. This finding is consistent with that of Staufenbiel and König whose results show that job security has a significant negative effect on job turnover intension (Staufenbiel & König, 2010). Herzberg argues that the existence of motivational factors such as interest in jobs, appreciation, and rewards by managers, and career development stimulate satisfaction and motivation (Bassett-Jones & Lloyd, 2005). As we found in our study, the lack of opportunities for career development for physicians and lack of autonomy due to intense control and supervision has a huge impact for clinicians in their desire to leave their job. These results reflect those of Kim and Madeleine Stoner who also found that job autonomy has a positive direct effect on job turnover in social workers (Kim & Stoner, 2008). In line with Herzberg's argument, recognition for one's achievement, responsibility, opportunity to do something meaningful, involvement in decision-making, and sense of importance to an organization give satisfaction and can influence the retention of physicians and other clinicians in their workplace.

The principal–agent theory can also explain the findings of this study, according to which, relationships between principals (e.g. employers) and agents (service providers) are formed using contractual or other forms of agreements (Garen, 1994). This theory emphasizes that principles should specify what is required for providers and establishes mechanisms to ensure that their expectations are achieved (Guston, 1996). Therefore, the contract between principles of Health Complexes and the private sector's clinicians is very important. It is encouraging to compare this figure with that found by Saeed et al. (2014) who argued that leader membership exchange with members of his/her work group has a direct negative influence on the turnover intention (Saeed et al., 2014).

This study shows that there is no strong connection between principal and agent. Lack of support for human resources of the private sector, lack of cooperative leadership in Health Complexes, and the country's health authorities and failure to address the problems of Health Complexes are the other factors categorized as dissatisfaction factors in the workplace. Based on the principle-agent theory, if the interests of principals and agents do not completely overlap, there will be inherent conflicts between principals and agents. Therefore, the Health Complexes and private sector ownership should provide better incentives for health care providers. to focus on long-term performance and minimize conflicts between owners of Health Complexes and professional managers of the private sector. These results reflect those of Josephson et al. (2008) who found that providing incentives like geriatric care and being socially included by superiors and/or workmates have a negative effect on leaving jobs and the propensity between nurses to seek for long-term sick leave (Josephson et al., 2008).

Health Complex managers should try to employ health workers with high competency and skills. In a study conducted by Li et al. (2020) in China, the results presented that primary health care physicians' perceived over qualification is positively related to turnover intention. Based on the results of this study, government and primary health care should address perceived over qualification to reduce the physicians' turnover intention or recognize and deploy their abilities properly (Li et al., 2020).

Managers of Health Complexes should use appropriate communication mechanisms and voice the concerns of Health Complex providers. The present findings are consistent with the results of Douthit et al. (2015), which showed that proper organization of the payment system minimizes problems in attracting and recruiting of health care providers (Douthit et al., 2015). Moreover, Amiresmaili et al. (2014) found a 26% turnover rate in GPs in rural and deprived regions, with 77.3% of the remaining GPs having turnover intentions. They attributed this situation to problems such as ineffective payment system, high workload, and lack of job security (Amiresmaili et al., 2014).

While many employers appropriately attempt to retain top health care providers by offering opportunities for growth and development, interesting work, a congenial work environment, and strong values-driven management, the reality is that many top performers still remain focused on their salary (Cullen & Parboteeah, 2005).

Shankar found that financial incentives, improvement of payment systems, and educational and professional strategies such as provision of opportunities for academic and professional advancement and community-oriented medical education could be effective in the attraction and retention of physicians in deprived regions (Shankar, 2010). Moreover, a 2016 review by Verma et al. (2016) showed that financial incentives, support for professional development, laying the groundwork for cooperation, and recruiting individuals with a rural background are effective strategies to encourage more doctors into entering deprived and underserved areas (Verma et al., 2016). Wen et al. (2018) identified high work risk, work pressure, low salary, doctors' position level, and lack of opportunities for professional development as the main factors influencing turnover intentions within Chinese doctors in rural areas (Wen et al., 2018). In addition, Rogers et al. (2010) conducted a survey in Australia and showed that lack of career opportunities, lack of professional support, professional expectations, and lifestyle goals are the most important factors that would entice doctors to a rural location (Rogers et al., 2010).

The significant challenge for employers in managing retention of health care providers is the fact that different health care providers are motivated by different factors relative to their desire to stay with an employer. Hence, any retention program needs to be individualized based on the needs of the health care providers who have been targeted for retention. Huselid (1995) showed that the theoretical rational for examining the effects of HRM practices on turnover lies in the effects on individual-level factors (Huselid, 1995). McEvoy and Cascio (1985, 1987), showed that job enrichment interventions and realistic job previews were moderately effective in turnover (McEvoy & Cascio, 1985, 1987).

The results of this research indicate that the most important factors in the retention of physicians and health care workers in suburban regions involve the following: improving the payment system, increasing job security and stability, providing opportunities for professional development and advancement of clinical skills, having consistent instructions and action plans, providing comprehensive support for more successful implementation of rural health care plans, involving practitioners in planning and decision-making processes, and avoiding excessive focus on documentation of processes by national health officials and health managers. The results of a study by Landoll et al. (2018) in the United States shows that the condition of workplace in the first year of employment has the most effect on job turnover among health workers of primary health care (Landoll et al., 2018).

STUDY STRENGTHS AND LIMITATIONS

One of the limitations of this study, due to lack of consent, is the failure to interview more physicians and health care workers that left Health Complexes. Conversely, its strengths are the fact that the target population included both working and resigned physicians and public health care workers in rural regions and the use of semi-structured interviews for data collection, which allowed physicians and health care workers to freely express their opinions and provide deeper insights into the mentioned issues.

The results of this study can be used to investigate the reasons for turnover in urban and rural Health Complexes in other cities and provinces of Iran. The results of the study can also be useful for managers and policymakers in the field of primary health care in other countries, especially low middle income counries.

It is recommended that future studies investigate the views of other medical and administrative staff of health centers in rural and deprived areas to shed more light on the reasons for turnover intentions. Furthermore, turnover intentions and Health care provider retention in public and private health centers can be compared.

CONCLUSION

The reasons for physicians and other health workers' withdrawal are multifaceted and contextual. Any policy designed to retain health care workers cannot be effective without considering the underlying reasons. Considerations need to account for the social context and the influence of the health care workers' demographic characteristics in their decision-making. Health authorities should identify the factors contributing to the endurance of physicians and other specialists to develop retention strategies. A well-established and appropriate payment system, job security and stability, reasonable control and monitoring, Health care provider involvement in planning and decision-making processes, cooperative leadership, opportunities for professional development, and support for practitioners working in the private sector are the most important factors that can improve retention and reduce turnover of health care workers in suburban areas. This, in turn, will expand access to health care. Health policymakers and planners should remember that the implementation of any national initiative first requires the necessary infrastructure and support.

AUTHOR CONTRIBUTIONS

Leila Doshmangir conceived the basic and original idea and outlined the study and drafted the article. Javad Babaie, HJ, Nasrin Mohammadi Aghdam and Maryam Zahmatkesh revised the study draft for important intellectual content. All authors participated in the final design and revision of the manuscript. All authored read and approved the final draft of the manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

ETHICS STATEMENT

This study was approved by the ethics committee of Tabriz University of Medical Sciences (Approval No: IR.TBZMED.REC.1396.905). All interviewees signed an informed consent form. Confidentiality and anonymity of the participants were strictly followed in all interviews. All recordings were deleted after transcription. All methods were carried out in accordance with relevant guidelines and regulations.

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APPENDIX

See Table A1

TABLE A1 Interview questions

1	What is your general opinion about working in Health Complexes?
2	What job opportunities does working in Health Complexes offer you?
3	What are the challenges and problems you face in working in Health Complexes?
4	What are the advantages and nonjob opportunities of working in Health Complexes?
5	What are nonjob opportunities of working in Health Complexes?
6	If you have the opportunity to leave your job or have left your job in Health Complexes, what were or will be the most important reasons and motivations for your decision?

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ORIGINAL ARTICLE

Social determinants of incidence, outcomes, and interventions of cardiovascular disease risk factors in American Indians and Alaska Natives

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Abstract

Cardiovascular disease (CVD) is the leading cause of death among American Indians and Alaska Natives (AIANs). Despite copious research on CVD incidence and outcome discrepancies, a social determinants of health (SDOH) focused framework on CVD risk factors and health outcomes in AIAN populations has not been undertaken. This paper presents the following: (1) a review of the literature on SDOH and CVD in AIAN populations, (2) a summary on intersectionality as it relates to SDOH and CVD, (3) a framework for conceptualizing CVD risks, interventions, structural determinants, and health equity, (4) a summary of potential interventions to address CVD in AIANs, and (5) a discussion about future work. Common SDOH themes across the CVD risk factors in AIANs are income-related obstacles, healthcare access, structural racism, discrimination, and failed colonial policies. Colonization of AIAN populations has resulted in social, political, and economic disadvantages, manifesting as systemic socioeconomic disadvantage and unequal access through elevated poverty rates, lower educational attainment, mental health challenges, and decreased healthcare access. These extensive social factors have a multifactorial effect across several CVD risk factors; all ultimately result in elevated CVD morbidity and mortality. Addressing SDOH and diminishing disparities is essential to facilitating improved CVD outcomes for AIANs.

KEYWORDS

American Indians and Alaska Natives, cardiovascular disease, health disparities, ischemic heart disease, risk factors, socioeconomic determinants

Highlights

- Cardiovascular disease is the leading cause of death among American Indians and Alaska Natives (AIANs).
- Social determinants of health (SDOH) are a major contributor to cardiovascular disease in this population.
- Addressing SDOH and diminishing disparities is key to improving cardiovascular health for AIANs.

INTRODUCTION AND BACKGROUND

Cardiovascular disease (CVD) is the leading cause of death among American Indians and Alaska Natives (AIANs) (Breathett et al., 2020). In the United States minority populations have both higher rates of CVD and worse health outcomes (Karnati et al., 2020; Virani et al., 2021). Historically, due to the very low incidence of CVD and slower epidemiological transition from infectious disease to chronic disease, it was incorrectly presumed that AIAN populations had inherent protection from CVD. However, recent rates of CVD among AIAN populations have been increasing in contrast to a decrease in rates among the general population, resulting in AIANs becoming disproportionally affected by CVD (Hutchinson & Shin, 2014; Virani et al., 2021). In addition to a higher incidence, AIAN populations have higher mortality rates from these same conditions than other groups (Veazie et al., 2014). The combination of increased morbidity and mortality makes CVD a serious threat to the health of AIAN populations.

Social determinants of health (SDOH) and structural racism have increasingly been recognized as essential factors in health disparities among racial/ethnic groups (Russo et al., 2021). Common SDOH including education, employment, income, family and social support, and community safety, account for up to 50% of health outcomes based on the length and quality of life (Robert Wood Johnson Foundation, 2022). Unlike other racial/ethnic groups AIAN contemporary health disparities stem from colonization, and are associated with cultural losses, historical trauma, discrimination, and lateral oppression (Elm et al., 2019). Colonization created conditions of exclusion, racism, marginalization, oppression, discrimination, and loss of control among AIAN populations. Beginning in the early 1800s, the U.S. government forcibly removed AIs from their homes and land, punished AIs for speaking their language and practicing ceremonies, and forced them to abandon their traditional health food systems.

Multiple well-established risk factors of CVD include diet, physical activity (PA), obesity, diabetes mellitus, kidney disease, hyperlipidemia, hypertension, tobacco use, family history/genetic predispositions, mental health, and pollutants (Table 1). Higher rates of these CVD risk factors compared to other racial/ethnic groups place disproportional burden of CVD on AIANs (Galloway, 2005). In addition to the elevated isolated incidence of these risk factors, AIAN populations are more likely to have multiple risk factors (Struthers et al., 2006). Impacts of SDOH on CVD are notable, for example, deaths attributable to low education are comparable to deaths attributed to acute myocardial infarction (Galea et al., 2011). Many hypotheses attempt to explain why risk factors differ among populations, often pointing to SDOH. One recent study explored SDOH and found greater social adversity was linked to increased CVD risk factors (Jilani et al., 2021). However, despite copious research on incidence and outcome discrepancies of CVD among minorities and the role of SDOH, a SDOH focused framework on CVD risk factors and health outcomes in AIAN populations has not been undertaken. A new SDOH framework that advocates for examining modifiable CVD risk factors in AIANs is presented here, along with how these risk factors affect health, and potential interventions to mitigate them. This paper is organized in sections: (1) a review of the literature on SDOH and CVD in AIAN populations, (2) a summary on intersectionality as it relates to SDOH and CVD, (3) a framework for conceptualizing CVD risks, interventions, structural determinants, and health equity, (4) a summary of potential interventions to address CVD in AIANs, and (5) a discussion about future work.

A REVIEW OF CVD RISK FACTORS IN AIAN POPULATIONS AND THE SDOH

Diet

Diet is a complex risk factor of CVD with dietary components affecting CVD outcomes differently. Although much of the dietary focus in CVD research is on saturated and unsaturated fats, other dietary components affecting CV health include omega 3 fatty acids, glycemic index, whole grains, fiber, antioxidants, vitamins, phytochemicals, overnutrition, and alcohol (Compher, 2006; Hu, 2009). This variety highlights the complexity of analyzing diet as a CVD risk factor.

Research on AIAN diet is sparse. The Strong Heart Dietary Study showed most AIANs did not meet dietary guidelines for reduction of chronic disease, including total fat intake, saturated fat intake, total energy intake, cholesterol intake, sodium intake, and fiber intake (Zephier et al., 1997). One large U.S. southwest AI-based study revealed fruits and vegetables were consumed less than once per day per person while high fat and sugary beverages like fry bread, sausage, and soft drinks provided 41% of energy and 46% of macronutrients (Ballew et al., 1997). This population also had inadequate intake of key nutrients (Ballew et al., 1997). Although limited, the existing literature points to a poor-quality diet consisting of high-calorie processed food with a lack of traditional foods, fruits, and vegetables (Berg et al., 2012; Compher, 2006). However, the diets of AIANs living on reservations may not differ greatly from the general U.S. population (Stang et al., 2005). Thus, diet may play a role in elevated CVD risk within this population, but further research is necessary.

Physical activity

Increased PA can prevent CVD and decrease risk, even without weight loss (Martinez-Gomez et al., 2019). This benefit has also been demonstrated in populations with concurrent CVD risk factors such as diabetes and kidney disease (Kang et al., 2019; Kodama et al., 2013). Minority populations have suboptimal PA and inactivity is a problem. AIAN adults do not meet the daily or weekly recommended amount of PA (Berg et al., 2012; Storti et al., 2009). Consistent with national trends, age and PA also have an inverse relationship in AIANs (Storti et al., 2009). The number of AIANs aged 65 or older is projected to grow faster than in the overall U.S. population (Administration for Community Living, 2020). This increase in size of the elderly population in combination with the inverse PA-age relationship

TABLE 1 Cardiovascular disease (CVD) risk factors, prevalence, social determinants of health (SDOH) influence, and interventions

CVD risk factor	American Indians and Alaska Natives (AIANs) prevalence	SDOH influence	AIAN interventions
Diet	AIANs do not meet dietary guidelines for reduction of CVD (Hayslett, 2001)	Poverty, food insecurity rural location, food deserts, lack of transportation, distance to food sources, limited refrigeration, higher food costs (Rao et al., 2013)	Navajo Nation local farming to improve fruit and vegetable intake, food sovereignty, access to traditional foods, economic incentives (Setala et al., 2011; Warne, 2007)
Physical activity	14.7% of AIANs meet recommended PA guidelines (Benjamin et al., 2019)	Education, urbanization, geographic isolation (Virani et al., 2021), walkability (Saelens et al., 2003), income (Kari et al., 2015), and occupation	Pathways Curriculum for youth and families, multilevel/component interventions increase PA in AIAN children (Davis et al., 2003; Grant et al., 2015)
Obesity	>82% of AIANs with overweight or obesity (Centers for Disease Control, 2022)	Multigenerational, chemical exposures (Schell & Gallo, 2012), food access, rural environments, education (Adams et al., 2019)	Pathways Study decreased body fat through PA, reduced fat content in school meals, and healthier diet practices at home and school (Davis et al., 2003)
Diabetes mellitus	23.5% of AIANs adults diagnosed with diabetes (Centers for Disease Control, 2022)	Internalized oppression, stigma, (West et al., 2012) limited healthcare (Walker et al., 2014), high uninsured rates, poverty, neighborhoods, limited access to quality food (Gary-Webb et al., 2011)	Discussion-based culturally influenced lifestyle intervention with diabetic women increased fruit and vegetable intake (Thompson et al., 2008), reduced diabetic risk factors
Kidney disease	33% of AIANs with chronic kidney disease (CKD) (Jolly et al., 2009)	Health care access, neighborhood (Jolly et al., 2009), lower socioeconomic status, (Hall, 2018) dietary restrictions, environmental exposures (Ozieh et al., 2021)	Home-based health interventions by community health representatives in Zuni Indians (Nelson et al., 2018)
Hyperlipidaemia	34.0% AIANs with high cholesterol (Centers for Disease Control, 2012) however AIANs have lower low-density lipoprotein (LDL) LDL cholesterol levels than Whites, (Breathett et al., 2020) and high-density lipoprotein	Social and genetic factors, limited opportunities for PA	National Heart, Lung, and Blood Institute Family Heart Study reports that increased alcohol consumption and PA were associated with increased HDL levels while increased smoking was associated with

(Continues)

TABLE 1 (Continued)

CVD risk factor	American Indians and Alaska Natives (AIANs) prevalence	SDOH influence	AIAN interventions
	(HDL) is dependent on obesity and diabetes		decreased HDL (Ellison et al., 2004)
Hypertension (HTN)	27.2% of AIANs diagnosed with HTN (Centers for Disease Control, 2022) versus 24.0% of NHW	Depression is linked to HTN in elderly (Fuchs & Whelton, 2020), age, gender, BMI, financial instability, mental health, and diet	REACH (Racial and Ethnic Approaches to Community Health) increased adherence to hypertension medications in AIANs (Ferdinand et al., 2012) through culture, history (Breathett et al., 2020)
Cigarette smoking	22.5% of AIANs current cigarette smokers (Centers for Disease Control, 2022) versus 15.5% of NHW Highest prevalence of adult and adolescent smoking in the U.S (Centers for Disease Control and Prevention, 2018).	Linked to HTN, diabetes, hyperlipidaemia, cardiovascular morbid and morality, (Benowitz, 2003) income, education, gender SES, culture, legislation, and marketing (Azagba et al., 2020; Mowery et al., 2015; Stehr, 2005)	Good Health and Wellness in Indian Country projects decreases commercial smoking through multifactorial, holistic, culturally appropriate health marketing strategies (Bauer & Espey, 2019), nicotine replacement therapy and home smoking bans effective in AIANs (Comiford et al., 2018)
Pollution	Increased exposure to household air pollution (HAP), (Lowe et al., 2018) tobacco smoke, coal-fired power plants, diesel exhaust, and mining (Ward et al., 2011)	Low-income, rural	Wood stove interventions in AIAN communities lower HAP (Noonan et al., 2020)
Genetic factors	Single set of genes regulates LDL size and obesity, may explain increased risk of diabetes and CVD in AIANs (Voruganti et al., 2006)	Linked to CVD RF phenotypes of obesity, dyslipidaemia, hypertension, and diabetes (North, 2003), low income, rural location	The GOCADAN study (Genetics of Coronary Artery Disease in Alaska Natives) showed that sex, hypertension, diabetes mellitus, albuminuria, high LDL cholesterol, high apolipoprotein B, and low HDL were strong correlates of CVD (Howard et al., 2010)

is likely to exacerbate inadequate PA in the AIAN population. Geographic isolation and rural nature of communities may also play a role in decreased PA. PA is lower in rural versus urban communities (Virani et al., 2021). The proportion of AIANs living in rural areas is twice as high as the general population making them disproportionally affected (American Indians

Remain Disproportionally Rural, 2014). Reservation communities are also often geographically isolated, decreasing outlets for PA which is a barrier in AIAN children (Thompson et al.). Dog attacks in some reservation communities are common, making outdoor PA nearly impossible (Jahns et al., 2014). Income correlates with PA directly in women but inversely in men (Kari et al., 2015). Low-income housing residents have higher rates of physical inactivity due to decreased feeling of safety or walkability (Saelens et al., 2003).

Obesity

Overwhelming evidence supports the impact of obesity on the prevalence, pathogenesis, and progression of CVD (Lavie et al., 2009). Obesity not only has a direct influence on CVD but also indirectly by exacerbating other CVD risk factors including dyslipidemia, type 2 diabetes, hypertension, physical inactivity, and sleep disorders (Powell-Wiley et al., 2021). While overall rates of unhealthy weight in the US population are alarming, rates of overweight or obesity among AIANs are even higher at 82% (Adams et al., 2019). Most concerning is that AIAN children have the highest prevalence of obesity and until recently were the only group with increasing rates (Sharma, 2009). These trends not only highlight the severity of the current obesity problem but also foreshadow a grim future unless effective interventions are implemented. Specific to children, growing up in a rural area confers increased risk for obesity, potentially due to a variety of aforementioned factors such as diet, exercise, and education (Adams et al., 2019).

Multigenerational transmission of obesity is well described. Maternal overweight or obesity, birth weight, household, body mass index, and primary caregiver identification as AIAN have been associated with increased childhood obesity (Adams et al., 2019; Lindberg et al., 2012). However, the specific reasons for intergenerational transmission are unknown with some research pointing to epigenetic factors, social inheritance, perceived and chronic stress, or AIANs' acceptance of obesity as normal (Marley & Metzger, 2015; Schell & Gallo, 2012; White et al., 1997). Population correlative and laboratory causal research have implicated chemical exposure with increased obesity (Schell & Gallo, 2012). AIANs have increased exposure to both environmental and household agents (solid fuel by-products, petroleum products, and pesticides), primarily due to location of reservations, income, and education (Redwood et al., 2012; Schell & Gallo, 2012). High-fat and high-sugar diets cause increased rates of obesity (Kavey, 2010).

Diabetes mellitus

Diabetes mellitus is a well-established CVD risk factor. Epidemiological data demonstrate diabetes doubles CVD risk and further exacerbates that risk in the presence of other risk factors such as lipids, smoking, and hypertension (Kannel & McGee, 1979; Stamler et al., 1993). Diabetes is a worsening epidemic in AIAN populations with the rates of type 2 diabetes higher than all other racial/ethnic groups (Cobb et al., 2014). Additionally, AIANs have significantly lower HbA1c control and diabetes medication adherence rates than non-Hispanic Whites, highlighting a discrepancy in diabetes management (Schmittdiel et al., 2014). Many AIAN adults either have diabetes or multiple risk factors for development of diabetes; therefore, preventing diabetes is important to reduce CVD (Harwell et al., 2003). Increased diabetes prevalence is associated with lower socioeconomic status, obesity, mental health conditions, and diet (Jiang et al., 2007; Subica et al., 2017); increased HbA1c is associated with low health literacy, acculturation, race, mental health conditions, social isolation, health care access, and neighborhood characteristics (Kivimäki et al., 2018; Walker et al., 2014).

Obesity is the greatest risk factor for diabetes, and the two are highly correlated in AIANs (Subica et al., 2017). They have multiple overlapping risk factors with higher rates of both obesity and diabetes making these relationships key to addressing CVD in this population. Neighborhood poverty is associated with poorer health status of diabetics; however, this could be due to limiting PA opportunity, proximity to quality food, safety, education, and mental health (Gary-Webb et al., 2011). Neighborhood influence on diabetic health is not limited to acute factors but follows children and adolescents into adulthood increasing their risk of diabetes (Kivimäki et al., 2018).

Diabetes incidence is also significantly associated with mental health conditions in AIANs (Jiang et al., 2007). This population has a larger adult mental health burden than non-Hispanic Whites compounded by most youth exhibiting "various behavior and emotional problems" and one-fourth meeting criteria for at least one mental health diagnosis (Brave Heart et al., 2016; Dickerson & Johnson, 2012). This is a complex issue with many factors at play, including collective historical trauma experienced by AIANs, internalized oppression, stigma, and strained interactions with colonized systems (West et al., 2012).

Health care

Difficulty obtaining healthcare and having no established source of care were associated with higher HbA1c in AIANs (Walker et al., 2014). Although members of federally recognized AIAN nations are eligible for Indian Health Service (IHS) care, AIANs have the highest uninsured rates among all racial/ethnic groups, two to three times that of non-Hispanic Whites (Johnson et al., 2010). IHS is not health insurance, does not meet Affordable Care Act requirements for healthcare coverage, and often provides inferior care due to underfunding, inaccessibility, limited services, and staffing shortages (Marley, 2019). Furthermore, more than 70% of AIANs live in urban and rural nonreservation areas and may be eligible for basic IHS services but not contract or specialty care (Breathett et al., 2020; Galloway, 2005). Many AIANs residing on reservations do not live near IHS facilities, further limiting their access. While the Patient Protection and Affordable Care Act has expanded access to care through Medicaid for low-income AIANs, the barrier of access may remain as AIANs can view the use of Medicaid as an abrogation of treaty rights to health care through the IHS. Thus, quality healthcare access, both real and perceived, is a significant barrier for diabetes management for AIANs.

Kidney disease

Kidney disease, regardless of the classification as chronic kidney disease (CKD), diabetic kidney disease, or end-stage renal disease, is associated with an increased risk of CVD and its complications (Fox et al., 2012; Go et al., 2004). Kidney disease as a risk factor is so important that individuals with CKD should be viewed as one of the most at-risk groups for CVD independent of other risk factors (Gansevoort et al., 2013). AIANs have triple the rate of CKD compared to Whites, with nearly one-third of AIAN having CKD (Jolly et al., 2009).

Lower socioeconomic status is associated with higher prevalence and incidence of CKD (Hall, 2018). In addition to prevalence, patients with low income have a 58% higher adjusted risk of death from CKD (Fedewa et al., 2014). The relationship between income and CKD may be bidirectional as poverty may lead to CKD through lack of healthcare access, dietary restrictions, environmental exposures, and poor CKD risk factor control, whereas CKD may lead to poverty via disability, unemployment, and health expenditures (Ozieh et al., 2021).

Given the high poverty rates of AIANs, income may be a significant factor in elevated CKD prevalence, incidence, and complications for this population.

Hyperlipidemia

Both decreased high-density lipoprotein (HDL) and increased low-density lipoprotein (LDL) are associated with elevated CVD risk (Emerging Risk Factors et al., 2009). The risk of elevated LDL and the benefit of decreasing LDL on CVD risk is well established. CVD risk due to LDL increases with concentration and duration of exposure with childhood LDL and total cholesterol levels correlating with adult CVD risk burden (Duncan, Freiberg, et al., 2019). The risk of decreased HDL and increased CVD risk is also well established; however, the benefit of increasing HDL to decrease CVD risk remains unclear. Data on cholesterol in AIANs is sparse. AIANs have lower average LDL cholesterol levels than Whites thus this is not a significant risk factor for the general AIAN population (Breathett et al., 2020). However, for the diabetic AIAN population, LDL cholesterol is a strong independent predictor of coronary heart disease, whereas low HDL risk may depend on obesity and diabetes (Breathett et al., 2020; Howard et al., 2000). One study of SDs of cholesterol levels in AIANs found that total PA was significantly related to increased HDL levels (Yurgalevitch et al., 1998). Given that AIANs have lower rates of PA than other groups, this may be a significant SDOH. Increased alcohol consumption is associated with increased HDL levels and reduced incidence of CVD (Toma et al., 2017), although episodic heavy alcohol consumption is associated with an increased risk of acute myocardial infarction despite its HDL effect (Toma et al., 2017). Smoking was associated with decreased HDL (Ellison et al., 2004).

One issue with identifying SDs of cholesterol in AIANs is the role of genetic factors. Lower concentration of lipoprotein(a) has been correlated with AIAN heritage but when used as a predictor of CVD disease, requires input of other factors (Wang et al.). This demonstrates the interrelationship of social factors and genetic factors when analyzing cholesterol as a CVD risk factor.

Hypertension

Hypertension (HTN) is among the best-documented risk factors for CVD, with the strongest evidence for causation and high prevalence of exposure (Fuchs & Whelton, 2020; Kjeldsen, 2018). AIANs have an increased prevalence of HTN compared to all other ethnic/racial groups (Galloway, 2005; Hutchinson & Shin, 2014). However, HTN in AIANs is relatively well controlled as they have higher proportions treated and lower degrees of HTN severity than the general population (Howard et al., 1996). Age is an important CVD risk factor due to the rapidly rising rate of elderly AIANs. This population increase combined with the elevated rate of elderly AIAN HTN suggests disproportionate burden of disease. A risk factor specific to AIAN elderly is the association between depression and HTN. Addressing the elderly AIAN population is important as the prevention of age-related blood pressure increases would reduce cardiovascular consequences and eliminate a large proportion of blood-pressure-related CVD (Fuchs & Whelton, 2020).

Smoking

Smoking has a causal role in the development of CVD through increased risk of thrombosis and atherosclerosis, leading to 21% of U.S. CVD deaths being attributable to smoking (Burns, 2003; World Health Organization, 2012). Smoking has a direct effect on CVD risk and acts synergistically and multiplicatively with other risk factors—HTN, diabetes, hyperlipidemia—to increase cardiovascular morbidity and mortality (Benowitz, 2003). Therefore, in this population with high rates of several CVD risk factors, smoking exponentially increases CVD risk. AIANs have the highest prevalence of adult cigarette smoking and adolescent smoking across all racial/ethnic groups (Centers for Disease Control and Prevention, 2018). However, there is geographical variation across AIAN groups with the highest rates in the Northern Plains and Alaska and lower prevalence in the Southwest. Despite recent national public health efforts and legislation to decrease rates of smoking, AIANs have not had the same decline as other groups (Mowery et al., 2015). In addition to higher rates, AIANs disproportionally feel the burden of smoking's adverse effects as the proportion of excess mortality for all diseases—greatest in CVDs—caused by smoking is greater in AIANs than in Whites (Mowery et al., 2015).

Tobacco use is part of many AIAN cultures. It is used in ceremonies, prayer, and traditional medicine, and viewed as a sign of respect of elders (Unger et al., 2006). Researchers have attempted to differentiate "traditional" versus "commercial" tobacco. However, commercial cigarettes are often substituted for homegrown tobacco at ceremonies making this distinction impossible (Unger et al., 2006). Despite this cultural use of tobacco, from a health perspective, the use of tobacco in traditional ways is irrelevant to commercial/recreational tobacco use because use of tobacco for traditional purposes is the same in light versus heavy smokers (Nazir et al., 2014). Traditional use of tobacco may be advantageous as this use is correlated to greater cessation in AIAN smokers (Daley et al., 2011). Despite the literature focusing on traditional tobacco use as a factor in increased rates of AIAN smoking, other determinants may have greater effect. Perhaps the greatest influence on smoking rates is a combination of marketing and legislation. Tobacco companies target AIAN communities through promotions, sponsorships, advertising, and exploitation of traditional use (Lempert & Glantz, 2019). Legislation limiting deceptive advertising resulted in nation-wide decrease in cigarette use but tobacco companies are still targeting AIANs. In addition, because tribal lands are considered sovereign nations by the U.S. government, they are exempt from cigarette taxes. This "sin tax" is considered one of the strongest deterrents of cigarette use with estimates showing a doubling of cigarette consumption due to lack of this tax (Stehr, 2005). Therefore, the combination of tobacco company exploitation and lack of federal tax disincentive play a large role in high rates of smoking in AIANs.

Smoking cessation is associated with significantly lower CVD risk within 5 years relative to current smokers and ceases to be associated with elevated CVD risk after 10–15 years (Duncan, Vasan, et al., 2019). This means that smoking cessation in this population could have extreme cardiovascular health benefits.

Pollution

The association between air pollution and CVDs has been of increasing interest. Several environmental air pollutants, especially "fine particulate matter" ($PM_{2.5}$), have been associated with increased CVD morbidity, severity, and mortality (Lee et al., 2014). Household air pollution (HAP) is one of the leading causes of health burden worldwide (Newell et al., 2019). Most research is focused on low/middle-income countries where income is the strongest determinant of high HAP exposure (Newell et al., 2019). AIAN reservations are similar to these low-income countries in that their population is rural with low income. Biomass (usually wood) combustion in deteriorating indoor stoves is the primary source of heat for 89% of families in one southwestern AIAN nation (Lowe et al., 2018). Because wood contains the same toxic agents as more general air pollution, burning wood for heat results in excess CVD risk (Huang et al., 2021). AIANs also have increased exposure to other air pollutants such as tobacco smoke, coal-fired power plants, diesel exhaust, and mining dust (Ward et al., 2011). The increased air pollution exposure, both indoors and outdoors, may play a role in the elevated cardiovascular and respiratory disease rates in this population.

THE ROLE OF INTERSECTIONALITY

When analyzing risk factors for CVD, it is impossible to neglect the role of intersectionality. As demonstrated with smoking, HTN, diabetes, and hyperlipidemia, these risk factors are multiplicative in their effect on CVD risk. For many risk factors, there is intersectionality among determinants of the risk factors, the risk factors themselves, and diseases caused by risk factors. For example, given the strong associations between CKD and CVD, CKD and diabetes, and diabetes and CVD, these conditions' modifiable risk factors and social determinants are all interconnected. SDs of CKD include psychosocial factors, healthcare access, and neighborhood (Jolly et al., 2009). Diabetes is the main reason for the excessive CKD burden in AIANs (Narva, 2018). Given that AIANs have higher rates of diabetes than any other ethnic/racial group, all the aforementioned diabetic social determinants in AIANs are also applicable to CKD (Table 1). As another example, refined carbohydrates are associated with increased prevalence of CVD, obesity, and diabetes, which themselves are CVD risk factors. The intersectionality of both CVD and diabetic SDs include income, employment, education, food access, loss of culture, and historical trauma. The structural determinants of diabetic social determinants include public policies, social policies, governance systems, colonization, historical forces, social forces, culture and societal values, economy, the educational system, and capitalism. These examples show the interconnectedness of multiple social determinants and disease states for one aspect of a CVD risk factor (diabetes). This interconnectedness may be an asset: if one intervention can successfully address one social determinant or one CVD risk factor, it may have exponential benefit toward the health of AIANs. Based on this review, the authors propose a new framework for conceptualizing the SDOH and CVD risk factors (CVDRFs) in AIAN populations (Figure 1). Here, colonization is the structural determinant that drives unequal and inequitable access to conditions that would promote health and wellbeing. Intersections between SDOH, genetic, behavioral, and social factors, and CVDRFs must be considered within the context of colonization and inequities when developing interventions that address CVD in AIANs.

POTENTIAL INTERVENTIONS TO ADDRESS DISPARITIES IN AIAN POPULATIONS

Interventions that address CVD risk factors and SDOH simultaneously have the most potential for impacting health and wellbeing. Specific interventions targeted towards the individual may not have the greatest effect on the population or addressing structural and institutional inequities but can have a profound effect on individuals or households. Individualized interventions are also more likely succeed because of their specificity, decreased cost, and simplicity.

Air pollution

The most successful personalized intervention found in this review was the stove exchange. In this project, the identified issue was households using stoves not designed for indoor use that were old and inefficient. By simply exchanging old stoves for modern, well-designed stoves, investigators decreased CVD risk due to HAP (Narva, 2018). Although this intervention did not address the overarching determinants of income constraints that forced the use of inadequate stoves, it could address a specific problem and reduce exposure to HAP.

Physical inactivity

A common theme across many CVD risk factors is their relationship to physical inactivity. Specifically for exercise, lack of places for safe exercise both in adults and children was identified as a problem. Although the rural nature and poverty of reservations present challenges, existing community centers and chapter houses may offer a safe place to exercise. Focusing on exercises that can be done at home and with minimal equipment may further promote activity without the need to commute to a central location. Local solutions do not need to be limited to exercise; they could include educational topics such as healthier eating or increasing health literacy.

Diabetes and kidney disease

Because much of the CKD burden is due to diabetes and the incidence of diabetes is elevated in AIANs, the IHS has aggressively implemented and monitored optimal care practices for people with diabetes at risk for progressive kidney disease (Narva, 2018). In 1989, the IHS established a dedicated kidney disease program to promote prevention and optimal care of CKD. Treatment strategies that slow or halt the progressive loss of kidney function may attenuate CVD risk (Gansevoort et al., 2013). These interventions may have been successful: despite a prevalence 2–3 times higher than Whites, ESRD due to diabetes among AIANs has declined by 53% since 2000, more than any other group (Burrows et al., 2020; Narva, 2018).

Increasing access to quality health care

The most direct intervention to address CVD in AIANs is to increase the access to and quality of health care. IHS has long been underfunded and unable to provide quality primary care to AIAN populations (Marley, 2019). These are some potential solutions to elevate AIAN health care. First, it would be appropriate to include AIAN leaders and healthcare consumers in formal dialog about what solutions are acceptable and sustainable in their respective communities. Second, equitable distribution of health care spending to provide proper funding in support of AIAN health care has already shown great effectiveness in addressing chronic diseases and CVD risk factors like HTN in this population (Parker, 2019). Increasing funding to urban Indian health centers may dramatically increase healthcare access as these facilities often serve AIANs who use both tribal and urban health services. Third, greater support for AIANs who choose self-governance of their community health care systems from IHS may allow locally relevant and culture-specific care. Fourth, increasing the number and quality of healthcare facilities and infrastructure facilitating access to these facilities may alleviate problems in healthcare access in poor and rural communities. Fifth, universal or nationalized health insurance may help fill gaps remaining in IHS health services. Finally, increased training, recruitment, and retention of AIAN healthcare workforce will improve quality of care. AIAN providers are more likely to serve this population and patients often prefer care from providers of similar ethnic/racial backgrounds, both of which can improve health outcomes (Reshaping the Journey: American Indians and Alaska

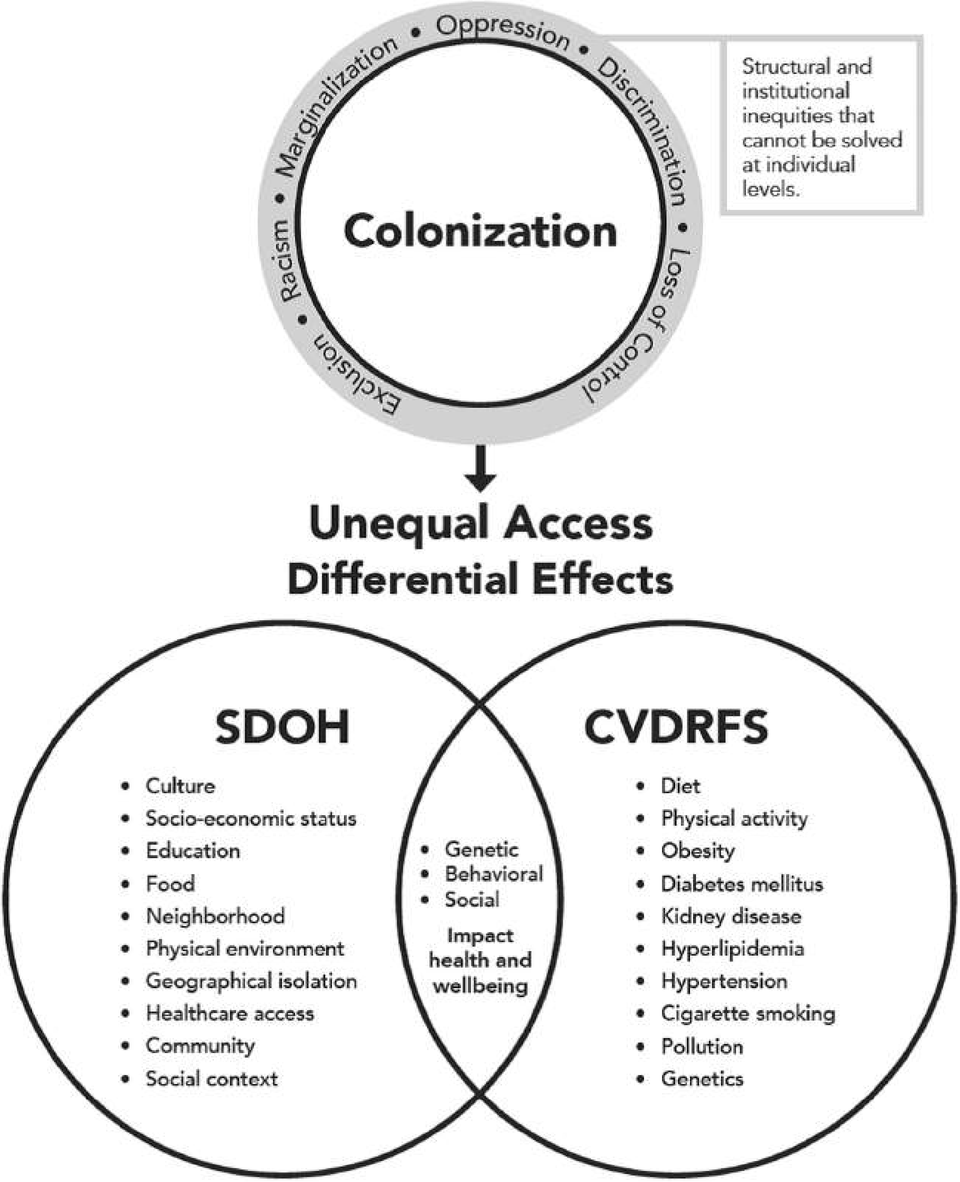

FIGURE 1 Structural determinants of cardiovascular disease (CVD) risk factors and social determinants of health (SDOH) in American Indians and Alaska Natives populations

Natives in Medicine, 2019). Universities must utilize a systematic approach to increasing the number of AIAN healthcare workers. Lessons from the University of New Mexico Indians Into Medicine program (IN-MED) from 2010 to 2014 identified two determinants of academic success: (1) early, diverse, and sustained exposure to role models, academic processes, math, and science, and (2) multilevel support where culture and language are reinforced, and environments are inclusive and supportive (Parker, 2019). Overall, with adequate resources, AIANs could have access to higher quality care to decrease CVD morbidity and improve the overall health of this population.

Addressing the structural determinants of health

Structural and institutional inequities influence every dimension of health (Russo et al., 2021). CVD risk factors like obesity, diabetes, HTN, and physical inactivity are not the cause. These risk factors are a symptom of colonization and subsequent structural and institutional inequities in AIAN populations. Policies and systems change are needed to promote equity in all places, where people live, work, grow, learn, age, and die. The current social and community contexts are set up so that Whites have advantage and privilege. White populations can more easily access employment, affordable food and housing, education, and healthcare (Russo et al., 2021). One of the most glaring disparities influenced by structural determinants is lower educational attainment. AIAN students report the lowest graduation rate in the nation, across any racial or ethnic demographic, with only 74% graduating from high school (National Center for Education Statistics, 2022). Increasing resources to support wellbeing throughout the life course, from conception to early childhood through tertiary education is critical. Federal assistance to AIAN populations seeking college degrees should be revamped with greater attention to SDOH. Most CVD interventions do not focus on educational attainment, income job skills, or social context--this is an injustice. In sum, CVD interventions must consider the interaction of structural determinants, genetics, behaviors, and social conditions that contribute to persistent disadvantage and unequal access in AIANs.

CONCLUSION

Common SDOH themes across the CVD risk factors in AIANs are income-related obstacles, cultural determinants, mental health, healthcare access, structural racism, discrimination, and failed policies. Taken together these factors resulted in political and economic disadvantages, manifesting as systemic socioeconomic disadvantage through elevated poverty rates, lower educational attainment, mental health challenges, and decreased healthcare access. These extensive social factors have a multifactorial effect across several CVD risk factors, ultimately leading to in elevated CVD morbidity and mortality.

Diminishing disparities is essential to facilitating a change in CVD for AIANs. However, attempts to do so face numerous obstacles such as rural isolation, colonial systems, discrimination, marginalization, diminishing returns and differential effects, lack of resources, and population heterogeneity making long-term benefits challenging (Assari, 2020). A new SDOH approach must consider the diversity of AIAN populations and their unique histories and culture, making an individualized assessment of challenges and resources essential to successful intervention. As exemplified by diet, CKD, and tobacco behaviors, interventions must take into consideration cultural and traditional influences and authentic community engagement when designing potential interventions. The multidisciplinary approach should include addressing social barriers such as lack of resources, inadequate education, and inferior healthcare while utilizing established programs, outreach activities, and communities to directly address both CVD risk and upstream determinants.

AUTHOR CONTRIBUTIONS

Eric Leung: Data curation; investigation; methodology; roles/writing - original draft; writing - review and editing. **Tassy Parker**: Methodology; formal analysis; validation; visualization; writing - review and editing. **Allyson Kelley**: Formal analysis; writing - review and editing. **James Blankenship**: Conceptualization; methodology; supervision; writing - review and editing.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

This manuscript has not been published elsewhere in part or whole. The authors have no conflicts of interest relevant to this topic. This work was not supported by funds from any organization. All authors have reviewed and approved the final manuscript. It was not approved by an investigational review board since it did not involve individual patients or protected health information. It meets all criteria for an ethical manuscript set forth in Wiley's Publication Ethics Guidelines (https://authorservices.wiley.com/ethics-guidelines/index.html).

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James Blankenship is currently director of the University of New Mexico Division of Cardiology and cardiac catheterization laboratories. He received an AB magna cum laude in biochemistry from Cornell University School of Arts and Sciences in 1976, an MD from Cornell University Medical College in 1980, and a masters of health care management from Harvard University School of Public Health in 2014. He completed residency in internal medicine and a fellowship in cardiology at the University of Michigan 1980–1987. He worked as an interventional cardiologist for Geisinger Health System until 2020 where he served as catheterization laboratory director for 20 years, as director of cardiology at Geisinger Medical Center for 10 years, and as chair of cardiology for Geisinger Health System for 3 years. He served as president of the Society for Cardiovascular Angiography and Interventions (2015–2016) and has represented the American College of Cardiology on the AMA's Relative Value Update Committee for 20 years. After submitting Rainier, Kilimanjaro, and Aconcagua (but failing on Denali) he moved to New Mexico to be close to his grandchildren.

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ORIGINAL ARTICLE

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The prevalence and social determinants of multimorbidity in South Africa

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Abstract

Multimorbidity is an increasing global public health challenge, however, most existing research focuses on high-income countries, with limited evidence from low- and middle-income countries. This paper aims to estimate the prevalence of multimorbidity in South Africa and analyse the associations between multimorbidity and social determinants of health in the adult population. Multimorbidity will be defined as the coexistence of two or more chronic diseases in an individual throughout this paper. Data from the South African National Income Dynamics Survey of 2017 was used with a total sample of 20,833. A binary logistic regression was performed to analyse the associations between multimorbidity and several social determinants of health indicators based on the Commission on Social Determinants of Health Framework. Multimorbidity was prevalent in 5.4% of the South African adult population surveyed, with 71.35% of those with multimorbidity being female. Hypertension was the most common NCD and the highest contributor to multimorbidity. Multimorbidity was found to have statistically significant associations with age, obesity, being female, being of Colored or Asian/Indian ethnicity, being in employment, and having no schooling. This study highlights the importance of analysing the associations between multimorbidity and the social determinants of health. Further research on multimorbidity is required in low- and middle-income countries to understand the specific challenges not identifiable in the existing research predominately based in high-income nations.

KEYWORDS

comorbidity, multimorbidity, social determinants of health, South Africa

BACKGROUND

Studies on multimorbidity have often been conducted in high and middle-income countries with limited research focusing on developing nations (Bayes-Marin et al., 2020). In high-income countries, the main driver of multimorbidity is age, with a larger proportion of the population living with disease as the demographics change and the population continues to age (Whitty et al., 2020). Despite the lack of an established definition of multimorbidity, in this paper, we adopt the common understanding of the concept to be the coexistence of two or more chronic diseases in an individual (Navickas et al., 2016).

Multimorbidity is a growing concern and is considered one of the greatest challenges facing population health and health systems globally (Pearson-Stuttard et al., 2019). Multimorbidity has been associated with higher rates of mortality, increased health expenditures as well as greater health service utilisation (Chang et al., 2019). Health services, and the complex interaction between diseases and their social determinants are generally configured to treat individual diseases rather than a combination of conditions, resulting in fragmented, inefficient treatment for multimorbid patients (Barnett et al., 2012). As multimorbidity increases, it is important to explore the causes and consequences of multimorbidity to help with the management of health services, ensure that population health is at the forefront of health system design and allow decision makers to apply the most cost-effective healthcare models (Navickas et al., 2016).

Five major domains have been identified that contribute to an individual′s health. These five categories are genes and associated biology; physical environment; clinical/medical care and public health services; health behaviours such as drug and alcohol use, tobacco use, physical activity and diet; and social and economic factors. Substantial evidence suggests that social and economic factors have the largest influence on population health and that policies that focus on the other four categories are unlikely to improve population health if societal characteristics remain unchanged (Tarlov, 2002).

The major health concerns in South Africa have historically been dominated by infectious diseases, with the most devastating epidemics since 1713 being smallpox, the bubonic plague, Spanish influenza, polio, and the HIV/AIDS epidemic (Phillips, 2012). However, as noncommunicable diseases (NCDs) rise, there is an increasing emerging pattern of high levels of multimorbidity in South Africa and across sub-Saharan Africa (SSA) (Gouda et al., 2019). In developing countries NCDs are increasing at an alarming rate, predominately in Asia and Africa (Islam et al., 2014) rising from 56% of the total disease burden in 2000 to accounting for almost 70% in 2020 (Tolullah & Natacha, 2017). In South Africa, hypertension is the most common chronic disease with 4.74 million South Africans suffering from it. With advancements in medicine and infection control, HIV/AIDS-related infections and deaths have reduced, however it remains second among the most prevalent chronic diseases in South Africa (Kamer, 2020). Moreover, South Africa has the highest prevalence of obesity and NCDs in sub-Saharan Africa (Otang-Mbeng et al., 2017). Other chronic diseases such as diabetes, arthritis, asthma, and mental illnesses are also highly prevalent. South Africa is the most industrialised country on the continent leading to the adoption of lifestyles that can increase the risk factors of NCDs.

Some researchers claim that the roots of the dysfunctional health system and the combination of both the communicable and NCD epidemics can be attributed to policies present throughout colonial subjugation, the apartheid period, and the postapartheid environment (Coovadia et al., 2009). South Africa is a complex country due to its history of discrimination based on race and gender, as well as the juxtaposition of extreme wealth and poverty. The legacy of apartheid in South Africa as well as the quadruple burden of disease including diseases of poverty, NCDs, communicable diseases, and violence and injury, means vast socioeconomic disparities have persisted, evidenced by health inequalities (Omotoso & Koch, 2018).

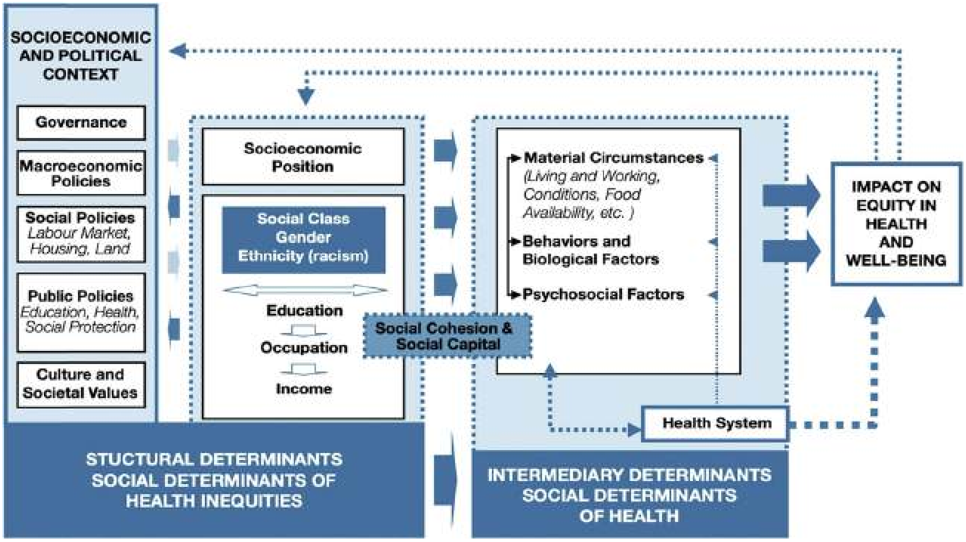

FIGURE 1 Commission on Social Determinants of Health Framework (Solar & Irwin, 2010)

The Commission on Social Determinants of Health framework (CSDH), illustrated in Figure 1, shows how social determinants of health can be divided into structural and intermediary determinants. This is a conceptual framework, which visualise the expected relationship between variables. The diagram highlights how the socioeconomic and political context produces and maintains social hierarchies through several channels (such as public policies) that influence education and health, and cultural and societal values (Solar & Irwin, 2010).

Structural determinants are made up of systems and policies that create health disparities. The structural mechanisms that influence socioeconomic position include age, social class, gender, race/ethnicity, education, occupation, and income.

This paper contributes to the current literature surrounding multimorbidity by analysing the associations of social determinants of health in South Africa in 2017. Much of the existing research focuses on high-income countries but as the issue of ageing population continues to rise and chronic disease becomes more prevalent, multimorbidity is emerging as a key public health challenge even in low- and middle-income countries where NCDs have historically dominated. From reviewing the existing evidence base, it is clear that further studies are needed to analyse the risk factors of multimorbidity in regions with great health disparities. This paper will allow for trends and changes to be identified between the 2008 and 2017 data, and thus illustrate how factors affecting health and multimorbidity have changed in South Africa over this period of time. Alaba and Chola conducted a similar study using the South African National Income Dynamics Survey (SA-NIDS) in 2008: this study is a follow up to their original study and aims to supply important evidence on this topical issue, with the findings allowing changes/trends to be recognised over the decade (Alaba & Chola, 2013).

METHODS

Analysis population

The study utilised the survey SA-NIDS 2017, Wave 5, produced by the Southern Africa Labor and Development Research Unit based at the University of Cape Town and sponsored by the Department of Planning, Monitoring and Evaluation and the Government of South Africa (Southern Africa Labor and Development Research Unit, 2018). This data was publicly available following a request detailing the intending methods of analysis and where the data would be presented.

Alaba and Chola's study utilised the 2008 SA-NIDS to investigate social determinants and multimorbidity. The intermediary and structural determinants involved in this paper have been selected based on those utilised in the previous study.

SA-NIDS is a longitudinal survey that began in 2008 with a nationally representative sample including over 28,000 individuals and 7305 households (Southern Africa Labor and Development Research Unit, 2018). The survey was created with the purpose of tracking the well-being of South Africans over a period of years and following changes in their income, expenditures, assets, access to services, education, health, and other determinants of health and well-being (Leibbrandt et al., 2009). The intention of the survey design was to collect data every 2 years from the continuing sample members and their households. The target population of the survey was private households in all nine South African provinces, thus excluding collective living quarters such as military barracks, prisons, hospitals, student hostels, and old age residence homes (Leibbrandt et al., 2009).

The continuing sample members and their households totalled 30,109 participants in Wave 5 of the SA-NIDS conducted in 2017. Household and adult questionnaires were issued to all members aged 15 years or older. With a response rate of 79.3%, the researchers interviewed 23,891 individuals (Southern Africa Labor and Development Research Unit, 2018).

Several participants had missing information, for example, they did not provide a date of birth and thus their age could not be identified, therefore these respondents were excluded from our data analysis. Moreover, 1833 participants were excluded as they were aged between 15 and 17 years old and the study applied an age restriction of 18 years or older. Missing data on social and economic indicators, height and weight, age, sex and race, and multimorbidity were deleted. The final sample used in the analysis was therefore $n = 20{,}833$, as shown in Figure 2.

Dependent variable

The questionnaire administered to participants of the SA-NIDS asked individuals to state if they currently suffered from a range of chronic diseases including tuberculosis, high blood pressure, diabetes, stroke, asthma, and cancer. The conditions were required to have been confirmed by a doctor. These indicators were summed to generate a value ranging from 0 to 6, depending on how many of these chronic conditions the participant suffered from. A score of two or more meant the individual had at least two chronic conditions and thus suffered from multimorbidity. In the analysis these variables were separated into two categories of 0 = no multimorbidity and 1 = multimorbidity.

Independent variables

The independent variables included in the data analysis were based on the CSDH, which was established in 2005 by World Health Organization (WHO) to collate information pertaining to the social factors involved in health inequities and poor health and wellbeing (Marmot et al., 2010). The key recommendations of the CSDH were the need to improve daily living conditions; tackle the inequitable distribution of power, money and resources; and measure and understand the problem and assess the impact of action. Understanding

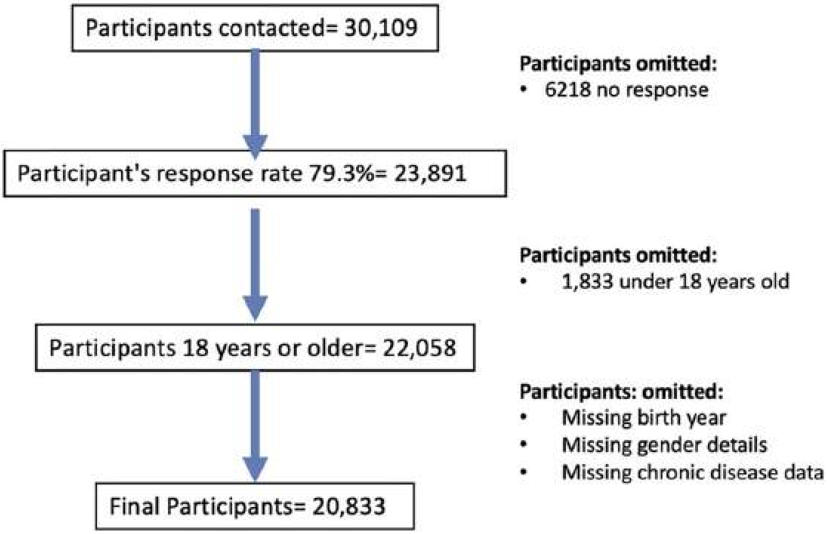

FIGURE 2 Flow chart for participant inclusion

the social determinants of health enables governments and societies to promote good health and wellbeing, in both a preventative and reactive manner. From the reviewed literature (Supporting Information: Material S1), it was hypothesized that structural determinants would be directly or indirectly associated with multimorbidity. Age and gender were frequently observed to be positively associated with multimorbidity with existing research associating being female, having urban residency, and older age with increased prevalence of multimorbidity. It was anticipated that educational attainment will be negatively associated with multimorbidity, however, several studies reviewed have conflicting findings regarding race and income.

The age variable was measured in single years from 18 years old and treated as a continuous variable in the logistic regression analysis (see below), to improve inference through the extra statistical information available in continuous quantities. Gender was dichotomized into 0 = male and 1 = female. The race variable was categorized into the following groups: 1 = African, 2 = Colored, 3 = Asian or Indian, and 4 = White, reflecting the population racial groups available in the SA-NIDS. Educational attainment was also categorized based on the classifications provided during the study. The variable was measured in years of schooling and grouped into the following categories: 1 = no schooling, 2 = primary (1–7 years), 3 = secondary (8–12 years), and 4 = tertiary (13+ years). The employment variable was divided into the categories of 0 = unemployed and 1 = employed, including both formal and informal forms of employment as stated in the SA-NIDS. Household income was grouped into five quintiles as given in the data set ranging from the poorest to the richest. The quintiles were noted as 1 = much below average, 2 = below average, 3 = average, 4 = above average, and 5 = much above average, with the average household income determined at the time by the Southern Africa Labor and Development Research Unit.

The data analysis also included intermediary determinants based on the CSDH framework, as shown in Figure 1. These are factors that immediately impact the quality of life of both the individual and the local community. The framework categorizes these factors into: material circumstances that include, but are not limited to, working and living conditions, accessibility and availability of affordable food and poverty and neighborhood safety; behaviors and biological factors such as genetics, smoking status, drug and alcohol use and diet and exercise; and psychosocial factors including mental illness, types of abuse, parental separation or divorce and incarceration of a household member. The psychosocial variables included in the research were smoking status and obesity. It was expected that being a smoker and/or being obese would be positively associated with suffering from multimorbidity.

Smoking status was measured as a dichotomous variable with 0 = nonsmoker and 1 = smoker. The obesity variable was based on body mass index (BMI) calculated from the equation BMI (kg m^{-2}) = Weight (kg)/Height (m^2), with the height and weight data provided in the SA-NIDS (NHS England, 2018). According to the NHS BMI measure, a score of 18.5–24.9 is a healthy weight, while 25–29.9 is overweight, 30–39.9 is classed as obese and ≥40 indicates severe obesity (NHS England, 2019). Therefore, a BMI score of ≥30 indicated that an individual was obese, generating the variables 0 = not obese and 1 = obese.

Data analysis

The statistical data analysis was conducted using STATA version 16.1 (StataCorp LLC, Texas, USA). From reviewing the existing literature, including the previous paper using the SA-NIDS 2008 by Alaba and Chola, the most frequent form of data analysis was multinomial logistic regression. Indeed, a binary logistic regression model is commonly used in health research to examine effects on the presence or absence of a particular disease (Harrell, 2015). We note that ordinal logistic regression may have been expected to be a reasonable approach to use with the data, analysing the dependent outcome on the original 0-6 scale.

However, it was anticipated that the proportional odds assumption would be violated in such an analysis. As such, a binary logistic regression approach was deemed most suitable, and was constructed with multimorbidity as the outcome variable and the aforementioned covariates as independent variables. Wherever appropriate throughout the statistical analysis, 95% confidence intervals are presented, meaning p-values < 0.05 were considered statistically significant.

RESULTS

The sample consisted of 20,834 participants ranging from ages 18 to 110, with a mean age of 39.54 years old (standard deviation, SD = 16.69). The majority of the sample were female (59.54%). Table 1 shows a detailed descriptive summary of the total sample. Approximately, 5.40% of the respondents suffered from multimorbidity with two or more chronic diseases reported. The frequency of each chronic disease measured in this study is shown, with the most common disease suffered being high blood pressure (16.80%), followed by diabetes (4.83%), tuberculosis (4.04%), asthma (2.69%), cancer (1.14%), and stroke (0.76%). As demonstrated in Table 1, 6124 adults suffered from at least one chronic disease, approximately 29.40% of the sample. Most of the respondents identified as African ethnicity (79.98%), followed by Colored (13.42%), White (4.99%), and Asian/Indian (1.61%). Secondary-level education was the most common educational attainment level at 55.87%, while 20.68% had tertiary-level education, 16.20% had just primary-level education, and 7.25% of respondents had no schooling. Most of the sample were unemployed (67.74%), while average income was the most common household income quintile reported (46.47%). Approximately, one-fifth of respondents were smokers (19.01%) and almost one-third were classified as obese (29.08%).

TABLE 1 Descriptive statistics of sample

	No multimorbidity (*n* = 19,710; 94.06%)	**Multimorbidity (*n* = 1,124; 5.40%)**	**Total *n* = 20,834**
Tuberculosis			
No	19,083 (96.82)	910 (80.96)	
Yes	627 (3.18)	214 (19.04)	841 (4.04)
Hypertension			
No	17,249 (87.51)	85 (7.56)	
Yes	2461 (12.49)	1039 (92.44)	3500 (16.80)
Diabetes			
No	19,410 (98.48)	417 (37.10)	
Yes	300 (1.52)	707 (62.90)	1007 (4.83)
Stroke			
No	19,665 (99.77)	1010 (89.86)	
Yes	45 (0.23)	114 (10.14)	159 (0.76)
Asthma			
No	19,387 (98.36)	886 (78.83)	
Yes	323 (1.64)	238 (21.17)	561 (2.69)
Cancer			
No	19,563 (99.25)	1034 (91.99)	
Yes	147 (0.75)	90 (8.01)	237 (1.14)
Gender			
Male	8107 (41.12)	322 (28.65)	8,429 (40.46)
Female	11,603 (58.87)	802 (71.35)	12,405 (59.54)
Race			
African	15,934 (80.84)	729 (64.86)	16,663 (79.98)
Colored	2544 (12.91)	251 (22.33)	2795 (13.42)
Asian/Indian	295 (1.50)	41 (3.65)	336 (1.61)
White	937 (4.75)	103 (9.16)	1,040 (4.99)
Education			
None	1336 (6.78)	175 (15.57)	1511 (7.25)

(Continues)

TABLE 1 (Continued)

	No multimorbidity (*n* = 19,710; 94.06%)	Multimorbidity (*n* = 1,124; 5.40%)	Total *n* = 20,834
Primary	3006 (15.25)	369 (32.83)	3375 (16.20)
Secondary	11,244 (57.05)	395 (35.14)	11,639 (55.87)
Tertiary	4124 (20.92)	185 (16.46)	4309 (20.68)
Employment			
Unemployed	13,181 (66.87)	932 (82.92)	14,113 (67.74)
Employed	6529 (33.13)	192 (17.08)	6721 (32.26)
Household income			
Much below average	3255 (16.51)	161 (14.32)	3.416 (16.40)
Below average	4953 (25.13)	291 (25.89)	5244 (25.17)
Average	9126 (46.30)	555 (49.38)	9681 (46.47)
Above average	1,750 (8.88)	86 (7.65)	1836 (8.81)
Much above average	626 (3.18)	31 (2.76)	657 (3.15)
Smoking			
No	15,940 (80.87)	933 (83.01)	16,873 (80.99)
Yes	3770 (19.13)	191 (16.99)	3961 (19.01)
Obesity			
No	14,231 (72.20)	545 (48.49)	14,776 (70.92)
Yes	5479 (27.80)	579 (51.51)	6058 (29.08)

Supporting Information: Materials S2-6 show the gender disparities in numerous determinants of health such as obesity, smoking status, educational attainment, employment status, and household income. A greater proportion of women were classed as obese at 41.27% (Supporting Information: Material S2), compared to men at 11.14%. Obesity is a major risk factor for NCDs and many studies have found a positive association between multimorbidity and obesity (Agborsangaya et al., 2013; Jovic et al., 2016). A higher percentage of women had no schooling or only primary education levels, whereas a higher percentage of males achieved secondary and tertiary levels of education in the study (Supporting Information: Material S5). Women also bore a greater burden of unemployment with 72.04% of females being unemployed. Some European studies have shown that unemployed people have a greater prevalence of psychological disorders, cardiovascular disease, inflammatory disease, and respiratory diseases compared to employed people (Yildiz et al., 2020). Hence, unemployed people are more likely to suffer from one and multiple chronic diseases, increasing their risk of suffering from multimorbidity.

As seen in Table 1, most of the people with multimorbidity were of African ethnicity (64.86%) which is expected as 80% of the sample belonged to this racial group. Furthermore, the majority of multimorbid individuals in the sample had secondary-level educational attainment (35.14%), were unemployed (82.92%) and of average household income (49.38%). Of those suffering from multimorbidity, 16.99% were smokers and 51.51% were obese.

Figure 3 shows the frequency of each chronic disease, by gender, in the total sample. For both males and females, high blood pressure was the most common chronic disease suffered. However, females had an incidence almost three times higher than males. Stroke was the chronic illness with the lowest prevalence in both genders. Overall, women had a higher prevalence for all six chronic diseases measured in the study.

Figure 4 presents the distribution of disease by gender. The figure shows that women had a higher prevalence of diabetes, hypertension, stroke, asthma, and cancer. However, males had a higher prevalence of tuberculosis.

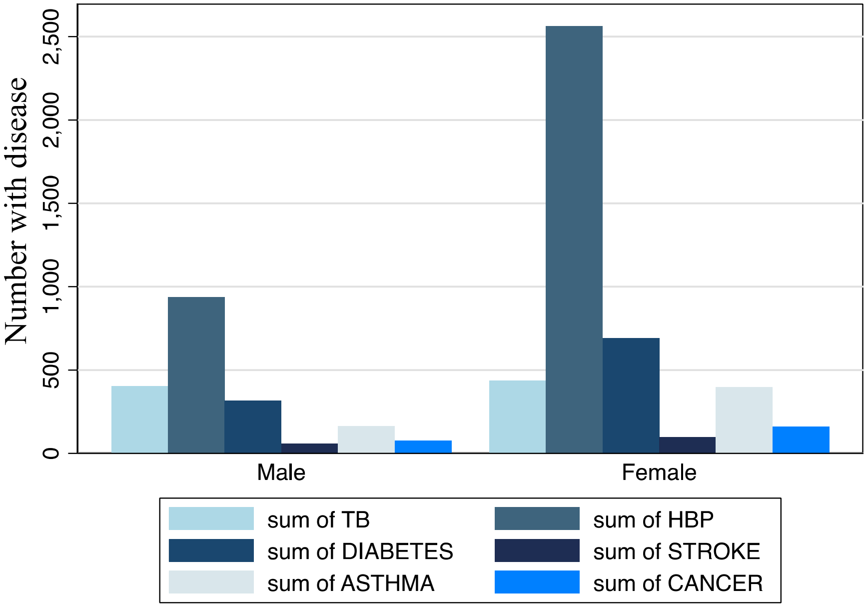

FIGURE 3 Chronic disease frequency by gender

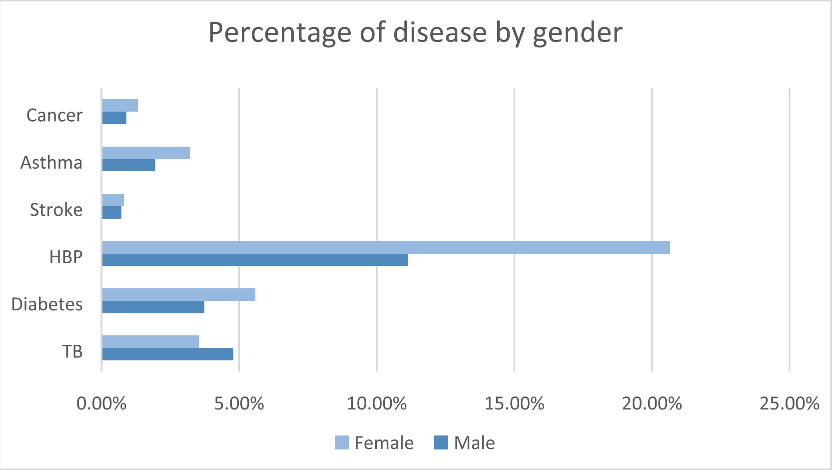

FIGURE 4 Percentage of disease by gender percentage of sample

Among the chronic diseases, hypertension was the highest contributor to multimorbidity, with 92.44%, followed by diabetes (62.90%), asthma (21.71%), tuberculosis (19.04%), stroke (10.14%), and cancer (8.01%).

Empirical results

A binary logistic regression was employed to analyse the association between the intermediary and structural social determinants and multimorbidity.

Table 2 shows that age was positively and significantly associated with multimorbidity (odds ratio [OR] = 1.07, 95% confidence interval [CI] = 1.07–1.08, $p < 0.001$). The odds of multimorbidity were 18% higher for females compared to males (OR = 1.18, 95% CI = 1.01–1.38, $p = 0.037$).

In terms of race, being of Colored (OR = 2.20, 95% CI = 1.85–2.61, $p < 0.001$) or Asian/Indian (OR = 2.62, 95% CI = 1.81–3.78, $p < 0.001$) ethnicity was found to have a statistically significant effect on multimorbidity relative to the African category. Belonging to the White racial group was not found to have a statistically significant effect on multimorbidity relative to the African racial group (OR = 0.64, 95% CI = 0.78–1.32, $p = 0.892$).

The odds of multimorbidity for those with no schooling, was found to be statistically significant. Specifically, the odds were 34% lower for those belonging to the no schooling group (OR = 0.66, 95% CI = 0.52–0.83, $p < 0.001$). However, having primary (OR = 1.10, 95% CI = 0.93–1.31, $p = 0.278$) or tertiary (OR = 1.06, 95% CI = 0.87–1.29, $p = 0.566$) level education was not found to have a significant effect on multimorbidity relative to having secondary level attainment.

Regarding the employment variable, the odds of multimorbidity were approximately 36% lower for the employed group (OR = 0.64, 95% CI = 0.54–0.77, $p < 0.001$).

For the household income variable, none of the five quintiles were statistically significant relative to the average household income category.

Intermediary determinants

In terms of the intermediary determinants, smoking was not found to be statistically significant (OR = 1.16, 95% CI = 0.95–1.41, $p = 0.126$). However, the odds of multimorbidity were 2.17 times higher for those in the obesity group (OR = 2.17, 95% CI = 1.88–2.49, $p < 0.001$). Overall, multimorbidity was found to have statistically significant associations with age, female, Colored and Asian/Indian racial groups, no schooling, unemployment, and obesity.

DISCUSSION

In 2008, 4% of the adult population suffered from multimorbidity (Alaba & Chola, 2013). The findings from this study show that this figure had increased 35%–5.4% in 2017. Nevertheless, multimorbidity has increased globally over the past two decades due to ageing populations so hence this trend was expected to be reflected in the SA-NIDS 2017 (Roomaney et al., 2020). In South Africa, the growth rate among those 60 years and older rose from 1.1% for the period 2002–2003 to 3.0% for the period 2019–2020 with 5.43 million people over 60 years old (Statistics South Africa, 2022) (Table 3).

Similarities and differences can be drawn between the findings of Alaba and Chola using the 2008 SA-NIDS and the findings of this study using the 2017 SA-NIDS. Age was

TABLE 2 Binary logistic regression analysis

Multimorbidity	Odds ratio	[95% Conf. Interval]	
Age	1.07201**	1.06679	1.07725
Gender			
(Ref) Male	1		
Female	1.18071*	1.01044	1.37968
Race			
(Ref) African	1		
Colored	2.19544**	1.84792	2.60831
Asian/Indian	2.61962**	1.81429	3.78243
White	1.01829	0.78360	1.32329
Education			
(Ref) Secondary	1		
No schooling	0.65595**	0.52138	0.82526
Primary	1.10061	0.92568	1.30859
Tertiary	1.05941	0.86975	1.29041
Employment			
(Ref) Unemployed	1		
Employed	0.64288**	0.53826	0.76784
Household income			
(Ref) Average	1		
Much below average	0.88391	0.72603	1.07614
Below average	1.02314	0.87210	1.20035
Above average	0.90548	0.70596	1.16139
Much above average	0.92089	0.62204	1.36330
Smoking			
(Ref) No	1		
Yes	1.16146	0.95868	1.40715
Obesity			
(Ref) No	1		
Yes	2.16711**	1.88443	2.49219
_cons	0.00119**	0.00087	0.00164

*$p \leq 0.05$.

**$p \leq 0.01$.

consistently found to be statistically significant with similar results observed in 2008 and 2017 (OR = 1.38 and OR = 1.07 respectively). Similarly, obesity had a strong, positive association with multimorbidity in 2008 and 2017 (OR = 2.33 and OR = 2.17 respectively). However, associations with gender, race, education, household income, and smoking

TABLE 3 Comparison between SA-NIDS 2008 and 2017

	SA-NIDS 2008 (OR)	SA-NIDS 2017 (OR)
Variable		
Age	1.38**	1.07**
Gender		
(Ref) Male	1	1
Female	1.17	1.18**
Race		
(Ref) African	1	1
Colored	1.43	2.20**
Asian/Indian	2.12	2.62**
White	1.92	1.02
Education		
Secondary	0.98	1
No schooling	1	0.66**
Primary	1.34	1.10
Tertiary	0.40	1.06
Employment		
(Ref) Unemployed	1	1
Employed	0.7	0.64**
Household income		
Average	3.02**	1
Much below average	1	0.88
Below average	2.23*	1.02
Above average	2.89**	0.91
Much above average	3.17**	0.92
Smoking		
(Ref) No	1	1
Yes	0.61*	1.16
Obesity		
(Ref) No	1	1
Yes	2.33**	2.17**

*$p \leq 0.05$

**$p \leq 0.01$

differed between the two studies. Most meaningfully, Alaba and Chola found a similar but not statistically significant association with multimorbidity and being female in 2008 (Alaba & Chola, 2013), whereas this paper shows strong, significant association analysing the 2017 data (OR = 1.17 and OR = 1.18). Overall, there are not any major differences in the findings between 2008 and 2017 with the trend in the indicators remaining generally similar. This implies that circumstances did not change much in the 9-year period. Nevertheless, a key change relates to the indicators race and income which are positively associated with multimorbidity in the 2017 data. One theory to explain this might be that generally people are wealthier and access to health services has improved. Therefore, people are more likely to be diagnosed early and seek medical treatment. Additionally, the people of South Africa are more likely to be in the working-class category and lead more sedentary lifestyles. Studies show that the Indian population in South Africa are among the most sedentary and have the highest rates of diabetes (Kader & Haffejee, 2018). Globalization and urbanization have driven underlying risk factors such as unhealthy diets, lack of physical activity, and the harmful use of alcohol and tobacco as the influence of westernised lifestyle contributes to the rising prevalence of NCDs in LMICs (Lalkhen & Mash, 2015).

In terms of contribution to multimorbidity, this study found hypertension was the most prevalent chronic disease, followed by diabetes. This supports the general findings of existing literature (Folb et al., 2015; Gouda et al., 2019; Weimann et al., 2016) and can be justified by the trend observed in adults aged 25 years and older that found the prevalence of hypertension displayed an increasing trend from 11.8% in 2005 to 14.3% in 2017. However, the prevalence of diabetes remained constant from 3.3% in 2005 to 3.2% in 2017 (Barhum, 2019). This differs from the results in Alaba and Chola's paper, which found that hypertension was the lowest contributor to multimorbidity (Alaba & Chola, 2013). This could be due to the growth of hypertension in the decade between data collection. In South Africa the prevalence of hypertension has increased from 29% to 49% in men and from 34% to 51% in women between 1998 and 2016 (Peer et al., 2021). A study of more than 4 million adults has shown that hypertension and diabetes often occur together as they share common causes such as obesity, inflammation, oxidative stress, and insulin resistance. Moreover, the study found people with high blood pressure were more at risk of developing type 2 diabetes (Barhum, 2019).

The accumulation of chronic diseases, from a gerontological standpoint, significantly accelerates with age leading to a loss of resilience and age-related multisystem homeostatic dysregulation (Fabbri et al., 2015). This can be attributed to the mechanisms that drive the ageing process being similar to those mechanisms that influence age-related chronic diseases (Fabbri et al., 2015). Numerous chronic diseases, such as dementia, are most commonly found in older people (Jaul & Barron, 2017). Elderly people have been subject to longer exposure and vulnerability to risk factors for chronic diseases (Lenzi et al., 2016). Furthermore, advancements in medicine and technology are ensuring people live longer and diagnostic rates are improved. Therefore, an ageing population are more likely to develop chronic disease and thus are contributing to the growing incidence of multimorbidity.

Gender disparities in multimorbidity have been explained through lower socioeconomic status, discrimination, and intersectionality among women of color in South Africa (Ademiluka, 2018). Moreover, higher rates of healthcare utilisation and longer life expectancies amongst women could lead to higher rates of diagnosis, hence more women report suffering from multimorbidity than men (Abebe et al., 2020). A South African study found that on average women had higher BMIs and lower educational attainment levels than men (McHiza et al, 2015). These are risk factors for several chronic diseases and thus increase the chance of experiencing multimorbidity.

Conflicting results have been found regarding race and multimorbidity with some research finding Indian or Asian people have increased odds of disease and other research suggesting African/Black people are more at risk (Amoateng et al., 2021; De Wet-Billings & Frade, 2020; Waterhouse et al., 2017; Weimann et al., 2016). The conflicting results are influenced by the country where the research has been conducted. However, being of color compared to White appears to be a common trend that increases the odds of multimorbidity.

Research has shown that the legacy of apartheid in South Africa continues to pertain social inequalities in health (Public Services International, 2019). The subsequent transition to a democratic government fostered policies of growth rather than redistribution of wealth which contributed to the economic disparities between races and the current significant public health challenges (Public Services International, 2019).

The positive association between education and health is well established, attributed to preventative care measures and increased knowledge of the risk factors associated with poor health outcomes (Raghupathi & Raghupathi, 2020). However, we found an association to contradict this concept. Findings show the odds of multimorbidity were approximately 36% lower for the employed group. A number of studies have found that unemployed people have a higher prevalence of chronic disease and increased odds of multimorbidity (Amoateng et al., 2021; Chung et al., 2015; De Wet-Billings & Frade, 2020). This is linked to deprivation leading to worse health outcomes due to financial and social issues. There are two main hypotheses to explain the relationship between employment and health outcomes. First, the causation argument states that those who transition from paid employment to unemployment will deteriorate in health, whereas the opposite transition will result in health improvements (Yildiz et al., 2020). Second, the selection hypothesis claims that those able to enter paid employment must already be in better health condition compared to those who remain unemployed, whereas those who leave employment must already have lower levels of health (Yildiz et al., 2020).

This paper examined the income variable and found no significant results with multimorbidity. However, previous literature reported a strong association with household income, with people from high-income households more likely to have two or more chronic diseases (Alaba & Chola, 2013). This relationship has a plethora of possible explanations. Notably, those from higher income can afford to consume more westernized diets, typically with higher calorie and fat contents which can lead to obesity and other health issues (Weimann et al., 2016). Moreover, those with higher incomes generally have less labor-intensive job roles such as office-based employment and thus adopt a more sedentary lifestyle. Nevertheless, the reverse relationship has also been found in LMICs like South Africa (Alimohammadian et al., 2017; Ataguba, 2013; Bayes-Marin et al., 2020). The association between poverty and suffering worse health is well established, as those from low-income households are more likely to be unable to afford or access healthcare and live in poorer housing and environments (Nwosu & Oyenubi, 2021). Income inequality has been exacerbated by the COVID-19 pandemic, having more deleterious health effects on those from poorer backgrounds relative to higher-income households (Nwosu & Oyenubi, 2021).

Although not statistically significant, the strong association between smoking and multimorbidity is reiterated by several studies finding current and past smokers have an increased likelihood of chronic disease and multimorbidity (Alaba & Chola, 2013; Alimohammadian et al., 2017; Bayes-Marin et al., 2020; Chung et al., 2015; Fortin et al., 2014). Predictably, obesity had a strong and statistically significant association with multimorbidity. This result supports the fact that obesity is a risk factor for several chronic diseases such as cardiovascular disease, diabetes, hypertension, and certain cancers (Pi-Sunyer, 2009). Numerous papers have found that obesity is associated with more than double the odds of multimorbidity (Agborsangaya et al., 2013; Alaba & Chola, 2013; Weimann et al., 2016), highlighting the significant influence this variable has on NCDs and multimorbidity.

The intersectionality of being a woman of color is proven to increase the odds of suffering multiple chronic diseases (Mbali & Mthembu, 2012). Vast inequalities of health persist in South Africa with unequal distribution of resources being a main challenge of the healthcare system. In 2017, a study found that over half of the South African population were living in poverty, the majority of whom were Black women (Futshane, 2021). Social identities of race, gender, and socioeconomic statues intersect and increase the risk of chronic disease and multimorbidity specifically in Black women (Baiden et al., 2022). Policy has previously taken a single attribute approach to addressing health inequalities however intersectionality theory could be a more promising framework for tackling health disparities (Holman et al., 2021).

Similarities and differences can be drawn between the findings of Alaba and Chola using the 2008 SA-NIDS and the findings of this study using the 2017 SA-NIDS (Alaba & Chola, 2013). Age was consistently found to be statistically significant with similar results observed in 2008 and 2017 (OR = 1.38 and OR = 1.07, respectively). Similarly, obesity had a strong, positive association with multimorbidity in 2008 and 2017 (OR = 2.33 and OR = 2.17, respectively). However, associations with gender, race, education, income and smoking differed between the two studies. Most meaningfully, Alaba and Chola found a similar but not statistically significant association with multimorbidity and being female in 2008 whereas this paper shows strong, significant association analysing the 2017 data (OR = 1.17 and OR = 1.18) (Alaba & Chola, 2013).

Overall, the results show that increased age and being female are consistently found to have positive associations with multimorbidity, in addition to unemployment and obesity. The statistically insignificant findings regarding income demonstrates that further research is needed concerning both income and wealth. The findings of this paper are valuable to understand the changing health landscape of South Africa and identify areas requiring intervention.

CONCLUSION

As the world is facing the issue of an ageing population, age-related multimorbidity will have major financial and social implications in both developed and developing countries. The burden of chronic diseases is estimated to be the biggest global financial challenge to nations and their healthcare systems (Lenzi et al., 2016).

This study contributes insightful and significant evidence to the existing literature by adding relevant analysis from recent data and by highlighting areas for further research, in particular the strong association with obesity observed in 2008 and 2017. Obesity is a risk factor for a plethora of chronic diseases and the significant association with multimorbidity found in both studies warrants additional study. As limited research has been done on multimorbidity in South Africa, this study provides relevant information that can be utilised by policy and decision makers.

In South Africa chronic disease management is designed to be provided using the integrated chronic disease management approach; nonetheless, this remains yet to be achieved as people suffering from multimorbidity commonly receive fragmented and inefficient health care delivery (Ayeni et al., 2020). In highlighting a strong association between obesity and multimorbidity in South Africa, this study emphasizes the importance for decision makers to address risk factors and reduce the level of obesity and, consequently, the level of multimorbidity.

As mortality rates decline but life expectancy increases, years lived with disability (YLDs) are on the rise (Atun, 2015). The strain that YLDs, driven by longevity, is having on health systems consists of increased demand and can precipitate greater out-of-pocket expenditures. Radical changes are needed to transition from the current reactive health system that focuses on diagnosing and treating disease to a more holistic, people-centered system that creates a synergy between primary care, community, and social care services better equipped to handle the challenges of multimorbidity.

For health systems to meet the demands of an ageing population in South Africa and support the challenges this evolution carries, synergy between healthcare services is required. Transitioning to a systems-based approach would manage the interactions between multimorbidity and the social, political, and economic determinants of health with the aim of interventions reducing future deprivation and chronic disease. The integration of health systems and services would also alleviate the strain that poor communication and coordination can place on patients with multiple diseases who thus require several health appointments that can be repetitive, expensive, and lead to fragmented care (World Health Organization, 2016).

Despite obesity being an important risk factor for multimorbidity, efforts to reduce obesity may be futile without key issues such as systematic and structural racism being addressed. Long-standing disparities in obesity levels could be a manifestation of systemic racism and addressing these fundamental issues could alleviate the disproportionate burden felt by people of color and minority groups (Aaron & Stanford, 2021). Even though policymakers have shifted the focus onto social determinants of health, examining racism and wealth inequality as a fundamental cause of social inequality and health disparities is key to reducing health inequalities and multimorbidity (Shelton et al., 2021).

Increasing incidence of chronic disease, longevity, and unhealthy lifestyles mean that multimorbidity is on the rise globally (World Health Organization, 2016). This study emphasizes the importance of addressing social determinants and the adoption of policies to tackle social determinants of health, at both a macro and micro level and of developing further research on this topic and on multimorbidity in low- and middle-income countries.

Limitations

There are several limitations related to the data included in the SA-NIDS. First, this study is likely to have underestimated the level of multimorbidity in South Africa for several reasons. Only a limited number of chronic diseases were measured in the SA-NIDS, allowing numerous other chronic diseases to be emitted from the analysis. Even though additional diseases were self-reported by participants, as they were not diagnosed by an expert it was not possible to judge whether the disease was active. Moreover, it is possible that individuals were unaware of chronic diseases they were suffering from due to undiagnosed or misdiagnosed illnesses being more predominant in those unable to afford or access healthcare services.

South Africa is home to 20% of all HIV/AIDS cases, making it the world's largest HIV population with almost 8 million people living with disease (UNAIDS, 2020). However, the SA-NIDS did not collect data pertaining to HIV/AIDS. This omission is likely to have resulted in mass under representation of multimorbidity.

As the SA-NIDS frame excluded certain living quarters such as student hostels, hospitals, and old age homes, this created a form of exclusion bias in which significant data about the health and social determinants of the individuals living in these establishments did not contribute to the research. It is likely that the individuals living in these facilities, particularly those residing in old age homes and hospitals, hold valuable data regarding health and social determinants.

All chronic diseases were required to be previously diagnosed by a medical professional to count towards the individual's health record. In South Africa, many NCDs go undiagnosed and untreated, particularly in the rural regions (Hansen, 2021). Moreover, chronic diseases were not measured at the time of the interview. Thus, it is undetermined if the chronic disease reported by the individual was active and contributing to their multimorbidity status. Since the individual chronic diseases were not measured at the time of interview, there was no possible method to quantify the intensity of the disease, hence no weight was placed on individual diseases.

Finally, as there is not an official definition of multimorbidity, it is plausible that medical professionals and academic researchers understand the concept differently as it is dependent on their own interpretation. The consequence of this ambiguity could result in conflicting judgments and conclusions being drawn.

ETHICS STATEMENT

This research paper utilised existing data in the public domain, therefore ethical approval was not required as the data was at population level.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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Backsliding among indicators of democratic stability relevant to public health: Risks in OECD nations

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Abstract

Oppression and inequality, as critical social and structural determinants of health, are key threats to public health. Democratic stability provides institutional measures to mitigate oppression and inequality. We investigate trends in democratic backsliding in the Organization for Economic Co-operation and Development (OECD) nations, overall, and compare trends in backsliding among specific indicators of democracy relevant to public health based on protections against oppression and inequality. We leverage a comprehensive, longitudinal, data set (V-DEM), capturing key indicators of democracy in OECD nations from 2010 to 2020. Indicators were selected from the scholarly literature on democracy and health for their effects on oppression and inequality. We observe trends over time in democratic stability among OECD nations, overall, and then compare trends in democratic stability or backsliding across OECD nations within categories of democratic indicators established to mitigate oppression and inequality. Democracy is declining across all OECD nations. Broad democratic declines are shown between types of OECD member states. Country income is not necessarily protective for democratic stability. We find specific declines in two measures with immediate implications for public health—Civil Liberties and Integrity of the Courts—across at least half of all OECD nations and a particularly alarming level of change in the United States. Politics shape and limit public health.

Declining components of democracy can have both short- and long-term consequences for population health by increasing inequality and reducing mechanisms to protect against oppressive tactics. Public health can play an important role in improving democracy by strengthening accountability.

KEYWORDS
democracy, inequality, oppression

Key points

- Democratic declines have acute and long-term consequences for population health by increasing inequality and reducing mechanisms to protect against oppressive tactics.
- Democracy is declining across all the Organization for Economic Co-operation and Development (OECD) nations, though with significant variation between countries.
- Middle-income countries show more volatility in their levels of democratic advance and decline, but the United States stands out among the richest countries for its level of democratic backsliding.
- Civil Liberties and Integrity of the Courts—two democratic indicators with immediate implications for public health are declining across at least half of all OECD nations.

INTRODUCTION

When we think about public health, we think about broad policy benefits that help protect the health of populations. The key to accomplishing public health goals is policymaking, where governments design and develop interventions to address public health problems. When government works best, policies are designed based on science and evidence, while addressing equity and the distribution of policy benefits.

What is often missing from public health discourse is the foundation of government on which policy processes exist. In the case of the United States and other high-income, Organization for Economic Co-operation and Development (OECD) nations, we think of liberal democracy. Here, we mean a government that is responsive to the needs of its constituents and provides benefits and protections for all (Fox, 2010; Greer et al., 2019). Designing public health policies to the needs of the people who are the recipients of public health policies is a key tenet of public health (Abbasi et al., 2018). The important presumption here is that public health was designed as a part of, and thus can only function well under, stable forms of government with protections for human rights and welfare and an established and functional welfare system to deliver public goods, provide safety net protections, and work to mitigate at least some primary types of inequality (Skocpol & Amenta, 1986).

But what happens if the government is increasingly unrepresentative of or unresponsive to its constituents, or if other interests shape public health policy outcomes beyond constituent needs and scientific evidence? Alternatively, what happens if core principles of democracy that protect the most upstream determinants of public health—like protections for human rights and against state-sanctioned violence—are eroded? Today, countries known as "consolidated democracies," which are relatively stable democracies across multiple international measures (Coppedge, 2020; Walter, 2022), are showing signs of democratic decline or backsliding.

Democratic backsliding is a public health problem for two reasons. First, there is a *normative* argument that public health necessarily is committed to key values such as respect for the individual and human rights, which are incompatible with authoritarianism. It is difficult to find a widely accepted framework of public health ethics or bioethics, more generally, that does not include a set of rights protections and respect for the autonomy of the individual, from the Belmont Principles to the Declaration of the Rights of the Child.

Second, there is an empirical argument, grounded in comparative politics, that backsliding increases the *probability* of worse public health systems and the potential for poor population health outcomes. There are instances of authoritarian governments improving public health, for example, the Philippines under Rodrigo Duterte (see Schaffar, 2021 for a detailed description of the case). Duterte brought about Universal Health Care in 2019, making the Philippines the first country in the Western Pacific to pass such a reform, thereby acquiring much acclaim from the World Health Organization (2019). However, moving away from democratic principles is associated with clientelism and corruption, which can undermine service provision, governance, and policy. If public health and public health policy are more likely to work only for certain groups of people, often people or groups in positions of *power*, as opposed to the citizenry as a whole, it can lead to the oppression of "outgroup" minority communities that are seen as a "threat" to the groups seeking to keep or gain power (Schneider & Ingram, 1993). Oppressive tactics—such as restricting voting, police violence, constraining policy benefits or provision of public health goods and services—have the effect of increasing inequality across constituent groups. Oppression is reflected across indicators of democracy such as election integrity and an independent judiciary, increasing the risks of both the restriction of goods and services to certain groups along with the use of repressive tactics. Corrupt misdirection of resources is easier if the people and communities that do not see results can be silenced or ignored (Uslaner, 2008).

While these patterns have certainly been observed throughout the 20th century in now "established" democracies, we typically think of many of these features as only occurring in nondemocratic nations or lower-income countries with shorter periods of democracy (Levitsky & Way, 2010). Our article builds on the growing literature demonstrating new declines in democracy among established democracies (Norris, 2022), focusing on declines among indicators most relevant to protections for public health.

Taken together, inequality and oppression, resulting from democratic backsliding, are key threats to the foundations of public health. We investigate trends in democratic backsliding in OECD nations, overall, and compare trends in backsliding among specific indicators of democracy relevant to public health selected based on protections against oppression and inequality. We use an international, longitudinal data set to measure and catalog changes in democratic indicators from 2010 to 2020 (Coppedge, 2020). This analysis highlights the threat of democratic backsliding and the democratic characteristics that are vulnerable to backsliding.

Overall, our findings illustrate where indicators of democracy are declining across all OECD nations. We find specific declines in two measures of democracy with immediate implications for public health by reducing protections against oppression and inequality—Civil Liberties and Integrity of the Courts—across *at least half* of all OECD nations. We conclude our analysis with the consequences of democratic backsliding for public health going forward.

DEMOCRACY AND PUBLIC HEALTH

Much of the literature on the relationship between public health and democracy has focused on health outcomes and inequality under stable, liberal democracies with long-established welfare regimes. Here, scholars importantly focus on heterogeneity in rates of inequality and adverse public- or population-level health outcomes, either within countries varying by subnational jurisdiction (Patterson & Veenstra, 2016; Rodriguez et al., 2013) or across countries to compare by welfare regime (Bambra, 2011; Hacker, 2002; Lynch, 2019).

Here we see a coalescing of two phenomena in the democracy and health literature. First, we have seen the progressive widening in inequality over time and across high-income countries since the 1980s (Kus, 2012; Tridico, 2018), indicating a change in the quality of democracy experienced by different populations and illustrated by changes in redistributive protections under welfare state system (Esping-Anderson, 1990; Lynch, 2019). Second, measures of democracy remained stable or increased throughout this period as a result of increased civil rights protections (Harre, 2022). Recently, scholars of democracy and health in the American context have increasingly begun to test the relationship between health and core indicators of democracy—such as election integrity (Montez et al., 2020; Pacheco & LaCombe, 2022). Our paper builds on these existing literatures to focus on a new, emerging issue emphasized by democracy scholars.

Specifically, our paper is interested in the reality of democratic backsliding, not as it pertains to the strength of the welfare state or heterogeneity of the quality of democracy for health outcomes among presumptively stable democracies. Rather, we examine the risks of greater democratic backsliding in core tenants of democracy or democratic indicators among "established" democracies. A growing chorus of literature in political science has established surprising trends in recent democratic declines among established democracies (Bauer & Becker, 2020; Gora & De Wilde, 2020; Grumbach, 2022; Norris, 2022; Waldner & Lust, 2018). Our paper expands on this literature by investigating trends in democratic backsliding among "stable" democracies across democratic indicators most relevant to *protections* for public health, whether because of direct violations of the normative precepts of public health (e.g. respect for rights under the rule of law) or because of changes in political decision making within a regime that make the adoption and retention of public health policies less likely. Here, we can think of these as protections against oppression, and state or policy capacity to reduce inequality.

Oppression

Backsliding in such core indicators presents risks to public health through other mechanisms beyond the quality and scope of the welfare state, and signals threats to human rights and livelihoods generally found in less established democracies or autocratic systems. Such threats include the protection of civil liberties, state-sanctioned violence, and election integrity. When broader threats to democracy are realized, these indicators affect downstream, traditional measures of democracy relevant to public health—such as welfare state provision of public goods (Greer et al., 2017; Levitsky & Way, 2010; Stenberg et al., 2022). Here, less stable democracies may have incentives for further restriction of public goods for certain groups to concentrate benefits among core supporters, along with tactics to *oppress and demobilize* pushback against constrained access to these public goods (González, 2020; Lerman & Weaver, 2014; Trounstine, 2008, 2018; Weaver & Prowse, 2020). Tactics of oppression may include heavy or militarized policing (González, 2020); voting restrictions (Helmke et al., 2022); use or promotion of violence by state and nonstate actors (Bartels, 2020; Vark, 2021); or limiting aspects of procedural justice (Hemrajani, 2022; Weaver & Prowse, 2020).

Inequality

We know from decades of research that the social determinants of health, such as housing, education, and income, have the greatest long-term effect on health outcomes (Marmot et al., 2008). Yet, the *structural* determinants of health, politics, policies, and laws ultimately determine the distribution and quality of the social determinants of health for different groups of people or constituencies (Creary, 2021). Thus, if a society does not have a stable governing regime, or has a corrupt governing regime, the *probability* of gross inequality and thus poor public health outcomes increases (Hanson, 2015; Knutsen & Rasmussen, 2017; Levitsky & Way, 2010). When understanding the relationship between democracy and public health, we must recognize the extent to which forms of governance, and governance institutions, as measured by various indicators of democratic quality and stability, are essential to public health.

The negative consequences of democratic backsliding for public health in high-income countries are not theoretical. Since a Populist Radical Right (PRR) government came to power in Poland, they have adopted a near-total ban on abortion (Berro Pizzarossa & Sosa, 2021), increased oppression of the LGBTQ community (Wyborcza, 2021), and increased contempt toward European Union legislation (Lorenz & Anders, 2021). After a wave of state-level challenges to the constitutional right to abortion in the United States, including one law in the state of Texas that enacted a functional ban on access to abortion while empowering private citizens to police and report providers performing abortions (Tavernise, 2021), the US Supreme Court struck down Roe versus Wade in summer of 2022 (Sidik, 2022). People who are or can become pregnant now have no access to abortion care including lifesaving reproductive procedures in more than one-quarter of the country (The New York Times, 2022). In Austria, amidst the credit blame game the new Austrian People's Party (new ÖVP), led by Chancellor Sebastian Kurz, enjoyed playing throughout the first three waves of the coronavirus disease 2019 (COVID-19) pandemic (Falkenbach, 2022); allegations of corruption, bribery, and false statements against Kurz and his inner circle led to Kurz's resignation as Chancellor in October 2021 and indications of democratic backsliding within the country (Falkenbach, 2022). In Hungary and other less stable democracies, new research demonstrates that trends to undermine fair elections accelerated during COVID-19 (Stenberg et al., 2022).

Why is democratic backsliding happening?

In the past decade, with the migration crisis of 2015 and the COVID-19 pandemic beginning in 2020, signs of democratic backsliding have been documented in many OECD nations. Well-developed democracies such as the United States are fueling social tensions, the media has become highly polarized, and disregard for the law under President Trump was standard (Sustainable Governance Indicators, 2022). The Trump presidency and the insurrection of January 6, 2021 further crystallized worries about the scale of democratic backsliding in the United States. Central and Eastern European (CEE) countries such as Hungary and Poland have seen a drastic reduction in judicial independence, an increase in corruption, and government control of the media (Drinóczi & Bień-Kacała, 2021). In Italy, the election of Giorgia Meloni, and the rise of the Brothers of Italy, portend the most far-right leader since Mussolini. While almost all political parties in Italy have been accused of abuse of power or fraud, influencing media, and corruption (Asquer et al., 2020).

So, why are established democracies backsliding? The most unsurprising answer is the increase in PRR parties and leaders, emphasizing ethnocentric sentiments, oppressing outgroups, spreading misinformation and mistrust of institutions, and promoting "strongman," or authoritarian actors (Mudde & Kaltwasser, 2017). The rise of populism and as a result democratic backsliding can be explained in several different ways: (1) Economic hardships, that is, when a country's economy is suffering, the citizens of a country want a reason and the far right can usually supply this in various forms: unemployment rates, resource distribution, and the EU's influence over national politics and decision making (Grzymala-Busse, 2017). (2) Particularly in Western Europe, the rise of the PRR "is a reaction to the failure of traditional parties' ability to respond adequately in the eyes of the electorate" to issues surrounding mass migration and financial insecurity (Albertazzi & Mueller, 2013; Daniele & McDonnell, 2015). (3) Immigration as a source of labor competition, a strain on the welfare system, and a cultural threat. In the mid to late 1990s, for example, countries with fairly low unemployment levels (Austria, Switzerland, Italy, etc.) found themselves faced with the onset of globalization and thereby labor shortages. This stark realization led to the demand by industry to open the borders so that Eastern laborers could fill positions. This influx of new workers from different socioeconomic and cultural backgrounds led to the emergence of exclusionary populism (Betz, 2001). In the words of Roger Griffen, many people in these countries felt "threatened by the pace of change" (Griffen, 1999). The PRR parties capitalized on this fear, which fit perfectly into their existing rhetoric.

An interesting development that has occurred over the last years with regard to the PRR and the issue of immigration is that many of the mainstream parties in Western Europe are "moving in the same direction as their more radical counterparts and have—to varying degrees—adopted similar approaches to immigration and integration as well (but not necessarily using the same rhetoric)" (Odmalm & Rydgren, 2019). With this development comes the natural risk that mainstream parties are fueling radical right-party support through their adaptation of more restrictive immigration positions (Down & Han, 2020).

PRR parties or actors have only recently been voted into positions of power, yet their threats are global. Since 2015, PRR parties have more than tripled their share of seats in the European Parliament (Inglehart & Norris, 2016), and a host of countries, including Hungary, Poland, Brazil, the United States, Spain, and Austria have fallen prey to PRR parties (Falkenbach & Greer, 2021). Other factors contributing to backsliding include the use of COVID-19 restrictions to silence critics, the tendency of countries to copy the antidemocratic behavior of other countries (see Orban's Hungary), and the use of disinformation to divide societies. Regardless, popular belief and support for democracy are deteriorating in all countries whether developed, transitioning, or still developing (Wike & Fetterolf, 2021).

METHODS

To measure the state of democracy, we leverage a comprehensive, longitudinal, data set capturing key indicators of democracy in OECD nations from 2010 to 2020. The indicators of democracy selected were chosen for their effects on oppression and inequality based on the robust scholarly literature on democracy and inequality, and democracy and oppression. We identify these democratic indicators as most relevant to public health—or our key measures of the relationship between democracy and public health. Importantly, these indicators work to protect public health by mitigating high levels of inequality and protection against oppression by promoting effective public health policy and governance. See Table 1 for our

TABLE 1 Supporting evidence and pathways by which indicators of democracy bolster governance to promote public health by mitigating inequality and oppression

Measure of democratic backsliding	Definition	Public health relevance	References
Election integrity			
Clean elections	The extent that elections are free and fair, with an absence of registration fraud, systematic irregularities, government intimidation of the opposition, vote buying, and election violence.	Makes politicians accountable to at least some voters, enabling accountability for providing public goods and services and reduce inequities	Gamm and Thad (2021) and Trounstine (2008)
Electoral democracy index	The extent of electoral competition, extensive suffrage, and political and civil society organization.	Party competition can result in benefit distribution across constituencies and civil society can help protect the public.	Helmke et al. (2022) and Patterson and Veenstra (2016)
Civil liberties and equity			
Social class equality in respect for civil liberties	The extent of civil liberties across socioeconomic groups, including private property rights, freedom of movement, and freedom from forced labor.	Inequalities in civil liberties can endanger groups' access to public health services or place undue burdens on particular groups that can harm health.	Bartels (2020), Montez et al. (2020), and Weaver and Gwen Prowse (2020)
Civil liberties	The extent that civil liberties are respected within a country, marked by the absence of physical violence committed by the government and/or its agents and the absence of constraints on private liberties.	The presence or threat of physical violence through oppressive tactics can endanger individuals or groups.	Keefer (2007)
Integrity of the Courts			
Access to justice	The extent that all citizens have secure and effective access to justice.	Unequal access to an effective system of justice can harm out-groups and diminish access to health, producing inequitable health outcomes.	González (2020) and Hemrajani (2022)
Predictable enforcement	The extent that laws are clear, well-publicized, coherent, stable, and enforced in a predictable manner.	Unpredictable legal enforcement can unduly harm out-groups, limiting their avenues for justice and placing legal burdens on them.	Acemoglu et al. (2005) and Lerman and Weaver (2014)

(Continues)

TABLE 1 (Continued)

Measure of democratic backsliding	Definition	Public health relevance	References
Censorship and corruption			
Government censorship effort—media	The extent that the government directly or indirectly attempts to censor print and broadcast media.	Censorship of media can fail to bring attention to outgroup discrimination and allows those in power to cover up abuses.	Wigley and Arzu (2011)
Political corruption	The extent that political corruption is pervasive within a country—within the executive, legislative, and judicial realms.	Corruption limits legitimate avenues for accountability and the distribution of benefits and burdens to groups.	Achim and Sorin (2017)

complete description of the evidence supporting and pathways by which these indicators of democracy bolster governance mechanisms to promote public health by mitigating inequality and oppression.

We utilize the Varieties of Democracy (V-Dem) data to create a summation of OECD countries' democratic trends. V-Dem is a global organization of researchers that collects annual multidimensional data on democracy and has been used in prior research projects. Our focus is on OECD nations because they are consolidated democracies that have traditionally been aligned with public health, and the wealthiest countries are the most likely to be democratic (Carey et al., 2019; Lührmann et al., 2018; Lynch, 2019). Additionally, backsliding among these nations raises troubling concerns for the threat of backsliding among non-OECD nations.

These descriptive trends, over time, across high-income democracies, allow for an evaluation of the risks to democracy among long-standing, stable democracies around the world. Further, as these indicators provide institutional protections for public health by mitigating risks of inequality and oppression, we contend that observing trends in these specific indicators should provide an initial assessment of the risks to public health in the capacity to protect against oppression and inequality, or greater degrees of such, among these nations.

Measures of democratic backsliding relevant to public health

To measure democratic backsliding among OECD nations, we include 10 measures of democratic institutions and freedoms from V-Dem (Pemstein et al., 2022). Shown in Table 1, these measures include key categories most recognized as essential tenets of democracy by scholars of democracy (Boese, 2019; Coppedge et al., 2017)—with critical implications for public health given their relationships with (1) oppression and (2) inequality. The broad categories these measures fall into are:

- Election integrity
- Integrity of the Courts or justice systems
- Civil liberties and equity
- Censorship and corruption

The combination of these measures provides a high-level overview of the health of democracy and risks to public health by virtue of being able to mitigate or protect against increasing inequality and subsequent oppression. Ideally, high-functioning democracies should demonstrate stability across all categories with little variation from year to year.

There are many different control variables that could be utilized to compare across country types to understand democratic backsliding. In this article, we do not seek to explain or predict conditions of democratic backsliding, but to identify and understand trends in democratic backsliding that are particularly relevant to public health. Furthermore, we do not attempt to measure the relationship between democratic backsliding and public health outcomes. As described in the "Democracy and public health" section, there has already been work done in this space, particularly relevant to heterogeneity in public health outcomes within and among established democracies. We rely on this literature for the foundation of our article and expand on this and the growing literature on backsliding in stable democracies to focus on and measure trends of democratic backsliding across indicators most relevant to public health—or indicators of democracy that enshrine protections against oppression and inequality.

In several instances, we do include per-capita gross domestic product (GDP) and the indicators of democracy across the OECD countries. We include GDP for three reasons: (1) to compare across descriptive trends over time; (2) GDP is relevant for understanding the relationship between inequality and democracy; (3) GDP may also be relevant for understanding the relationship between high-income countries as democracy; there has been a longstanding assumption that high-income countries are those with the most "stable" democracies.

After we selected the V-Dem measure included in the analysis, we normalized each measure. Normalization was required due to the different scales and directions of the different V-Dem measures. Data were standardized through min–max scaling, where each measure was scaled to a 0–1 range. The results presented include the trends in the individual components of democratic backsliding (means of the measures of each individual component by year), as well as the mean of the combined scores across individual measures by year. Three researchers collected the variables across each OECD country during the study period. See Supporting Information: Appendix 1 for data sets.

RESULTS

Our results illustrate broad declines in democracy across all OECD nations. Additionally, we find broad declines in democracy between types of OECD nations—by country region and country income—where income is not necessarily protective for democratic stability. We find specific declines in two measures with direct or immediate implications for public and population health—Civil Liberties and Integrity of the Courts—across at least half of all OECD nations. When analyzing trends across our specific measures of democracy relevant to public health, there is variation in the types of countries clustering around the measures, suggesting that we are seeing differential declines in democracy across different types of OECD nations based on GDP, all of which pose threats to public health.

Overall declines in democracy

When looking at our measures of democracy in aggregate, nearly half of all OECD nations (42%) have declining democracy scores (see Figure 1). Some of the largest declines occurred in western democracies: the United States, Germany, France, Denmark, and

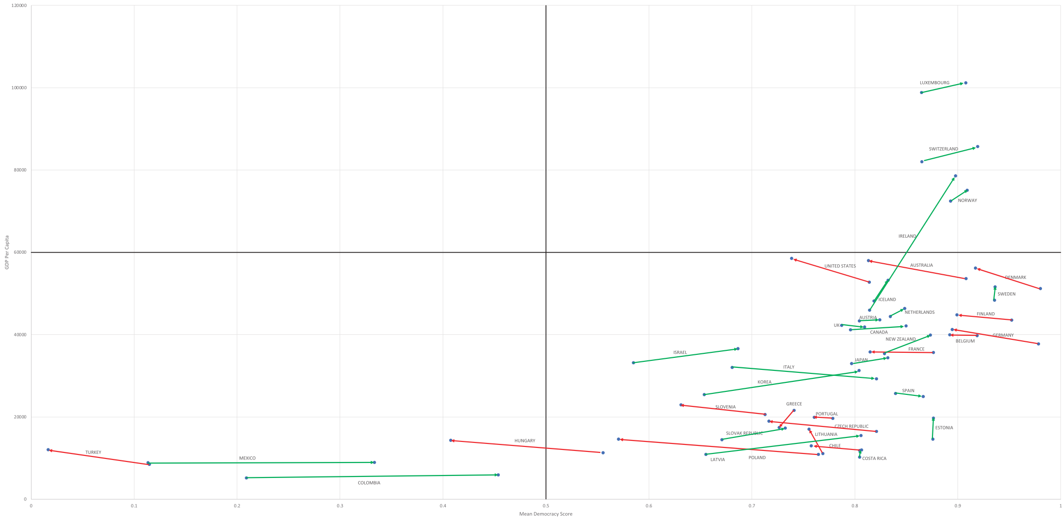

FIGURE 1 Relationship between democracy and gross domestic product across Organization for Economic Co-operation and Development nations

Australia. We also see the greatest declines among countries with a shorter history of democracy, including postcommunist states in CEE and middle-income countries such as Turkey and Slovenia.

It is also useful to consider the relationship between democracy and country income. In Figure 1 we plot the change in the average score across all measures of democracy by change in GDP per capita between 2010 and 2020. Red arrows indicate declining average democracy scores over time, while green arrows indicate improved democratization over the same period. Two important trends are occurring among OECD countries. First, there is some evidence of middle-income OECD countries making substantial gains in democracy overall, without significant gains in country income. For example, per-capita GDP in both Mexico and Colombia have basically remained static, but both countries have seen their democracy score more than double. Similar dynamics are in play in Israel, Latvia, and the Slovak Republic. Second, there are many instances where high-income OECD nations have made gains in per-capita GDP while experiencing substantial democratic decline: the United States, Germany, France, Denmark, and Australia. This finding may be particularly relevant for public health when considering the relationship between inequality and democracy.

Finally, it is useful to contextualize the mean democracy scores against each other across country types. As shown in Figure 2, while we see broad declines in democracy across nearly half of OECD nations, the final mean score for 2020 illustrates surprising results for clusters of countries with higher or lower mean democracy scores by the end of the decade. For example, by the end of the time period, we see the United States clustering its mean democracy score for 2020 in the bottom third of all OECD countries, comparable to other lower-income OECD nations with shorter histories of democracy or more recent periods of democratic backsliding (e.g., Slovak Republic, Greece). By contrast, some high-income countries that did not experience substantial backsliding but did not make substantial *gains* in democracy over the time period (Figure 1)—United Kingdom, Austria—rank in the middle tier of mean democracy scores by 2020 (Figure 2).

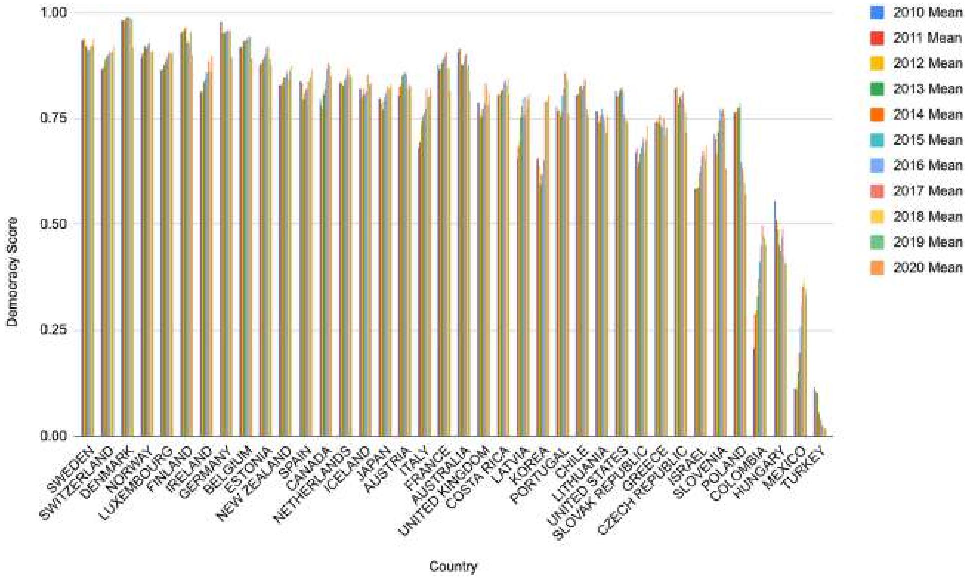

FIGURE 2 Democracy scores across Organization for Economic Co-operation and Development nations from 2010 to 2020, ranked by 2020 final mean democracy score

Declines in democracy across specific measures relevant to public health

Here, we present findings for two measures of democracy directly relevant to public health that experienced the most substantial declines. The trends in all measures of democracy relevant to public health can be seen in Figures 1 and 2 and Table 2.

Declines in civil liberties

For analysis of specific indicators of democracy, we took the mean change over time of our measures of each individual indicator (see Table 1) to create an aggregate measure of mean change in categories of indicators of democracy from 2010 to 2020 (see Table 2). Protections for civil liberties declined across exactly *half* of all OECD nations from 2010 to 2020. The magnitudes of change in declines in protections for civil liberties are substantial. Six nations saw declines greater than 10%, with another six countries experiencing declines greater than 5%. Overall, the countries' most experiencing declines in civil liberties were post-Soviet, CEE nations, some of which have experienced recent trends in democratic backsliding (Poland, Turkey, Hungary); the United States; and a few high-income western democracies—including Iceland, Portugal, and France. As described in Table 1, these findings illustrate declines in protections against oppression, including state-sanctioned violence and freedom to access social and public health services.

Declines in Integrity of the Courts

Integrity of the Courts, or the mean change across our two indicators of Integrity of the Courts (see Table 1) over the time period, decreased across over half, or 53% of all OECD

TABLE 2 Percent change in indicators of democracy relevant to public health from 2010–2020 across OECD nations, ranked from greatest reductions to greatest gains in democracy scores.

Country	Civil liberties percent change	Country	Censorship and corruption percent change	Country	Election integrity percent change	Country	Integrity of the Courts percent change
Turkey	−55.00	Turkey	−100.00	Turkey	−100.00	Australia	−35.91
Hungary	−20.97	Slovenia	−35.01	Hungary	−54.43	France	−30.51
Lithuania	−16.72	Poland	−30.81	Poland	−33.57	Czech Republic	−28.66
Slovak Republic	−15.61	Czech Republic	−21.65	United States	−11.91	Poland	−28.42
Iceland	−14.46	Hungary	−18.48	Czech Republic	−4.54	Denmark	−26.90
Portugal	−11.04	Chile	−17.65	Slovenia	−1.92	Germany	−26.46
Greece	−8.81	United States	−14.97	Australia	−1.50	Finland	−23.63
United States	−7.39	Greece	−12.93	Chile	−1.30	Belgium	−20.60
Slovenia	−6.19	Australia	−9.09	Germany	−1.13	Estonia	−14.78
France	−6.03	Japan	−7.96	Greece	−0.39	Portugal	−13.52
Poland	−5.68	Germany	−6.37	Sweden	1.18	Austria	−13.40
Sweden	−5.39	Finland	−3.76	Iceland	1.99	Canada	−11.23
Italy	−3.67	Belgium	0.27	Denmark	2.45	Slovenia	−9.70
Czech Republic	−2.77	Sweden	0.42	France	2.90	Costa Rica	−7.80
Chile	−2.38	Denmark	0.85	Ireland	3.40	United Kingdom	−6.85
Denmark	−1.69	Estonia	0.94	Portugal	3.41	Netherlands	−4.61
United Kingdom	−1.50	Costa Rica	2.31	Austria	3.77	Norway	−3.44
Luxembourg	−1.04	Switzerland	2.46	New Zealand	3.81	Spain	−3.05
Germany	−0.25	Luxembourg	2.75	Costa Rica	4.02	Chile	−1.29
Netherlands	0.44	Lithuania	3.37	Spain	4.17	United States	−0.73
Finland	0.48	New Zealand	3.49	Finland	4.77	Turkey	0.00
Costa Rica	0.64	Netherlands	3.54	Lithuania	5.27	Lithuania	1.65
Belgium	0.72	Ireland	4.28	Belgium	5.64	Korea	3.11
Japan	1.38	France	5.00	Norway	6.50	Sweden	3.97
Norway	1.59	United Kingdom	6.38	Netherlands	6.59	Switzerland	9.26
New Zealand	1.75	Norway	6.69	Luxembourg	7.70	Hungary	10.04
Spain	1.83	Canada	8.95	Switzerland	8.43	Latvia	10.05
Estonia	2.35	Portugal	9.67	Slovak Republic	9.55	Luxembourg	10.67
Austria	2.58	Iceland	9.72	Estonia	9.61	Israel	10.75
Australia	2.87	Spain	10.48	United Kingdom	11.32	Japan	12.51
Switzerland	5.02	Latvia	13.12	Japan	11.36	Greece	13.04

TABLE 2 (Continued)

Country	Civil liberties percent change	Country	Censorship and corruption percent change	Country	Election integrity percent change	Country	Integrity of the Courts percent change
Ireland	5.97	Austria	15.58	Italy	13.88	New Zealand	13.66
Canada	8.08	Slovak Republic	22.39	Israel	18.51	Iceland	19.00
Korea	9.44	Israel	26.56	Canada	18.95	Slovak Republic	24.56
Israel	16.32	Italy	57.24	Korea	26.93	Italy	30.57
Colombia	27.09	Korea	60.92	Latvia	42.66	Ireland	31.55
Latvia	27.78	Colombia	98.00	Mexico	116.26	Colombia	93.41
Mexico	485.13	Mexico	278.26	Colombia	600.30	Mexico	231.05
Eastern Europe	**−4.73**	**Eastern Europe**	**−8.26**	**Eastern Europe**	**−3.42**	**Eastern Europe**	**−4.41**
Western Europe	**−1.56**	**Western Europe**	**7.36**	**Western Europe**	**5.12**	**Western Europe**	**−4.00**

Note: Bold values shows cumulative change in regions (Eastern Europe, Western Europe).
Abbreviation: OECD, Organization for Economic Co-operation and Development.

nations from 2010 to 2020, as shown in Table 2. The magnitudes of change in the Integrity of the Courts were striking. For eight countries, the mean change from 2010 to 2020 was greater than 20%, or a greater than 20% *decline* in the Integrity of the Courts over the decade. Notably, countries experiencing the most democratic decline in measures of the courts were primarily western democracies—France, Germany, Denmark, Australia, Finland—and post-Soviet, eastern European countries with recent periods of democratic decline—Poland, Estonia, and the Czech Republic. These findings, as indicated in Table 1, illustrate decreased protections against inequality *and* oppression, by creating unequal access to justice systems, or protections against injustice, for different groups of people.

Variation in country type by categories of democratic indicators

While Civil Liberties and Integrity of the Courts experienced the broadest amount of democratic decline across all OECD nations, different categories of OECD countries experienced different types of democratic backsliding when examining mean change from 2010 to 2020 across the categories of individual indicators of democracy (Table 2). Most notably, while fewer than half of OECD nations experienced declines in measures of Censorship and Corruption, and Election Integrity, the countries experiencing declines in Censorship and Corruption, Election Integrity, and Civil Liberties were similar groups of countries. In each of these three mean categories, the greatest amount of backsliding occurred across the same nations: post-Soviet, CEE with recent periods of democratic decline, and the United States (see Table 2). These findings align with Figure 2. In 2020, at the end of the study time period, we see the United States clustered at the bottom third of nations alongside countries with shorter periods of democracy, lower or middle incomes, and histories of recent democratic decline.

The second key takeaway from the heterogeneity across countries in these mean changes across categories of individual indicators of democracy is that the countries experiencing the greatest declines in the Integrity of the Courts are very different from the countries with the greatest declines in the other three categories. These nations are primarily high-income, western European nations, ranked at the top third or middle third of nations in Figure 2, or the mean democracy scores at the end of the time period, 2020.

Limitations

We sought to specify the state of democracy with a particular focus on issues that are relevant to public health. This has costs and benefits. Our index weighs on aspects of politics that have direct rather than indirect effects on public health policymaking, as an upstream determinant of public health outcomes. However, public health outcomes themselves are not included in this analysis. The most robust health results are indicators such as life expectancy that are often slow to change to measure with regard to democratic backsliding and are not included in this analysis (Aburto et al., 2020). It is also important to note that while the literature on democracy and health outcomes is increasingly robust, there are some conflicting findings based on different governing regimes that make teasing out this relationship challenging (e.g., when authoritarian regimes invest in welfare, we may see positive correlations with life expectancy; Grassi & Memoli, 2020; Ross, 2006), which may obscure the nuances of the true relationships between health and democracy, including more complex relationships such as oppression. Again, we argue that backsliding away from democratic principles increases the probability of clientelism and poor public health outcomes related to gatekeeping of public goods and limited human rights protections.

Furthermore, this is one reason we aim to investigate the trends in indicators most relevant to public health governance protections against inequality and oppression, rather than directly measuring the relationship between democracy and health outcomes. Additionally, it is more likely that a focus on the provision of key public goods such as safe drinking water or streets, or measures of state-sanctioned violence (Kleinfeld & Barham, 2018) would be the relevant dependent variables to gauge the effect of more or less democracy on health outcomes. An extension of this research in the future could examine the indicators of democracy relevant to public health that are currently experiencing the highest degrees of democratic backsliding, and compare these measures to the relationship with the provision of key public goods.

Finally, we do not have a cross-nationally comparable indicator of subnational authoritarianism and democratic backsliding, though the QoG project is making progress (University of Gothenburg, 2022). Subnational authoritarianism, which generally directs national politics in an authoritarian direction, is a major issue in many countries. The United States has a long and problematic history with state-level "authoritarian enclaves" that includes slavery, Jim Crow, racial authoritarianism or the police state, and current state-level democratic backsliding (Mickey, 2015). New research detailing democratic backsliding in the states of the United States shows the strength of these antidemocratic forces and their negative impact on health (Grumbach & Michener, 2022; Montez et al., 2020). Future research should continue to examine the trends in these indicators facing the most serious declines at the subnational level in various countries, where trends in democratic decline may accelerate if a country is experiencing broader trends in backsliding, and protections against inequality or oppression may be easier to evade.

CONCLUSIONS

Our results demonstrate substantial democratic decline for nearly half of all high-income, OECD nations. This worrying trend can increase the probability of expansion of vulnerable populations and the likelihood of victimization occurring. We find that for *at least half* of all OECD nations, there are substantial declines in democracy for Civil Liberties and Equality and Integrity of the Courts. These democratic declines have acute and long-term consequences for public health by increasing inequality between groups of people; reducing protections against inequality; increasing opportunities for unchecked oppression; or using oppressive tactics against different groups of people. There are many examples in different OECD countries, from restricted access to social and medical services for refugees in western European countries (Kohlenberger et al., 2019) to state-sanctioned violence against peaceful protestors in the United States (Ihaza, 2020). This research is important in considering the potential shift from variation in the quality of democracy experienced by residents in consolidated democracies in terms of degrees of inequality and provision of or access to public goods and provision of these goods, to risks of further increasing inequality between groups within countries and the use of oppressive tactics by political actors to promote political regimes at the expense of the electorate.

Additionally, our work highlights three broad patterns. First, corruption and censorship have always been high in CEE countries as well as in many South American countries (Helmke & Levitsky, 2006; Sajo, 1998; Zaloznaya, 2017). Interestingly, since the onset of the COVID-19 pandemic in early 2020, we have seen an increase in both corruption and censorship among these countries (Horodnic et al., 2021). A likely explanation for the increased censorship is the authoritarian command these country leaders have taken during the pandemic (Greer et al., 2022). As for the increase in corruption, an increase in aid (COVID-19 aid from the European Union or elsewhere) typically brings with it an increased likelihood of corruption (Batory, 2020).

Second, reductions in protections for Civil Liberties have been broadly experienced. Even well-situated and respected countries, like Denmark and Sweden, experienced declining Civil Liberties scores, likely due to strict COVID-19 measures. In countries such as Turkey, Hungary, or Poland, where civil liberties have been on the decline for years (Esen & Gumuscu, 2021; Pap, 2017; Repucci, 2020), we see an unsurprising continuation and perhaps even more pronounced decline due to authoritarian COVID-19 measures and restrictions (Levine, 2021; Stenberg et al., 2022). Aside from the COVID-19 pandemic, civil liberties in CEE (Hungary, Poland, Slovenia, Slovakia, Czech Republic, etc.) are seeing their civil liberties decline as a result of a decrease in free and independent media, independent institutions (particularly the courts) and reduced support for civil society (Vachudova, 2020). It is easy to speculate that civil liberties measures will revert to high levels in many countries after COVID-19 policies end, but some backsliding or authoritarian regimes may retain measures for longer to retain control.

Lastly, the United States has seen an unusually dramatic downward trend across our indicators, which is not necessarily what one would expect in a wealthy country with a long history of procedural democracy. If we look at the variable Election Integrity, which includes access to elections, we see a downward-sloping trend since 2016. This is unsurprising given the increasing number of states enacting voter restriction laws. Examples include laws in Florida and Georgia adding additional rules for absentee ballots and the presenting of identification and removing power from local election officials (Fowler et al., 2022; Timm, 2022). In most cases, these measures pose a disadvantage to voters of color. Texas saw the rate of votes rejected increase from 1% to 15% from 2020 to 2022, disproportionately affecting racial minorities (Corasaniti, 2022). Some scholars argue that the United States is no longer a democracy at all, having backslid into being an “anocratic” blend of authoritarian and democratic practices. Anocracies are not just problematic for their authoritarian features; they are particularly unstable regimes with a high risk of civil war (Walter, 2022).

Finally, beyond the dramatic shifts in the United States, which are more visible now at the national level but have been persistent at the subnational level for centuries, it is important to contextualize the shifts we are seeing in Integrity of the Courts. As mentioned in the results, the countries seeing the greatest declines in the Integrity of the Courts are not the same group of countries that are experiencing the most backsliding overall, or across the means of the categories of individual indicators (Civil Liberties and Equality; Election Integrity; Censorship and Corruption). These countries have been otherwise insulated from democratic backsliding and have broadly remained at the top of the democracy rankings by the end of the time period. This distinct difference in the types of countries seeing shifts in their justice systems compared to other categories of democracy may indicate future democratic backsliding for the most consistent, stable, high-income OECD nations in future years.

What is to be done in the face of this widespread democratic backsliding? First, democracies can reinvigorate alliances and support for multilateral institutional building. This is particularly important for public health organizations within these democracies to help strengthen each other. This increased cooperation can include information sharing and holding each other accountable for furthering democratic principles and ideals (Greer et al., 2019). Second, an often-overlooked mechanism that can buttress democratization is the development of civil society (Scholte, 2002). Long-term democratic change can be brought about within struggling countries through increased international support for civil society and grassroots movements actively calling for democracy by producing additional accountability mechanisms and avenues for transparency (Warren, 2011). Public health organizations may be uniquely suited to garner democratic accountability by building civil society because, as discussed in this paper, of the intrinsic relationship between public health and human rights, and because of the unique organizational contexts in which public health exists. Public health organizations often bridge jurisdictions and in many cases countries, producing opportunities for external accountability and transparency. Furthermore, developing civil society is often a part of public health strategies in tasks to incorporate education, outreach, and service provision. Lastly, improving the status of access to fact-based and independent information can be a powerful tool to combat authoritarian regimes and democratic backsliding (Hollyer et al., 2011). Public health agencies and organizations may yet again be a key tool in mitigating disinformation campaigns that can exert pressure in increasingly oppressive regimes or regime tactics. During the COVID-19 pandemic, public health in many nations faced new challenges to science and scientific credibility through misinformation campaigns by partisan actors (Falkenbach & Willison, 2022; Greer et al., 2022). Public health agencies and actors have an opportunity to improve trust and mitigate the spread of misinformation by standing against misinformation campaigns and strengthening fact-based information sources (Macaulay et al., 2021).

Taken together, there are paths forward to strengthen democracy globally, but it requires immediate action and resources. Worse health outcomes have been associated with support for the PRR, as well as declines in political participation (Kavanagh et al., 2021). Therefore, improving and sustaining population and public health, independent of regime, is essential. Healthier people are more likely to participate in an election and less likely to support authoritarianism. There has been a global trend away from democracy, but supporting and improving public health increases the probability of democratization. Bolstering public health can, therefore, not only protect the health of the people but also the health of democracies.

ETHICS STATEMENT

Ethical approval was not required for this study because there were no human participants in the research design.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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Actors in conflict of interest in Iran's health system: Ranking and policy recommendations for conflict of interest management

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Abstract

We conducted this study to rank conflict of interest (COI) actors in Iran's health system. Based on a review of relevant literature, we extracted a list of 27 actors within seven categories who play roles in the COI in the health system. We considered three criteria for ranking the actors: the actor's interest, power, and authority concerning COI. Each actor scored one to five on the Likert scale in every criteria. Using descriptive statistics, each actor's mean and standard deviation of its scores were calculated in these three indicators. The actors were ranked using the fuzzy TOPSIS method. The results showed the leading players in abusing the COI in the health system of Iran are the “Food and Drug Organization” and the “Parliament.” The role and capacity of civil society and nongovernmental organizations as essential arms of oversight and transparency should not be overlooked. The government needs to enhance its efforts, we envisage, to utilize the capability of these actors by opening a dialog with them and providing the necessary training for COI.

KEYWORDS
conflict of interest, fuzzy TOPSIS, health system, policy actors, Iran

Key points

- The Food and Drug Organization and the Parliament are the leading players in conflict of interest (COI) management in the Iranian health system.
- As the central legislative body in the country, the Parliament might have the most significant effect on

COI management through appropriate and transparent law-making.
- It is necessary to consider mechanisms for selecting people with the least COI in policy and decision-making positions.
- The government needs to foster its efforts to make the best use of the energy and capability of civil society to manage COI.

BACKGROUND

Successful implementation of any policy hinges on good insight and knowledge about stakeholders. Accurate knowledge about the interests, political orientations, methods of influence, and power of each actor will enable the policymakers to develop meaningful and relevant policies (Brugha & Varvasovszky, 2000). Sakeholder analysis provides one or a set of tools for project policy-making, management and implementation processes (Varvasovszky & Brugha, 2000). In general, policymakers may use the results of stakeholder analysis to prevent potential conflicts, maintain fairness in interests, and avoid paying too much attention to a particular group, while overlooking others (Prell et al., 2009).

There are different definitions of stakeholder analysis. In one definition, stakeholder analysis is a process that first defines aspects of the phenomenon that influence individual decisions directly. The next step identifies individuals or organizations that affect or are affected by the phenomenon and prioritizes them, aiming to identify the main actors involved in decision-making (Reed et al., 2009).

On the other hand, stakeholder analysis is a process that aims to collect and systematically analyze qualitative information. The primary purpose of collecting this information is to determine the actors' interests when developing or implementing the policy (Schmeer, 1999). Others consider eight steps for the stakeholder analysis: (1) Planning for the stakeholder analysis process, (2) selecting and defining an appropriate policy, (3) identifying key stakeholders, (4) implementing data collection tools, (5) collecting and recording information, (6) filling in the stakeholder table, (7) analyzing the stakeholder table, and (8) using the collected information (Schmeer, 1999).

Although the approaches and goals of stakeholder analysis have similarities and differences, a key message is that collecting and analyzing data must be replicated. The main reason for this repetition is that the analyst needs to revise and deepen the previous levels of analysis. At each stage of the process, new data is acquired that must be combined and matched with the previous data (Varvasovszky & Brugha, 2000). Using the results of stakeholder analysis enables policymakers and managers to evaluate the knowledge, interest, opportunities, and alliances of key actors, which might help policymakers formulate the right policies (Schmeer, 1999). This process can lead to effective interaction with key actors and increase their likelihood of supporting the developed policies. In this case, one can hope that the policy or program is more likely to succeed (Schmeer, 1999).

Stakeholder analysis is essential for COI management. The Organization of Economic Cooperation and Development (OECD) defines conflict of interest (COI) as a situation in which public employees conflict with their official duties and personal interests (Whitton & Bertók, 2005). In another definition, a COI is present when judgments about professional responsibility are improperly influenced by the interests of an individual or organization (Claxton, 2007). Because COI situations can lead to corruption, the main goal of policymakers is to manage these situations and maintain public confidence in their decisions (Fineberg, 2017).

There are several methods and techniques for undertaking stakeholder analysis, such as standard stakeholder map, stakeholder triage, sociogram (Clayton, 2014; De Vita et al., 2016; Horita et al., 2019; Martikainen et al., 2015; Paletto et al., 2015), and multicriteria decision-making techniques such as fuzzy Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) (Ekmekcioğlu et al., 2021; Nilsson et al., 2016; Ozturkoglu & Turker, 2013). Proposed by Hwang and Yoon (1981), the TOPSIS is one of the most widely used Multi-Criteria Decision Aid (MCDA) or Multi-Criteria Decision Making (MCDM) methods for solving real-world decision problems (Behzadian et al., 2012; Tzeng & Huang, 2011).

Studies about COI in Iran are mostly concerned with the legal standards of COI (Milanifar et al., 2011), financial and nonfinancial COI (Khaji, 2015), COI in medical research (Ahmadi & Motevalizade, 2011; Rezaeian, 2010) and COI in the Ministry of Health and Medical Education (MoHME's) job positions (Memari, 2018). No studies have been conducted specifically on COI actors. In this study, we ranked actors whom perceived to abuse the COI situation in Iran's health system.

MATERIALS AND METHODS

This discriptive study aimed to rank the COI actors in the stewardship of Iran's health system. The main questions were: (1) How much interest, power and authority do each of the actors have in abusing the COI?, and (2) What is the rank of each of the actors in abusing the COI in relation to one another? Based on a comprehensive review of relevant literature (Khanjankhani & Takian, 2021), we extracted a list of 53 actors who play roles in the COI. The research team discussed and reduced this list to 27 actors within 7 categories.

To rank the actors, we considered three criteria: the actor's interest (the feeling of wanting to pay attention to something), power (the ability to influence others) and authority (having the moral or legal right or ability to manage people or organizations) to abuse of COI situation. The data collection tool was an online scoring form. We used the RABIT[i] platform to develop the form. Each actor received a score of one to five on the Likert scale in every criteria. We asked respondents to rate each actor based on the "what it is." To rank the actors, we used the opinions of 50 health system experts, with knowledge and practical experiences in COI in public and health policy, and sent them the questionnaire link. 35 experts completed the questionnaire (Table 1). Two participants were excluded from the study due to information deficiencies. In total, 33 questionnaires were included.

We analyzed data using Microsoft Excel. Using descriptive statistics, each actor's mean and standard deviation were calculated in three indicators. We ranked the actors using the fuzzy TOPSIS method, where the best alternative with the shortest distance from the positive ideal solution (PIS) and the farthest distance from the negative ideal solution (NIS) were chosen. Some researchers have extended the TOPSIS method for solving MCDM problems under various fuzzy environments over the last decades (Kutlu Gündoğdu & Kahraman, 2019). Due to its focus on a state other than true and false, fuzzy logic provides very valuable flexibility for reasoning, in which it is possible to consider uncertainties (Dernoncourt, 2013), and its application in policy-making is highly recommended. The fuzzy TOPSIS method comprises the following steps, as shown in Figure 1 (Ansari et al., 2020). The research was approved by the Ethics Committee of School of public health, Tehran University of Medical Sciences, Iran (number: IR.TUMS.SPH.REC.1398.152).

TABLE 1 Number of experts in each specialty or deputy.

The specialty/deputy		Number
Health policy	Specialty	5
Public Policy	Specialty	3
Health economic	Specialty	5
Healthcare management	Specialty	5
Medical ethics	Specialty	1
Deputy of Treatment	Deputy	5
Food and Drug Organization (FDO)	Deputy	4
Deputy of Education	Deputy	3
The National Iran's Health Insurance Organization	Deputy	1
Total	-	35

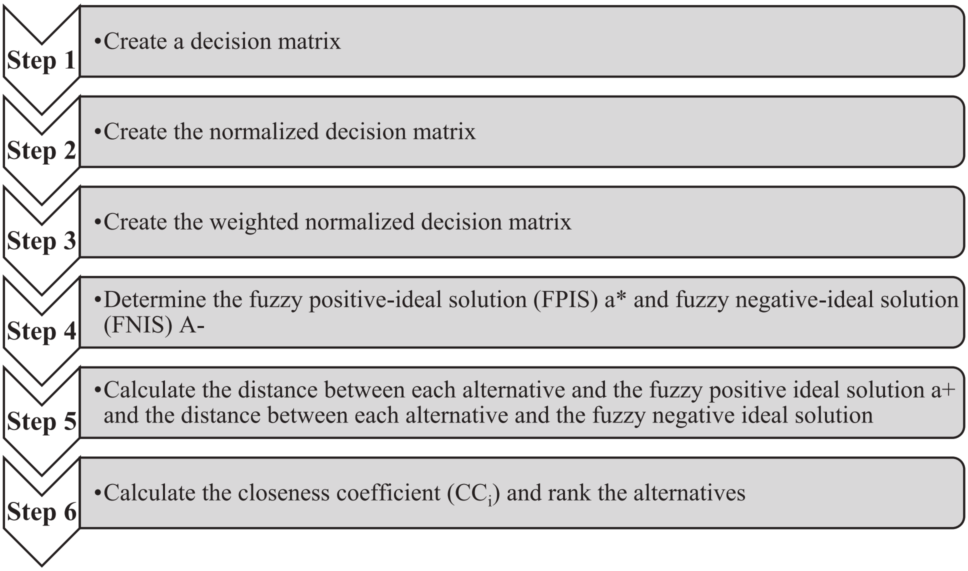

FIGURE 1 The fuzzy TOPSIS method steps.

RESULTS

Table 2 shows the descriptive statistics and TOPSIS results in each category. In the interest criteria, "FDO" (4.44 ± 0.95) and the "NGOs and patient support associations" (2.08 ± 1.26) received the highest and lowest mean. Also, in the power criteria, "FDO" and the "NGOs and patient support associations" scored the highest and lowest averages, respectively (4.64 ± 0.73 vs. 2.17 ± 1.11). Finally, in the authority criteria, "Parliament" (4.48 ± 0.12) and the "NGOs and patient support associations" (2.20 ± 1.40) received the highest and lowest mean. We used fuzzy TOPSIS to rank actors in each category. In the "Actors of the body of MOHME" category, the actors of the "FDO" ($CC_i = 0.69$) and the "Deputy of Cultural and Student Affairs" ($CC_i = 0.25$) were

TABLE 2 The descriptive statistics and TOPSIS results in each category.

		Descriptive statistics				Fuzzy TOPSIS in each category	
		Interest	Power	Authority	The total average		
Categories	Actors	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	CC_i	Rank
The MOHME and its affiliated departments	Deputy of treatment	3.91 ± 1.26	4.61 ± 0.81	3.91 ± 1.16	4.14 ± 0.40	0.63	3
	Deputy of nursing	3.26 ± 1.23	3.05 ± 1.15	2.88 ± 1.06	3.06 ± 0.19	0.39	8
	Deputy of education	3.41 ± 1.28	3.88 ± 1.06	3.67 ± 1.17	3.65 ± 0.23	0.52	4
	Deputy of hygiene	2.97 ± 1.35	3.29 ± 1.24	3.58 ± 1.15	3.28 ± 0.30	0.44	7
	Deputy of research and technology	3.26 ± 1.35	3.79 ± 1.06	3.61 ± 1.30	3.55 ± 0.26	0.50	6
	Deputy of development of management, resources and planning	3.94 ± 1.2	4.38 ± 0.85	4.18 ± 1.15	4.16 ± 0.22	0.63	2
	Deputy of legal and parliamentary affairs	3.44 ± 1.43	3.64 ± 1.22	3.44 ± 1.30	3.50 ± 0.11	0.51	5
	Deputy of culture and student affairs	2.29 ± 1.31	2.35 ± 1.12	2.52 ± 1.21	2.39 ± 0.12	0.25	9
	FDO	4.44 ± 0.95	4.64 ± 0.73	4.26 ± 1.05	4.45 ± 0.19	0.69	1
	The average of the category	3.43 ± 0.98	3.74 ± 0.68	3.56 ± 0.83	-	-	-
Affiliated actors with the MOHME	The Iran's Health Insurance Organization	3.39 ± 1.22	3.82 ± 0.90	3.70 ± 1.24	3.64 ± 0.22	0.42	3
	Universities of Medical Sciences	3.64 ± 1.22	3.91 ± 0.96	3.55 ± 1.13	3.70 ± 0.18	0.43	2
	Foreign Exchange Board of Trustees Fund	4.14 ± 1.13	4.5 ± 0.74	4.20 ± 1.14	4.28 ± 0.18	0.58	1
	The average of the category	3.73 ± 1.004	4.07 ± 0.66	3.82 ± 0.92	-	-	-
Related organizations and companies	The Red Crescent	3.23 ± 1.18	3.76 ± 1.04	3.35 ± 1.22	3.45 ± 0.27	0.53	3
	Social Security Organization	3.81 ± 1.07	4.17 ± 0.79	3.79 ± 1.17	3.92 ± 0.21	0.64	2
	NGOs and patient support associations	2.08 ± 1.26	2.17 ± 1.11	2.20 ± 1.40	2.15 ± 0.06	0.25	5
	Health syndicates	3.47 ± 1.30	3.14 ± 1.04	2.67 ± 1.27	3.09 ± 0.39	0.45	4
	Planning and budget organization	3.73 ± 1.30	4.44 ± 0.82	4.08 ± 1.08	4.08 ± 0.35	0.68	1

TABLE 2 (Continued)

		Descriptive statistics				Fuzzy TOPSIS in each category	
		Interest	Power	Authority	The total average		
Categories	Actors	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	CC_i	Rank
	The average of the category	3.26 ± 0.88	3.54 ± 0.58	3.22 ± 0.90	-	-	-
Decision-making institutions	Parliament	4.38 ± 1.07	4.61 ± 0.65	4.44 ± 1.049	4.48 ± 0.12	0.65	1
	Supreme councils	3.11 ± 1.45	3.44 ± 1.35	3.17 ± 1.31	3.24 ± 0.17	0.35	2
	Planning working groups and specialized committees of the MoHME	3.47 ± 1.26	3.26 ± 1.10	2.91 ± 1.19	3.21 ± 0.28	0.34	3
	The average of the category	3.65 ± 1.08	3.77 ± 0.84	3.50 ± 0.88	-	-	-
Trade unions and research organizations	Medical council	4.05 ± 1.36	3.91 ± 1.16	3.79 ± 1.27	3.92 ± 0.13	0.63	1
	Nursing council	3.52 ± 1.23	2.88 ± 1.00	2.85 ± 1.23	3.08 ± 0.38	0.40	3
	National research institutes and other research centers	3.05 ± 1.27	2.82 ± 1.08	2.73 ± 1.21	2.87 ± 0.16	0.35	4
	Scientific associations and specialized scientific boards	3.29 ± 1.54	3.20 ± 1.32	2.85 ± 1.25	3.11 ± 0.23	0.42	2
	The average of the category	3.48 ± 1.06	3.20 ± 0.83	3.05 ± 0.95	-	-	-
Other actors related to the health system	Health organizations affiliated with military institutions and other organizations	3.11 ± 1.34	3.38 ± 1.23	3.02 ± 1.35	3.17 ± 0.18	-	-
Institutions and regulatory mechanisms	Public oversight bodies	3.08 ± 1.40	3.85 ± 1.30	4.05 ± 1.30	3.66 ± 0.51	0.52	1
	Newspapers, radio and social media	3.5 ± 1.44	3.52 ± 1.21	3.32 ± 1.38	3.45 ± 0.11	0.45	2
	The average of the category	3.29 ± 1.15	3.69 ± 0.90	3.69 ± 1.23	-	-	-

ranked first and last. This arrangement in the “Affiliated actors with the MOHME” category was related to the two actors of the “Foreign Exchange Board of Trustees Fund” ($CC_i = 0.58$) and “The Iran's Health Insurance Organization” ($CC_i = 0.42$). In the “Related organizations and companies” category, two actors of the “Program and budget organization” and the “NGOs and patient support associations” were ranked first and last ($CC_i = 0.68$ vs $CC_i = 0.25$). In the “Decision-making institutions” category, the “Parliament” ($CC_i = 0.65$) and the “Planning working groups and specialized committees of the MoHME” ($CC_i = 0.34$) were ranked first and last. This arrangement in the “Trade unions and research organizations” category was related to the two actors of the “Medical Council” ($CC_i = 0.63$) and “National research institutes and other research centers” ($CC_i = 0.35$). In the “Institutions and regulatory mechanisms” category, two actors “the Public oversight bodies” and “Newspapers, radio and social media” were ranked first and last ($CC_i = 0.52$ vs. $CC_i = 0.45$).

In addition to ranking actors in each category, all actors were also compared. “Iran's Islamic Consultative Assembly and relevant commissions” was identified as the most influential player in MCOI ($CC_i = 0.77$). The “NGOs and patient support associations” were also identified as the least effective actors in MCOI ($CC_i = 0.22$). See Table 3.

DISCUSSION

This study aimed to rank the actors who abuse the COI situation in their stewardship of Iran's health system. Here, we focus discussion on the actors with the highest average score in the three indicators of interest, power (the “FDO”) and authority (the Parliament), and the lowest average score in these criteria (the “NGOs and patient support associations”). In addition, we discuss the actors with the highest (the Parliament) and lowest (the “NGOs and patient support associations”) ratings based on TOPSIS results.

Comparing the average scores of the actors in the indicators of interest and power showed that the FDO has the most interest and power in abusing the COI situation. Due to their decision-making power, high turnover, and numerous advisory committees, the FDAs in all countries can easily find themselves in the COI situations (Arthur et al., 2019; Steinbrook, 2005). The results of studies conducted in Iran show that as a result of its diverse tasks, the FDO is one of the most critical bottlenecks in the COI. The FDO's most important tasks are regulation of the production, import, distribution, and export of medicines, food, medical equipment and cosmetics; Issuance of drug and food licenses and medical equipment; and determining prices for public and private for pharmaceutical and laboratory services (Ashtarian et al., 2020; Memari, 2018). Performing these tasks within a structure provides an excellent opportunity for conflict of structural interests. Our findings also confirmed the FDO's highest power and interest in abusing the COI situation, hence managing the FDO's COI is an essential step for COI management in the entire Iran's health system.

The “Parliament” received the highest average score in the authority index. In comparison ranking between all actors in fuzzy TOPSIS, the “Parliament” was identified as the most influential actor in abusing the COI situation. It is important to note that a fundamental step to COI management is parliamentary intervention in drafting and amending appropriate laws, which may be insufficient without powerful enforcement of such laws by the executive bodies (Mortab et al., 2020). It is crucial that these institutions enjoy a stable political structure to avoid uncertainties and dysfunctions during political changes.

The Iranian Parliament's role in the Iranian legal system is to legislate and to monitor laws implementation (Islamic Parliament Research Center, 2022). The Parliament has two primary functions: legislation and oversight (Islamic Parliament Research Center, 2022).

TABLE 3 The comparative ranking of the actors.

Actors	CC_i	Rank
Parliament	0.70	1
FDO	0.69	2
Foreign Exchange Board of Trustees Fund	0.66	3
Deputy of Development of Management, Resources and Planning	0.64	4
Deputy of Treatment	0.63	5
Planning and budget organization	0.62	6
Medical council	0.59	7
Social Security Organization	0.58	8
Public oversight bodies	0.54	9
Universities of Medical Sciences	0.54	10
Iran's Health Insurance Organization	0.53	11
Deputy of Education	0.53	12
Deputy of Legal and Parliamentary Affairs	0.51	13
Deputy of Research and Technology	0.51	14
Newspapers, radio and social media	0.49	15
Red Crescent	0.48	16
Deputy of Hygiene	0.45	17
Supreme Councils	0.44	18
Planning working groups and specialized committees of the Ministry of Health	0.43	19
Health organizations affiliated with military institutions and other organizations	0.42	20
Scientific associations and specialized scientific boards	0.42	21
Health syndicates	0.40	22
Nursing Council	0.40	23
Deputy of Nursing	0.39	24
National research institutes and other research centers	0.36	25
Deputy of Culture and Student Affairs	0.26	26
NGOs and patient support associations	0.22	27

According to Article 71 of the Constitution, similar to other countries, the Parliament may legislate within the constitutional boundaries. For example, the British Parliamentary system operates in two chambers: the House of Commons and the House of Lords. Both are tasked with legislating, reviewing government work, and discussing current issues. In addition, the House of Commons is responsible for giving the government money by passing bills that increase taxes. In general, decisions made in one chamber must be approved by another. This two-chamber system acts as a control and balance for both houses (The Parliament of United Kingdom, 2022). In Austria, the Parliament is first and foremost responsible for reviewing bills, passing them into laws, reviewing the government's performance, and monitoring only its most essential tasks (The Parliament of Austria, 2022). In the Netherlands, the House of Representatives and the Senate have the power to carry out their duties effectively. These rights include the right of the Parliament to evaluate the budget, investigate, question the members of the government and present the plan (Government of Netherlands, 2022). In recent years, Iran has taken major steps to COI management, that is, the COI Management Plan (February 2019), the Improving the Administrative Soundness and Combating Corruption Act (June 2020), the COI management in Performing Legal Duties and Providing Public Services Act (June 2020) and the Act to Improve the Administrative Soundness and prevent COI (August 2021) (Madihi, 2022), most of which were not satisfactorily implemented.

This study showed that the "NGOs and patient support associations" get the lowest average score in the interest, power, and authority indicators. Some countries have institutionalized the use of civil society views in the policy-making process with the aim of COI management. For example, the media and citizens in Poland, the Czech Republic, Canada, and the United States comment on specific policies. In Portugal and Slovakia, the employees' associations and NGOs are involved in the policy review process. Studies on the practical implementation of the COI policy in Hungary revealed that government consults civil society organizations in the social dialog process (Whitton & Bertók, 2005). In Thailand, the National Health Assembly (NHA) is one of the most critical social mechanisms for facilitating evidence-based policy-making. The assembly's main emphasis is on inclusive participation as a policy-making process throughout the year. In this assembly, the inclusive participation of the government, universities, the health professions, and the public sector lies throughout this process (National Health Commission Office, 2020). In Iran, the Parliament holds public opinion polls on draft plans and bills, such as public opinion on the bill on COI management in public services, the civil liability bill on nuclear damage, the bill amending the law on engineering system and building control, and sports and athletes protection plan (Asghari, 2021; Islamic Consultative Assembly Research Center, 2021; Mazandaran Construction Energineering Organization, 2021; Samadpoor, 2020). However, little evidence exists to understand how the results of these surveys were used.

Previous experience in Iran shows that granting civil society organizations and the press with some authority might help them play an important role in bridging the gap between citizens and the government (Razmi et al., 2016). These institutions help gather the necessary information from the country's administrative system and hold managers accountable. In addition, they can help consolidate and explain the interests of citizens and strengthen the process of overseeing and holding the government accountable by equipping both the people and members of Parliament (Razmi et al., 2016). In particular, strengthening civil society through enhancing public awareness is important in COI management. The existence of informal oversight can be as necessary as formal oversight of compliance with and enforcement of rules and regulations (Asian Development Bank [ADB], 2007; World Health Organization, 2016). Civil society can increase trust and cooperation through citizen participation and clarify the political rights and duties of the people by increasing political participation and political competition (Plumptre & Graham, 1999). It can also play an important role in strengthening social capital, increasing citizens' empowerment, and making government institutions accountable by creating the necessary channels and information resources. Improving skills such as critical thinking, public relations, bargaining, and forming coalitions are other cornerstones of civil society that could help to advance COI management goals (Weiss, 2000). Therefore, we advocate that governments put the participation of civil society, NGOs, and national associations of local and regional authorities at the forefront, and with their help, provide the necessary training in the field of ethics and COI in the society (Council of Europe, 2018).

CONCLUSIONS AND POLICY IMPLICATIONS

This study showed that the FDO and the Parliament are the most prominent COI abusers in Iran's health system. Comparing all actors revealed that the FDO have the most interest and power, and the Parliament has the most authority in abusing COI. The FDA is prone to various structural conflicts of interest with multiple tasks. It is necessary to manage these conflicts by modifying key processes. On the other hand, due to its unique function, most FDA's decision-makers have several kinds of conflicts of personal interests. Therefore, it is necessary to consider mechanisms for selecting people with the least COI in this institution's policy and decision-making position. As the central legislative body in the country, the Parliament might have the most significant effect on COI management through appropriate and transparent law-making. However, the mere formulation of laws does not guarantee COI management without meaningful involvement of the institutions that oversee the implementation of laws. In the meantime, the role and capacity of civil society and NGOs as essential arms of oversight and transparency should not be overlooked. The government needs to foster its efforts to make the best use of the energy and capability of civil society, which it can do by faciliating dialog and providing the necessary training on how to manage conflicts of interest.

Limitations and bias

Since the situations and actors of COI are very contextual, it is suggested to generalize the findings in the context of the health system of other countries with caution.

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DATA AVAILABILITY STATEMENT

Not applicable.

ETHICS APPROVAL STATEMENT

The research was approved by the Ethics Committee of the School of Public Health, Tehran University of Medical Sciences, Iran (number: IR.TUMS.SPH.REC.1398.152).

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ENDNOTE

[i] https://rabit.kums.ac.ir/login.html

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Implications from the health belief model concerning zoonoses-related threat perceptions held by livestock farmers in Nepal

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Abstract

Diseases that can be spread from animals to humans (zoonoses) are neglected health issues in Nepal. Due to professional exposure, livestock farmers are highly vulnerable to zoonoses. However, since there are limited studies, we have virtually no actual evidence on perception and practices toward prevention and response to zoonoses by livestock farmers in Nepal. This study examines the association between zoonoses preventive practices and the threat perceptions held by livestock farmers in Nepal based upon applications of health belief model (HBM) constructs. A descriptive cross-sectional quantitative interview-based survey was conducted with 380 livestock farmers randomly selected from three districts in Nepal. Results show that livestock farmers held primarily strong beliefs about zoonoses based on key constructs from the Health Belief Model (susceptibility, severity, benefits, and barriers with 91.5%, 93.7%, 91.1%, and 41.0%, respectively). However, they described low levels of participation in zoonoses preventive practices, such as handwashing with soap and water (52%–59%), following prescribed sick animal consumption practices (6.6%–17.7%), raw meat consumption practices (1.6%–6.3%), engaging in vaccination practices for livestock (33.9%–38.2%), and maintaining distance between home and shed (2.1%–13%). Based upon these findings, we strongly recommend enacting strategies to minimize the gaps between zoonoses preventive practices and perceptions through targeted communication interventions that include optimal educational sessions to reinforce applications from the constructs of HBM in farming communities.

KEYWORDS
Gandaki province, health belief, livestock-farmers, perception, practice, zoonoses

INTRODUCTION

The vast majority of infectious diseases experienced by humans originate from animal sources (Taylor et al., 2001). These animal-borne infectious diseases are called zoonoses. Sadly, attention to the health risks from zoonoses is a widely neglected issue, particularly in poor and developing countries like Nepal (Devleesschauwer et al., 2014). This is especially relevant for people who have close exposure to animals (i.e., livestock farmers, zookeepers, veterinarians), since they are most vulnerable to zoonoses. These professionals who work with animals need to be knowledgeable about the health risks from zoonoses and skillful in following established preventive practices to avoid zoonotic infections.

Due to limited studies concerning public perceptions and beliefs concerning zoonoses in Nepal, we do not have sufficient evidence about levels of knowledge, preventive practices, and threat perceptions toward zoonosis exposure by those who work closely with animals (such as livestock farmers). Increasing knowledge about these issues is very important in Nepal since epidemiological studies have shown that every year huge numbers of people and livestock are endangered by zoonoses, with significant human, livestock, and economic losses; for example every year about 100–150 people died due to rabies (Pant et al., 2013), brucellosis is the next most common animal-borne disease after rabies (Acharya et al., 2017), swine flu is endemic in Nepal as a highly contagious zoonotic disease with 172 cases reported, including two deaths in 2009 (Adhikari et al., 2011), and in Nepal avian influenza is highly contagious in poultry and is also transmitted to human beings with a deadly outcome (Shrestha, 2019).

Zoonoses are a complex problem in Nepal, with several different types of zoonotic agents found in communities, including bacteria, viruses, fungi, and protozoa. Virus-originated zoonoses are found to be particularly contagious and sometimes lead to lethal outcomes, including with zoonotic diseases like COVID-19, SARS, and swine flu. People who keep animals in their households are especially vulnerable to zoonotic diseases, since the animals can be amplifier hosts for lethal pathogens. For example, pigs are amplifier hosts for swine flu. This suggests that people who are close to livestock, such as those who engage in livestock-related professions, need to be especially aware of these animal-borne health risks and skillful in engaging in relevant preventive practices related to zoonoses which are endemic.

Evidence shows that most of the zoonoses are preventable by simple and cost-effective preventive practice (i.e., simple hand washing with soapy water, wearing masks and gloves, or by taking appropriate vaccines). However, empirical evidence suggests that people are not prioritized to adopt those preventive practices which are comparatively easy to apply and affordable for everyone (Bagale & Adhikari, 2019). The farming sector is the backbone of Nepal, with 20.4% of the total National GDP covered by this economic sector (Ministry of Finance, 2021). Therefore, it is essential for the government of Nepal to develop needed policies and programs to promote the health of those who work in the farming sector by establishing relevant policies and programs to address threats from zoonoses. However, this has not been done. There is no specific training for livestock farmers about preventing zoonoses, nor any zoonotic-related curriculum in the schools where the majority of the people involved in agriculture as a profession and their children are likely to be enrolled.

Health beliefs play an important role in leading people to engage in preventive health behavior (Acharya et al., 2022; Chen et al., 2022; Kissal & Kartal, 2019) and the health belief model is a frequently used model in the field of health education and health promotion to determine how perceptions about particular health behaviors influence members of vulnerable populations. Six health belief model (HBM) constructs (perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy) help determine the different levels of perception of the health problems (Champion & Skinner, 2008).

Zoonotic-related preventive practices are essential for preventing multiple risks (e.g., handwashing with soap and water not only prevents zoonotic bird flu but is also equally useful to prevent diarrheal diseases or several other cases of flu). The challenge, however, is whether farmers are willing and able to wash their hands with soap and water in risky situations. So, it is important for public health practitioners to provide proper health education and support to livestock farmers to encourage them to engage in relevant prevention behaviors. This study is designed to determine the association between zoonoses preventive practices and the threat perceptions held by livestock farmers to guide applications of the constructs of HBM for preventing the spread of zoonotic diseases.

METHODS AND MATERIALS

This study involved conducting a descriptive cross-sectional quantitative interview-based survey concerning zoonoses beliefs and behaviors with livestock farmers in Nepal.

Study site

This study was conducted in the Nasung rural municipality ward no 4 from Manang, the Bhanu municipality ward no 5 from Tanahun and the Kawaswoti municipality ward no 17 from the Nawalpur district, which are all parts of the Gandaki province of Nepal which support active livestock farming and represent diverse geographical areas of Nepal. Due to the diverse socio-cultural and geographical presentation in Nepal, the Gandaki province was selected purposively (since it is located near the center part of the country) and further districts, municipal, and wards were selected by multi-stage random sampling techniques.

Population and sample size

The unit of analysis in the study was the household (HH). Therefore, the head of the household (HHH) or family members who were actively involved in livestock caring roles (including poultry and buffalo) were the populations that were surveyed. According to the National population and housing census 2011, the total number of households (livestock farmers) in Nasung 4, Manang was 232, Bhanu 5, Tanahun was 1365, while the Kawaswoti 17, Nawalpur district was 1238. The total number of livestock farmer (households) was 2835 which was the population frame for this survey. The probability proportional to size (PPS) sampling technique suggested by Solvin (Susanti et al., 2019) was used to estimate the sample size of each municipal area. To select the respondent's the researchers followed the systematic random sampling technique and the sampling interval was seven.

Data collection tools, technique, and analysis producers

An interview schedule (IS) was the main tool in the study, which consisted of four sections: (i) socio-demographic status, (ii) zoonoses related knowledge measuring questionnaires,

(iii) zoonoses preventive practices including observation checklist, and (iv) perception-related statements based on constructs of HBM. Due to the specific aim of this study, we excluded knowledge measuring questionnaires in the survey.

Statistical analysis

Collected data were analyzed using the Statistical Package for Social Sciences (SPSS) for IBM, version 20. The statistical significance of the data was assessed at $p < 0.05$. Data were analyzed using descriptive statistics and repeated measures analysis of variance.

Ethical considerations

The study was conducted with the "no harm principle." Before starting the fieldwork researchers took the approval letter from the Graduate School of Education, Tribhuvan University, and visited relevant municipal areas for data collection. Researchers received approval to conduct the survey from the respective municipal office. People were not in any way forced to participate as research respondents. Before data collection, study objectives and the use of collected data were informed to respondents. The cultural value, norms, and traditions of each respondent was dealt with respect during the process of data collection. Researchers in this study were assured that collected data and information would not be available to anyone who was not directly involved in this research and verbal consent was taken before the interviews where respondents were requested to participate voluntarily. Moreover, we followed the ethical guidelines established by the American Psychological Association throughout the research process (APA, 2020).

RESULTS

Socio demographic characteristics of the respondents

This study was conducted in the Manang, Tanahun, and Nawalpur districts, which are located in Gandaki province and represent all three ecological zones (Mountain, Hill, and Terai) of Nepal. Among the total (380) respondents, 8.4%, 46.3%, and 45.2% were covered by Manang, Tanahun, and Nawalpur districts respectively as PPS sampling technique (Table 1).

The majority (54.2%) of the respondents in the study were male. Nearly 3 in 5 (59.7%) were between 20 and 39 years of age, whereas one-third of the respondents (33.7%) were 40–59 years of age and one-fourth (6.6%) were 60 years old and above. The median age of the respondents was 35 years. Nearly all (91.6%) respondents were Hindu and Janajatis was the major ethnic group among the respondents 263 (69.2%) in the study.

Socioeconomic characteristics of the respondents

This study was conducted with a randomly selected sample of 380 livestock farmers in the Gandaki province of Nepal. Table 2 shows the Socioeconomic characteristics of the respondents which are interrelated to zoonotic diseases.

Data collected showed that Agro-farming was the main occupation of 257 (68%) of the respondents' households. Whereas few households were involved in public service,

TABLE 1 Sociodemographic characteristics of the respondents ($n = 380$).

Variables	Attributes	Frequency	Percent
District	Manang	32	8.4
	Tanahun	176	46.3
	Nawalpur	172	45.2
Gender	Female	174	45.8
	Male	206	54.2
Age group	20–39	227	59.7
	40–59	128	33.7
	60 and above	25	6.6
Religion	Hindu	348	91.6
	Buddies	15	3.9
	Christian	14	3.7
	Bon	3	0.8
Ethnicity	Dalit	28	7.4
	Janajatis	263	69.2
	Brahmin/Chhetri	89	23.4

livestock farming, foreign employment, and trade were their major occupations, which were 8.7%, 7.9%, 7.6%, and 7.1%, respectively. Economically, the majority of the respondents (78.0%) earned very low amounts of money (<15,000 rupees/month) from their livestock. More than half (52.0%) had basic level education, with (44%) having secondary level education, and very few (4.0%) were not able to read and write. A nominal percentage (3.0%) of livestock farmers had received training related to livestock farming.

We found that 9 out of 10 (91.8%) of the households surveyed were keeping mixed types of livestock, where poultry, goat/sheep, buffalo, and cow were the common rearing livestock (90%, 68%, 53%, and 28%, respectively) in their household, however, the main purpose of that farming were limited only for household consumption (86%). Data showed that only 13 (3.4%) of the farmers surveyed had received government support for livestock farming, more than 1 in 10 (12.1%) farmers were enrolled in an insurance program for their livestock with the collaboration of a local veterinary office and local farmers' cooperative, whereas 11.1% had experienced livestock deaths in their shed including zoonotic agents within the past year before the study.

Impact of perception toward zoonoses preventive practices

Practices and behaviors were found to depend on respondents' perceptions; perception itself, of course, is reflected by knowledge gained by in the home, community, and or formal education. Table 3 shows the association between perception and zoonoses preventive practices of livestock farmers which might determine the need for several zoonotic preventive approaches in farming communities.

TABLE 2 Socioeconomic characteristics of the respondents ($n = 380$).

Variables	Attributes	Frequency	Percent
Main occupation of household	Livestock/Poultry	30	7.9
	Agro farming	257	67.6
	Service	33	8.7
	Foreign Employee	29	7.6
	Trade	27	7.1
	Other	4	1.1
Average monthly income from livestock	Less than 15,000	297	78.2
	15,000 to 30,000	72	18.9
	Above 30,000	11	2.9
Educational status of respondents	Illiterate	16	4.2
	Up to basic level	199	52.4
	Secondary and above	165	43.4
Aim of livestock farming	Household consuming	328	86.3
	Commercial Farming	52	13.7
Training related to farming	Yes (short course)	11	2.9
	No	369	97.1
Type of livestock farming	Single	31	8.2
	Mixed Farming	349	91.8
Keeping livestock in household[a]	Cow	107	28.2
	Buffalo	200	52.6
	Goat/sheep	260	68.4
	Pig	26	7.1
	Poultry	340	89.5
	Yak/Chauri	7	1.8
	Other	8	2.1
Death of livestock last year	Yes	42	11.1
	No	338	88.9
Government support for livestock	Yes	13	3.4
	No	367	96.6
Insurance of livestock	Yes	46	12.1
	No	334	87.9

[a] Percentage may exceed 100 due to multiple responses

TABLE 3 Association: constructs of health belief model (HBM) and zoonoses preventive practices.

Variables (Perception)	**Zoonoses preventive practices ($N = 380$)**						
Category	**Yes**	**%**	**No**	**%**	**Total**	**Chi-square**	***p*-value**
Perceived susceptibility to zoonoses transmission	Regular hand washing practices						
Agree	181	52.0	167	48.0	348	7.0	0.030
Neutral	17	65.4	9	34.6	26		
Disagree	6	100.0	0	0.0	6		
Perceived severity to zoonoses transmission							
Agree	188	52.8	168	47.2	356	1.98	0.372
Neutral	15	68.1	7	31.9	22		
Disagree	1	50.0	1	50.0	2		
Perceived benefits to adopt the zoonoses preventive practices							
Agree	183	52.9	163	47.1	346	1.0	0.603
Neutral	19	61.2	12	38.8	31		
Disagree	2	66.6	1	33.3	3		
Perceived barriers to adopt the zoonoses preventive practices							
Agree	108	59.0	75	41.0	183	11.13	0.004
Neutral	42	61.8	26	38.2	68		
Disagree	54	41.9	75	58.1	129		
Perceived susceptibility to zoonoses transmission	Sick animals consuming practices						
Agree	61	17.5	287	82.5	348	1.85	0.396
Neutral	3	11.5	23	88.5	26		
Disagree	0	0.0	6	100.0	6		
Perceived severity to zoonoses transmission							
Agree	63	17.7	293	82.3	356	6.21	0.045
Neutral	0	0.0	22	100.	22		
Disagree	1	50.0	1	50.0	2		
Perceived benefits to adopt the zoonoses preventive practices							
Agree	60	17.3	286	82.7	346	1.78	0.411
Neutral	3	9.7	28	90.3	31		
Disagree	1	33.3	2	66.6	3		
Perceived barriers to adopt the zoonoses preventive practices							
Agree	12	6.6	171	93.4	183	29.16	0.000
Neutral	14	20.6	54	79.4	68		
Disagree	38	29.4	91	70.6	129		

(Continues)

TABLE 3 (Continued)

Variables (Perception)	Zoonoses preventive practices (*N* = 380)						
Category	**Yes**	**%**	**No**	**%**	**Total**	**Chi-square**	***p*-value**
Perceived susceptibility to zoonoses transmission	Raw meat consumption practices						
Agree	22	6.3	326	90.7	348	0.654	0.721
Neutral	1	3.9	25	96.1	26		
Disagree	0	0.0	6	100.0	6		
Perceived severity to zoonoses transmission							
Agree	22	6.1	334	93.9	356	8.22	0.016
Neutral	0	0.0	22	100.0	22		
Disagree	1	50.0	1	50.0	2		
Perceived benefits to adopt the zoonoses preventive practices							
Agree	21	6.0	325	94.0	346	4.36	0.113
Neutral	1	3.2	30	96.8	31		
Disagree	1	33.3	2	66.6	3		
Perceived barriers to adopt the zoonoses preventive practices							
Agree	3	1.6	180	98.4	183	12.41	0.002
Neutral	6	8.9	62	91.1	68		
Disagree	14	10.9	115	89.1	129		
Perceived susceptibility to zoonoses transmission	Vaccination practices to livestock [preventive]						
Agree	133	38.2	215	61.8	348	13.42	0.001
Neutral	1	3.9	25	96.1	26		
Disagree	1	16.7	5	83.3	6		
Perceived severity to zoonoses transmission							
Agree	133	37.4	223	62.6	356	16.27	0.000
Neutral	0	0.0	22	100.0	22		
Disagree	2	100.0	0	0.0	2		
Perceived benefits to adopt the zoonoses preventive practices							
Agree	130	37.6	216	62.4	346	7.56	0.023
Neutral	4	12.9	27	87.1	31		
Disagree	1	33.3	2	66.6	3		
Perceived barriers to adopt the zoonoses preventive practices							
Agree	62	33.9	121	66.1	183	5.4	0.064
Neutral	18	26.5	50	73.5	68		
Disagree	55	42.7	74	57.3	129		

TABLE 3 (Continued)

Variables (Perception) Category	Zoonoses preventive practices ($N = 380$) Yes	%	No	%	Total	Chi-square	*p*-value
Perceived susceptibility to zoonoses transmission	Distance maintaining home to shed						
Agree	45	13.0	303	87.0	348	2.71	0.257
Neutral	1	3.9	25	96.1	26		
Disagree	0	0.0	6	100.0	6		
Perceived severity to zoonoses transmission							
Agree	45	12.7	311	87.3	356	5.8	0.054
Neutral	0	0.0	22	100.0	22		
Disagree	1	50.0	1	50.0	2		
Perceived benefits to adopt the zoonoses preventive practices							
Agree	44	12.8	302	87.2	346	12.78	0.002
Neutral	0	0.0	31	100.0	31		
Disagree	2	66.6	1	33.3	3		
Perceived barriers to adopt the zoonoses preventive practices							
Agree	4	2.1	179	97.9	183	41.55	0.000
Neutral	8	11.8	60	88.2	68		
Disagree	34	26.3	95	73.7	129		

Based on the data collected, livestock farmers held generally strong beliefs about zoonoses and related issues and events (i.e., susceptibility, severity, benefits, barriers etc.) in the study, which is related to the many zoonotic-related threats that confront livestock farmers. Most respondents (348/380) perceived their susceptibility (agree) to zoonoses illness and a slight majority (52.0%) followed regular hand washing practices with soapy water after close exposure to their livestock. This association (perception and practice) shows statistical significance ($p = 0.030$) in the study. Similarly, 82.5% reported avoiding sick animal consuming practices, almost all respondents (90.7%) reported avoiding raw meat consumption practices, and more than one-third (38.2%; $p = 0.001$) reported getting pre-exposure vaccinations for their livestock to protect from zoonoses. However, among the respondents who reported lower levels of perceived susceptibility, only 13% reported maintaining standard distance between home and shed in their practices.

Additionally, of the total number of respondents (356/380). almost all (93.7%) perceived the severity of zoonotic infection. Among the respondents who perceived severity, more than half (52.8%) followed regular hand washing practices after close exposure to their livestock. More than four in five who perceived severity (82.3%) avoided engaging in sick animal consumption practices ($p = 0.045$), with 93.9% avoiding raw meat consumption practices ($p = 0.016$), more than one thirds (37.4%) practiced pre-exposure vaccination of their livestock ($p = 0.000$), and more than 1 in 10 (12.7%) maintained the standard distance between their home and shed to protect from zoonoses.

Almost all of the respondents (346/380) perceived benefits to adopting zoonoses preventive practices (i.e., hand washing with soap water) in the study. The data collected showed that of the respondents who perceived the benefits of preventive practices, more than half (52.9%) engaged in washing their hands with soap and water after close exposure to their livestock. Most of the respondents (82.7%) avoided sick animal consumption practices, almost (94%) respondents avoided raw meat consumption practices, more than one thirds (37.6%) followed recommended vaccination practices for their livestock as a pre-exposure prophylaxis to protect from zoonoses ($p = 0.023$), and 12.8% maintained standard distance between home and shed ($p = 0.002$).

Perceived barriers as a construct of HBM were examined in the study to determine difficulties in following zoonotic preventive practices by livestock farmers. The data showed that nearly half of the respondents (183/380) perceived barriers (i.e., time, money, knowledge, etc.) to adopting zoonoses preventive practices. Of the respondents who perceived barriers to adopting preventive practices, nearly half (41.0%) reported washing their hands only by water after close exposure to their livestock ($p = 0.004$). Similarly, less than 1 in 10 (6.6%) reported consuming sick animals ($p = 0.000$) in their households, 1.6% reported following raw meat consumption practices ($p = 0.002$), due to perceived barriers, more than two-thirds (66.1%) did not get their livestock vaccinated, and most respondents (97.9%) built livestock sheds closer than 15 m from their households ($p = 0.000$).

DISCUSSION

People perceive their surrounding environment and events based on their previous knowledge and experiences. In this study, the researchers evaluated Nepalese livestock farmers' responses to zoonotic-related threats by comparing their perceptions and practices toward zoonoses in accordance with their belief in key HBM constructs. The essence of HBM is that perceptions of the severity of health risks influence actions to address those risks depending on the benefits and barriers to taking those actions (Acharya, 2020; Chen et al., 2022). The HBM posits that the strength of individual beliefs on its four constructs can predict behaviors (Carpenter, 2010). This study illustrated that Nepalese livestock farmers held strong perceptions about zoonotic risks related to close exposure to their livestock.

The HBM posits that when people perceive susceptibility or severity of health problems in a timely manner, they are oriented to prevent, control, or cure diseases like zoonoses (Acharya et al., 2022; Chen et al., 2022). Other HBM constructs, like perceived benefits, can positively influence following recommended health-promoting behaviors (Champion & Skinner, 2008; Neuhauser & Kreps, 2010). However, poor socioeconomic status and cultural taboos can create barriers to taking healthy action (Dutta & Kreps, 2013). A meta-analysis shows that benefits and barriers are strong predictors of behavior change compared to perceived susceptibility and the severity of diseases (Carpenter, 2010). The positive association among the constructs of HBM found in this study suggests that healthy behaviors might contribute meaningfully to building a healthy farming community. However, we found many gaps between the perception and practices of livestock farmers related to zoonoses in this study.

Most respondents (91.57%) agreed with the statement, "it is likely I will get sick from livestock (i.e., rabies) sometime during my life." However, study findings comparing respondents' perceptions about zoonotic susceptibility did not predict their adoption of preventive practices. Among the respondents who perceived zoonotic susceptibility ($n = 348$), only slightly more than half (52.0%) regularly washed their hands with soapy water ($p = 0.030$). Moreover, a significant number of respondents (17.5%) still consume sick animals and 6.3% consumed raw meat which can make them highly vulnerable to zoonoses. Similar discrepancies between perceptions of susceptibility and the adoption of health behaviors were identified in a study conducted in the rural Parish of Quito, Ecuador (Roess et al., 2016), where livestock keepers sold or consumed animals which recently died. Similarly, nearly two-thirds of respondents in the current study do not vaccinate their livestock, and almost all respondents build animals' sheds near than 15 m than their household are the poor preventive practices to compare their good perceived susceptibility toward zoonoses.

Interestingly, in the statement we presented to respondents related to perceived severity, [e.g., "If I got sick from livestock (e.g., rabies, brucella) the illness would be very bad," most respondents (93.7%)] in the study perceived severity of zoonoses, however, these beliefs did not predict respondents' behaviors. Of respondents who perceived zoonoses severity, only half (52.8%) of them washed their hands with soapy water regularly, nearly one in five (17.5%) respondents still consumed sick animals, 6% consumed raw meat, nearly two-thirds ignored recommended vaccination practices for their livestock as pre-exposure prophylaxis, and nearly 9 in 10 respondents-built livestock sheds nearer than 15 m from their households. These findings illustrate a serious disconnect between relevant HBM beliefs about zoonoses and the adoption of recommended preventive practices.

Perceived benefits were found to be strong predictors to taking healthy actions toward zoonoses, such as handwashing with soapy water, vaccinating livestock, or mask-wearing. Almost (91.1%) of respondents in the study who perceived benefits (agreed with the statement "when I wash my hands after cleaning up animal waste, I am decreasing my chance of getting zoonoses." This suggests that promoting the benefits of preventing zoonoses with communication interventions may be effective strategies for enhancing public adoption of prevention strategies for responding effectively zoonoses, as well as to other serious health risk such as pandemics.

However, among respondents who perceived the benefits of preventive practices, only a little more than half (52.9%) washed their hands with soapy water after close exposure to their livestock, 17.3% still consumed sick animals and 6% consumer raw meat, only 62.4% followed recommended animal vaccination practices for their livestock ($p = 0.000$), and only 12.8% maintained a standard distance between home and shed ($p = 0.002$).

To determine perceptions related to barriers to taking preventive actions, researchers constructed the statement, "washing my hands each time after interacting with my animals will take too much time," in which nearly half (41%) of the respondents perceived barriers (agreed with the statement) suggesting they were ignoring washing their hands with soapy water after close exposure to their livestock ($p = 0.004$). Similarly, less than 1 in 10 were consuming sick animals ($p = 0.000$), 1.6% were consuming raw meat ($p = 0.002$), more than two-thirds (66.1%) were avoiding recommended animal vaccination practices, and the vast majority of respondents (97.9%) built livestock sheds nearer than 15 m from their households ($p = 0.000$). These poor practices for zoonoses prevention illustrate how perceived barriers to prevention, likely related to issues concerning time, money, or knowledge about zoonoses, influence adoption—or the lack thereof—of prevention strategies.

Respondents in the study expressed similar positive perceptions concerning statements about zoonoses susceptibility (91.5%), severity (93.7%), and benefits (91.1%), which were designed based on key constructs from the HBM. However, of those respondents who expressed positive perceptions, only around half (52%–59%) followed the handwashing practices with soapy water after close exposure to their livestock, which compared very poorly to the practices of small (family) operated farmers (94.0%) in Chitwan, Gorkha, Tanahun districts (Kelly et al., 2018) and small operation farmers in suburban areas of Bangladesh, where 100% reported washing their hands with soapy water after interaction with livestock (Chowdhury et al., 2018). These higher practices were associated with several strategic motivational and educational communication interventions introduced to promote zoonoses prevention in these areas.

The consumption of sick animals was influenced by several factors (i.e., socio-cultural, economic, and/or education), with a significant number of respondents (6.6%–17.7%) reporting that they still consume sick animals in their households, a number that exceeded findings reported in a previous study conducted in Kars Turkey (Çakmur et al., 2015). Most zoonotic diseases are preventable if simple preventive practices (i.e., hand washing with soap water or take an appropriate vaccine etc.) are followed, however, only a little more than a third (33.3%–38.2%) of the respondents reported following pre-exposure livestock vaccination practices. These data were poor compared to findings reported in a previous study of suburban areas of Bangladesh, where almost (78.26%) respondents vaccinated their livestock to prevent from several communicable diseases (Chowdhury et al., 2018). Similarly, respondents in the study did not support the preventive measure of maintaining a standard distance between the home and shed (Park, 2009, p. 66). Few respondents reported (2.1%–13.0%) maintaining this 15-m standard; similar practices were observed in smallholder farmers in Bangladesh (Ausraful et al., 2021).

In this study, we found that livestock farmers had a positive perception of the importance of preventing zoonoses; however, the proliferation of poor practices and the persistence of perception-practice gaps create a serious challenge for those people involved in the field of health education, veterinary sciences, and public health in Nepal. Based on those findings we also need to design and conduct interventional activities which might positively impact on healthy practices in farming communities in Nepal.

Limitations and directions for future research

The cross-sectional survey research design used in this study does not capture changes over time, and represents one time-slice of public health data. Health beliefs and behaviors are subject to change, especially in response to serious health threats, changing regulations, and health promotion interventions. The singular cross-section of time examined in this study might not be representative of societal changes that may occur, perhaps in response to zoonotic-originated health threats, such as the COVID-19 pandemic and the Monkeypox health threat. It would be valuable to build upon the important evidence from this study by tracking changes over time with repeated measure studies of Nepalese livestock farmers' beliefs and health behaviors related to zoonoses. This could be especially valuable at different points in time related to zoonotic disease outbreaks, new public health regulations, and both before and after introduction of zoonoses prevention promotional interventions.

Infectious diseases do not adhere strictly to geographic boundaries, as we have learned from recent pandemics (such as with COVID-19, the Avian Flu, SARS, and MERS) where serious diseases spread across countries. To address this issue, it is important to track health beliefs and behaviors across countries, as well as to develop integrated global prevention and response strategies (Dutta & Kreps, 2013; Kim et al., 2013). Future research should be designed to both extend and replicate data collected in this study concerning zoonotic health beliefs and behaviors by collecting data across countries to provide a broader understanding of international zoonoses prevention patterns.

While the use of the quantitative survey data collection method in this study provided important insights into the health beliefs and behaviors of Nepalese livestock farmers, it did not provide full and in-depth information about why the survey respondents did or did not follow recommended zoonoses prevention behaviors. This kind of in-depth information is crucial for guiding the design and implementation of needed health promotion policies and programs to improve public health (Kreps, 2020). Future studies could build upon the findings from this study by collecting more in-depth data, perhaps with probing qualitative interviews, to more deeply examine the variety of social, economic, cultural, and environmental factors that are most influential in the adoption of relevant zoonotic disease prevention guidelines.

Implications for health promotion

This study illustrated how the constructs from HBM have influenced the adoption of zoonoses prevention behaviors. The study helps to validate the HBM theoretical position that personal perceptions toward particular health issues influence adoption of relevant recommended preventive health responses (Champion & Skinner, 2008). Yet, this study also illustrates the powerful influence of perceived barriers in mitigating widespread adoption of zoonotic prevention guideline. While most respondents in the study held positive perceptions concerning zoonoses-related susceptibility, severity, and the benefits of adopting zoonoses preventive practices, this did not always translate into livestock farmers in Nepal uniformly following recommended zoonoses prevention behaviours. A significant number of respondents perceived barriers to engaging in recommended healthy actions, such as concerns about washing hands with soapy water taking too much time, the convenience of establishing proximity between home and shed, and the economic benefits of consuming livestock, even when the animals have been ill. These perceived barriers limit the effective dissemination of important prevention guidelines to farmers and should be addressed in targeted health promotion efforts. Based upon the findings in this study, we recommend the development of targeted government programs, policies, and health communication campaigns in Nepal to help farmers address their perceived barriers to zoonoses prevention. New strategies should be introduced to encourage and make it easier for livestock farmers to overcome their perceived prevention barriers. For example, efforts could be taken to promote relevant new public policies, veterinary practices, building codes, and food safety regulations to support prevention guidelines to help improve zoonoses safety and public health.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

ETHICS STATEMENT

The research committee from graduate school of education, Tribhuvan University, approved the study proposal on 12/11/2019. Consent was taken and request for voluntary participation to the respondents before interview and informing respondents about study objectives and their right to reject participation at any time.

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ORIGINAL ARTICLE

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Locating illness behavior as a social practice among women in Jammu city

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Abstract

This paper seeks to understand the patterns of social experiences of women patients by means of an empirical study undertaken in the Jammu region of the union territory of Jammu and Kashmir in India. Social factors play an immense role in determining the onset and management of lifestyle diseases among South Asian women. These social factors entail some peculiar entities that require detailed investigation. Data were collected in Government Medical College Hospital, Jammu, and its allied hospitals. Results show that for women, social factors and their impact on illness patterns have a strong bearing on their care-seeking behavior. Care-seeking behavior of women in this part of the country is determined by their social status and is determined by the meanings that are provided to these illness experiences. Therefore, physical pain and related symptoms were not found to impact these women as much as changes in their socio-familial status due to the onset of lifestyle diseases. These diseases can broadly be categorized into three categories, namely, socially stigmatising diseases, socially irrelevant diseases, and socio-economically burdensome diseases. However, these categories are not fixed for a particular disease. As the experiences of the women undergo change, so does the categorization of the disease. Hence, diabetes may be a socially irrelevant disease at one point of time. Nevertheless, as the condition of the patient deteriorates, diabetes becomes a socio-economically burdensome disease. That is why lifestyle diseases keeps circulating from one category to another every time a patient encounters a new result arising from a lifestyle disease.

KEYWORDS

social construction, lifestyle diseases, women

Key points

- The present study aims at exploring socio-cultural factors responsible for the onset and management of lifestyle diseases among women.
- It examines the importance of socially constructed roles of women that are pivotal in deciding their course of treatment.
- Therefore, lifestyle diseases can be constructed as socially stigmatizing diseases, socio-economically burdensome diseases, and socially irrelevant diseases. The socio-cultural nature of the diseases circulates within these three categories.

INTRODUCTION

Women worldwide enjoy a better mortality rate than men. In contrast, their morbidity rate is higher than men's (Lane & Cibula, 2002). Ross and Bird (1994) observed that differences in labor activities and lifestyle are the leading causes behind women's marginalisation in the field of health. Oyejide et al. (1996) studied changing trends in the illness pattern of women for 10 years in the United Arab Emirates and found that 83% of the deaths were due to noncommunicable diseases (NCDs). Dhak and Mutharayappa (2009) studied mortality and morbidity patterns of the Indian population. They found that, except for early childhood, women experience high morbidity rates throughout their lives.

In contrast, the prevalence of life-threatening diseases and vulnerability to accidents was high amongst their male counterparts. According to a survey conducted by the Associated Chamber of Commerce and Industry (ASSOCHAM) in 2009, more than 68% of working women in India in the age group of 21–52 years suffer from lifestyle diseases. The most prevalent diseases are obesity, depression, chronic backache, diabetes, and hypertension. It is also observed that around 75% of these women are suffering from anxiety and depression (IANS, 2009). These diseases have been the leading causes of death among women globally for decades. However, this pattern has worsened because two out of three deaths in women are caused by these diseases (WHO, 2021).

Women suffer from various lifestyle disorders like Polycystic Ovary Syndrome (PCOS), mental illness, hypertension, breast cancer, cardiovascular diseases (CVDs), diabetes, anxiety, and depression. During infancy and childhood, the physical benefit of longevity for females is overridden by sociocultural factors which prefer males over females as children, thereby increasing the vulnerability of females towards chronic diseases (AbouZahr, 2014). PCOS is commonly known as a disease of urban areas and mainly affects those with unhealthy lifestyles. Eleftheriadou et al. (2012), in a study of teenage girls, observed that healthy teenagers (not suffering from PCOS) were far more engaged in physical activities than those with PCOS. Pathak and Nichter (2015) observed that structural vulnerabilities in the urban Indian setup make women more prone to PCOS. Such women are expected to be efficient in multitasking and thus play the dual role of a bread earner and an unpaid family caretaker. Nidhi et al. (2011) found in their study of adolescents suffering from PCOS that India experiences relatively high instances of PCOS compared to other Asian countries. Psychological distress was another consequence of PCOS, which made women develop a negative self-image due to the resultant physical appearance, which included the onset of obesity, hirsutism, male-patterned hair fall, and acne (Zangeneh et al., 2012).

Another lifestyle disease which is a substantial threat and is among one of the four deadliest lifestyle diseases according to WHO (2018b) is diabetes. According to Harikrishnan (2012), diabetes is not a gender-specific disease. However, in the Indian context, it turns out to be largely a female-specific disease. A case study of Southern Kerala showed that women seldom compromise their role as family caretakers and hence give the least priority to their health. It is also observed that women's lifestyle over the past few decades has undergone a sea change. As far as homemakers were concerned, their lifestyle was even more sedentary. A study conducted by Bajaj et al. (2013) on South Asian women with diabetes analysed various peculiar consequences faced by South Asian women. Young women with diabetes face stigma and fail to get a suitable match for marriage. South Asian women experience a shorter life span than those in Western countries, mainly because females in the South Asian region face social and cultural biases resulting in poor access to healthcare facilities. Sometimes, rural women with diabetes are subjected to family rejection and may have to seek a divorce (ANI, 2017; Bajaj et al., 2013).

Similarly, CVDs also inflict enormous impairment on women. More than 80% of casualties caused by CVDs are observed in lower and lower-middle-income countries (WHO, 2018a). The onset of CVDs also contribute to the vicious circle of poverty in which a person spends all their earnings on the treatment of these ailments, and these ailments further make that person unsuitable to take up any job (WHO, 2017). Chow and Patel (2012) observed that CVDs healthcare provision for women and CVDs outcomes in India are lacking. Women were underrepresented in CVDs-related research, and little available data shows that gender disparity exists in CVDs management, with the worst affected females from a poor socioeconomic and educational background. Stroope (2015) analysed gendered practices in India and their impact on the rise and control of hypertension. Research revealed that women living an isolated life tend to be more hypertensive than men due to social and sexual insecurities. The impact of lifestyle diseases is manifested not only in the form of deteriorating health conditions but also in the form of social and economic burdens. When sufferers are among the most vulnerable segment of society, as women are, the management of lifestyle diseases becomes even more difficult.

Available literature shows that the onset of lifestyle diseases among women in lower and lower-middle-income countries, in general, and India, in particular, needs a focused theoretical framework. In this study, a theoretical framework has been proposed based on an empirical analysis for future research on lifestyle diseases and women. Furthermore, to explore social factors responsible for the existence of lifestyle diseases, this study was undertaken with women participants suffering from lifestyle diseases. This framework is called the "Circular Model of Illness," which is an application of the social construction of illness in Indian settings. A pattern to study illness-related behaviors of women has been proposed in this model.

SOCIAL CONSTRUCTION OF ILLNESS

As Freidson (1970) has argued, illness is constructed socially. Freidson defined illness as a form of deviance which is constructed professionally by medical practitioners and in a common sensical way by the masses. He further argued that the medicalisation of illness legitimises whether a person is sick or not. Biological deviance, otherwise known as disease, is sanctioned through the social process of diagnosis and treatment, which is unique to human beings. A state of illness may be acknowledged as a disease in one society and the patient may be provided with a suitable treatment to cure it. In another society, on the other hand, a patient may refused to be considered sick and hence, may be labeled as a deceiver. Hence, illness entails social as well as biological deviance. Lay people tend to construct their illness experiences depending upon their socio-cultural backgrounds. The laymen's perspective on illness is necessary for medical practitioners to decide the course of treatment. Not all ill persons tend to seek medical consultation, and the reasons behind this attitude vary. Some societies consider black magic to be the prime reason behind the onset of illnesses. Some economic classes tend to avoid seeking medical facilities due to the lack of economic resources. Others prefer to rely on traditional methods of medical care which might not be medically recommended. Therefore, it is basically the societal reaction which forces a person to seek medical consultation (Freidson, 1970).

Though he did not work specifically on the social construction of illness, Michel Foucault discussed construction of knowledge about human body in medical arena (Turner, 1997). His concepts of biopower and "technologies of the self" are disciplinary tools of great relevance to the process of illness construction (Bury, 1986; Conrad & Barker, 2010). They are the means which make society and a person her/himself to control the body, and to try to achieve a docile body (Barry & Yuill, 2012). Biopower and the technologies of self are embedded in "Governmentality" which Murray and Li (2007) defined as "conduct of conduct" as it is the method of governing human behavior by means of already defined social means, and for this coercion is not used. However, attempts have been made to educate masses and to persuade them to voluntarily abide by the norms meant to fulfill social desirability. Cooter (2010) talked of biopower as an addendum to the machineries governing mentalities of the masses, that is, "govern-mentality" through social and scientific methods, administrative measures, and "technologies of the self." He also evoked "biopolitical technologies of the autonomous self" as direct indications that bio-power and technologies of the self are ingrained in governmentality.

Conrad and Barker (2010) say that writers inspired by Foucault usually provide a detailed analysis of medical discourse to deconstruct this knowledge. They do so to unveil the ingrained meanings, normalising tendencies, and identities embedded in the medical discourse. Language plays a vital role in expressing thoughts and in generating a discourse (Barry & Yuill, 2012). Subjective discourses in the field of health create identities which have a bearing on the social status of the said person. Turner (1997) stated that Foucault's work enabled medical sociologists to formulate a new framework where medical practices take place under the influence of socio-cultural milieu. He further explained that sociology of body emerged as an important theme in the medical sociology as socially constructed nature of disease and illness revolves around it.

METHODOLOGY

Research tools

The qualitative study employs the "Grounded Theory Method" (GTM), which entails collecting qualitative data primarily through interviews. It begins with purposive sampling, and then the researcher moves on to theoretical sampling until key themes emerge (Charmaz, 2014). On average, 40–50 respondents were interviewed for each disease depending upon the data saturation achieved. While explaining the importance of sample size, Charmaz (2014) says:

> Some grounded theorists (Banu, 2016) argue against attending to the amount of data. Numerous other researchers have embraced a similar stance to legitimize small studies with skimpy data. For both Glaser and Stern, small samples and limited data do not pose problems because grounded theory methods aim to develop conceptual categories and thus data collection is directed to illuminate properties of a category and relations between categories. (page-18)

To ensure equal representation of all the diseases in the study, the sample size has been restricted to 41 respondents for each condition, which takes the total sample size to 123 respondents. Some of the responses have been reproduced in the study, and pseudonyms have been used to address them.

Since the study used GTM, we started with purposive sampling. In the beginning, the patients deemed suitable by the physicians were interviewed. During the interview, they were requested to share their contact details, which they all did without hesitation. Based on the memos prepared during the first round of interviews, the first author (who was collecting data) noted a series of intriguing ideas for further study. For instance, some of the patients suffering from PCOS stated that infertility was the only problem they were going through, whereas young unmarried women were marred only by obesity or hirsutism. Conversely, patients with diabetes made statements such as that "it can be handled by going for a walk," "I do not need a doctor." Many of these respondents were further contacted through phone calls, or online or in-person meetings. Data collection proceeded by means of theoretical sampling as recommended by Charmaz (2014). Based on this series of interviews, the final three categories, namely "socially stigmatising disease," "socially irrelevant disease" and "socio-economically burdensome disease," were formulated. In addition to in-depth interviews, the observation method was also employed.

Data collection

Empirical data for the study were collected in three phases spanning over a year and a half at the Government Medical College (GMC) Hospital, Jammu (Jammu and Kashmir), and its allied hospitals, namely Sri Maharaja Gulab Singh Hospital and the Superspeciality Hospital. Interviews were conducted in the Outpatient department (OPD) of the Gynaecology department, the Department of Medicine, the Coronary Care Unit (CCU), and the OPD of the department of Cardiology. Ethical clearance was sought from the Institute Ethics Committee of the GMC. Data were collected by interviewing female patients suffering from PCOS, Type 2 Diabetes Mellitus (hereafter diabetes), and CVDs.

For in-depth interviews, semi-structured interview schedules were framed separately for all three diseases. Each primarily consisted of questions related to their socioeconomic and demographic profile, eating habits, nature of their work, family history of metabolic diseases, knowledge of the disease, and their health-seeking behavior. Interviews spanned 30–40 min and informed consent was sought from all the respondents before the interviews began. Interviews were conducted in Hindi or Dogri, and responses were transcribed on interview schedules.

Data analysis

All the responses were later translated into English with the help of English language experts. In addition to in-depth interviews, the first author also got the opportunity to observe the behavior of the respondents and their family members during their visit to the hospitals. For numerical representation, Statistical Package for Social Science (SPSS) has been used to formulate tables. Data analysis in GTM is done by a constant comparative method which involves delving into data generated and creating different themes. It entails sorting and organising raw data into groups based on their characteristics and then organising these groups in a structured manner to formulate a new theory. In the words of Kolb (2012):

> The constant comparative method "combines systematic data collection, coding, and analysis with theoretical sampling to generate theory that is integrated, close to the data, and expressed in a form clear enough for further testing."

RESULTS

Circular model of chronic illnesses

All the results and observations of the study lead to the conclusion that illness patterns concerning lifestyle diseases and women have three broader categories: socially stigmatising diseases, socially irrelevant diseases, and socio-economically burdensome diseases. Depending upon the change in the meaning that patients and their family members render to illness experiences, diseases keep circulating (shifting) from one category to another. For example, for one woman, diabetes may be a socio-economically burdensome disease but may be largely irrelevant for another. These categories are explained in detail in upcoming sections.

Socially stigmatising diseases

Results of the present study indicate that PCOS is broadly considered a stigmatising disease. PCOS affects women during their reproductive years, yet its consequences span their entire lifetime. Obesity, diabetes, and CVDs are highest amongst postmenopausal women with PCOS as compared to those without PCOS. The onset of PCOS is directly associated with stigma and depression due to visible acne, hirsutism, and obesity, which are the main symptoms of the onset of PCOS (Sanchez, 2014). In the case of PCOS, the process of knowledge construction and method of dealing with "pain" determines the "sick role" of the patients (Freidson, 1970; Parsons, 1991). Their immediate experiences restrict pain related to PCOS to infertility, irregularity of periods, body disfigurement, and resulting negative self-image. For unmarried women, it is the feeling of being less feminine which brings them to the gynecologist; for married women, it is the pain of being "infertile." For others, it is not having a desired body or suffering from acne and hirsutism that make them seek medical advice. It is intriguing to know that immediate social experiences determine impact and future course of action for PCOS by these women. Although this disease has more long-term complications which can adversely impact their own physiological composition and of their offspring, yet these women are not concerned about that part of the PCOS.

In addition to pain, knowledge construction related to PCOS has a bearing on the approach of these patients toward the disease. It can be argued here that women in rural and peri-urban areas cannot connect themselves to this disease. Women in urban areas are aware of the term PCOS and the symptoms that it entails. However, those from rural and peri-urban areas fail to understand the process and management regimen of PCOS. They feel that they lack femininity due to their inability to fit into a socially defined notion of what it means to be a woman. This failure motivates them to consult a doctor and try to regain their femininity.

As 18-year-old Sneha stated:

> *I went to skin doctor to check problem of hair growth on my face. He recommended me to go to gynecologist. I do not understand what this disease is all about (sic)*.

Additionally, alternative sources of medicine also aim to provide relief from the "pain," restore femininity, and add another dimension to the knowledge construction related to PCOS. Nowadays, these sources include unconventional methods of medication like drinking a potion, wearing an amulet, or regular visits to a godman.

PCOS becomes socially irrelevant once the onset is after acquiring a certain social role. One such category is of women married with kids. Respondents in the present study who were married with kids visited a physician just for the sake of visiting. They had no intentions of putting in any effort to manage or cure their disease. As 38 years old Anuja (mother of two) stated:

> *My periods have been irregular for quite a while. However, I do not care at all. I visited the doctor because she happens to be a friend of mine and insisted that I should visit her during her working hours to discuss this problem*.

Pushpa was a 35 years old housewife who visited the gynecology department because her son was admitted to the pediatrics department of the same hospital. She said:

> *In a way, I am happy that my periods are irregular. This saves me from the ordeal of every month. I thought of visiting the doctor because I was already here for my son. I had no intention of visiting a doctor otherwise*.

However, diabetes, which emerged as a socially irrelevant disease, has turned out to be socially stigmatising in the case of unmarried women of young age.

Socially irrelevant disease

Sick role acquisition in the case of diabetic women is very poor, mainly due to the meaning that they and their family members assign to it. The present study is done on patients suffering from Type 2 Diabetes Mellitus, which is experiencing 90% more occurrence than the other two types of diabetes, namely, type 1 diabetes mellitus and gestational diabetes. Factors like obesity, unhealthy diet, and physical inactivity play a crucial role in the onset of this type (DeFronzo et al., 2015). Diabetic patients rely on the common perception of diabetes management which emphasises that it is not a very harmful disease. Their experiences postulate that diabetes does not need any special care or attention. However, such meanings keep changing with the change in the experience and future consequences of the disease. In the case of women who are the family's primary caretakers, the process of this change of meaning is even slower as they keep on prioritising the need of their family over their own health. It is due to this reason they tend to act what Parsons (1975) called "Hyperchondriac."

As 50 years old Lata said:

> *I do consume medicines prescribed by the doctor. However, I primarily rely on Okra water to manage my blood sugar levels*.

Anita (45 years old housewife) said:

> *My husband forced me to visit a doctor; else, I was managing this disease quite well by going for walks regularly. Our neighbor was cured of diabetes by simply going for regular walks*.

Another significant aspect of the study of diabetes is the asymmetry of the physician-patient relationship, where patients are either completely dependent on physicians or on their personal management techniques. A balance reflecting reliance on both is a very rare phenomenon. The discourse generated on account of their discussion with their relatives and friends usually determines their disease management regimen. The semantics conveyed during these discussions have a strong impression on the knowledge production related to diabetes and its management (Berger & Luckmann, 1991; Parsons, 1975). This shows that discourse leads to knowledge production and provides patients and their fiduciaries with the power to choose their own course of treatment (Parsons, 1975). This meaning may or may not be in line with the medically approved method of diabetes care.

All the aspects of a socially irrelevant disease were missing in the case of women who experienced early onset of diabetes. Their course of action for diabetes was similar to that of PCOS, namely to work towards preserving their feminine traits. Another aim was to hide it so that it did not create hurdles in their imminent future. This argument is also substantiated by many existing studies (Abdoli et al., 2018; ANI, 2017; Bajaj et al., 2013; Browne et al., 2014). Diabetes sometimes also acts as an economically burdensome disease, mainly when patients belong to economically weaker sections (Chandra et al., 2015; Oberoi & Kansra, 2020; Rani Javalkar, 2019; Yesudian et al., 2014).

Socio-economically burdensome disease

CVD is an umbrella term used to refer to any disease related to the human heart, such as myocardial infarction, stroke, heart failure, arrhythmia, and heart valve problems (Association, 2019). Female patients suffering from CVDs face challenges of role conflict, negative self-image formation and unwillingness to comply with the routine meant to manage diabetes (because diabetes is the most significant risk factor in the onset of CVDs). As Ranjita, a 55-year-old respondent, said:

> *I discovered that I was diabetic around two years ago. Since then, I have been managing it on my own. However, a few days ago, my left arm started paining, so I came here to consult the doctor*.

Behaviors like this act as potential barriers in their CVDs management routine. All these factors are directly or indirectly associated with financial constraints and self-beliefs, which are instrumental to managing lifestyle diseases. Female CVD patients tend to consider themselves undesirable due to their ill health.

> *I had already been suffering from diabetes, and now the onset of a heart problem makes me feel like a huge burden on the family. These diseases are physically exhausting, and I feel terrible when I fail as a mother and a wife. In addition to this, my monthly expenditure has also increased because of my health*.

This makes them opt for “technologies” to manage their disease to make themselves desirable again and perform their everyday expected role efficiently. The meanings these patients provide to the CVDs are subject to constant transformation due to the impact of ongoing change in their experiences. The resulting reflexive actions to these transformations bring changes in these meanings and their approach toward disease management.

The onset of CVD is found to be socially irrelevant in the case of women who have already crossed a certain age. They believe that they have to die in old age anyway, from one ailment or another. As 70 years old Satnam Kour stated:

> *I lived my life to the fullest. Now I want to relish whatever (food items) I like. Anyway, one has to die in old age, so it does not matter much*.

This is also believed to be a common strain of thinking of the elderly, negatively impacting their healthcare-seeking behavior (Bonita & Beaglehole, 2014). Therefore, with change in the person's social status, the patient's approach toward CVDs also changes.

DISCUSSION

The management of lifestyle diseases is more of a social requirement than a physiological need for women. For these women, the necessity of consulting a physician arises when they realise that their bodies have become grotesque by the standards of existing societal norms (Lupton, 2000). They experience lack of femininity and in one way or another fail to fit into the criteria of being a socially constructed ideal woman. Their failure to experience “normal womanhood,” becoming an economic burden or their inability to render the disease irrelevant determines the health-seeking behavior of these women.

Therefore, for all three diseases, the approaches of the patients and their family members were different. For PCOS, most of the respondents were adolescents and young girls. Hence they were worried about their prospects for marriage and bearing children in future. In the case of diabetes, patients were found to have a lackadaisical approach. In the case of CVDs, patients and their family members were concerned and visited a physician regularly. The main findings of the observation method were patients' overdependence on physicians and their inability to understand the disease management regimen.

This knowledge construction can take place at many levels, which changes with the change in the patients' experiences and, therefore, leads to a change in the meaning of illness experience (Freidson, 1970). Disease experience occurs at familial level when members get influenced by the experiences of their close kin, or onset in one person changes the attitude of the entire family towards the disease, or when patients witness a change in the status of those who have already been suffering from it. An important point that needs to be added here is that illness experiences are affected not only due to the exposure of the patients towards it but also due to the exposure of their family members (Parsons, 1975). Therefore, these meanings are constructed by women and their family members. Women are not free to make their own decisions, making it a feature typical of South Asian settings (Banu, 2016; Senarath & Nalika Sepali Gunawardena, 2009).

Societal pressure to acquire a docile body is an indirect disciplinary act of society to make these patients opt for technologies of the self and strive to attain a disease-free health condition. This change in the meaning of illness experiences leads to a change in the attitude of the patients towards the disease. This makes the social impact of these diseases circular in nature. Meanings and illness experiences change depending upon the course of events that can occur because of aggravation of or recovery from these diseases. Therefore, meanings are provided to these diseases depending upon the immediate

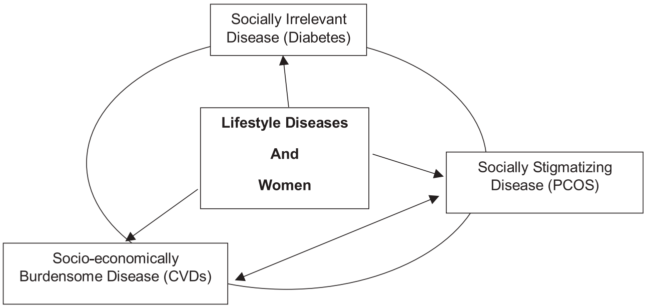

FIGURE 1 Circular model of illness.

experiences of the stakeholders. As shown in Figure 1, these diseases may circulate from one category to another in no particular order, depending upon the change of experience undergone by the patient or her family members. Therefore, one disease can be socially irrelevant at one point in time while becoming socially stigmatising as well as socio-economically burdensome at another point in time. These meanings are always contested by changing the course of social interactions and experiences. It is this change in meaning that circulates the same disease from the category of socially stigmatising to socially irrelevant to economically burdensome (not particularly in that order).

Charmaz (2000) identified major problems being faced by patients with chronic illnesses, namely making sense of bewildering symptoms, reconstructing order, and maintaining control over life. Various discussions on the impact of these diseases bring in new perspectives for these patients and their caregivers. Their reflexive actions towards these discussions change the meanings that they attribute to these diseases and shape the course of treatment in the end (Turner, 2000). This is how disease management is more of a cultural than a physiological necessity for these women. Das et al. (2018) studied women's health-seeking behavior in Kolkata. They found that women opt for traditional sources of medication because they feel it to be culturally secure, pocket friendly, and easy to access. However, in the present study, women sought medical consultation to effectively perform their role of a family caretaker. It had other implications as well, since women prioritize their family requirements over their health requirements and are, therefore, ineffective with their sick role performance. This role conflict is also manifested in the form of negative identity formation or “pain” where these respondents are found to be suffering from the social impact of the disease. This pain is inflicted when respondents cannot perform their role as a homemaker, when they find that they are too young to experience the outset of a disease, or when they make an addition to the pre-existing heavy household expenditures.

Another determinant of lifestyle disease and the female patients' (or of their fiduciaries') approach towards it is reflected in how it is being represented in everyday discourse. Respondents commonly use the euphemism “sugar” to define diabetes and “heart problems” to define CVDs, whereas they have no single term or an elaborate way to explain their encounter with PCOS. In the case of PCOS, every respondent has her own way of explaining symptoms which has varied dimensions. It is quite disturbing for them that they have no single word to explain the varied symptoms of the disease. The absence of any common term in colloquial language makes it almost impossible for the respondents to create any general discourse through which they can provide a popular meaning to PCOS. At an individual level there are varied narratives, but at a common level, there is none. For diabetes, the standard narrative makes respondents believe that diabetes can be taken care of quite easily. In the case of CVDs, this discourse makes them diligent about their medicine and medical consultation.

In the case of PCOS, no single approach can emerge as a characteristic feature of the population suffering from PCOS. Due to this fact, there is a lack of communication, interaction, and knowledge production among respondents. As a result, knowledge is easily contested and can lead to a change in the existing meanings of the disease. Therefore, it can be argued that different lifestyle diseases have different meanings, depending upon the experience of the common masses with them. This provides changing social nature to the social experience of the disease. Their impact keeps on circulating from one category to another. These diseases can be called by using the umbrella term "lifestyle diseases," but their social impact is exclusive and inclusive. Circulating meanings and experiences of these diseases transform from being socially loathsome to being vestigial.

CONCLUSION

The social impact of lifestyle diseases affects the care-seeking behavior of women in Jammu city. The same phenomenon may also hold good for other parts of the country, though we must leave this question for future researchers. The social construction of lifestyle diseases is essential to determine not only the individual approach but also the governmental approach. Without taking stock of the socio-cultural needs of society, policy formulation and implementation cannot succeed. For example, the National Health Policy (NHP) 2017 aims to establish a National Institute of chronic diseases to monitor lifestyle diseases (Welfare, 2017). However, no special provision for females except for breast cancer monitoring has been incorporated. Here we would like to suggest that provisions of NHP 2017 cannot be achieved without opting for a gender-specific approach in which factors determining the onset and management of lifestyle diseases amongst men and women are to be monitored separately. Lifestyle diseases are not gendered. However, their management is a gendered phenomenon in need of further exploration and redress.

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ETHICS STATEMENT

Ethical clearance for the present study was sought from the Institute Ethics Committee of the Government Medical College Hospital, Jammu (India), and the study was listed as I18/C/IEC/GMCJ/16. Additionally, informed consent was sought from all the respondents.

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ORIGINAL ARTICLE

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The three major themes of women's birthing experiences: A qualitative study in Saudi National Guard hospitals

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Abstract

Childbirth is the most significant interaction between pregnant women and the health system. Women's satisfaction during the birthing process is an essential indicator of care quality because satisfaction reflects the gaps between expected and actual care and services. In-depth studies of women's birthing experiences and maternity services provided in public and private sectors in the Kingdom of Saudi Arabia are needed to improve the health system. Such studies are particularly critical because ongoing privatization policies continue to change Saudi Arabia's approach to childbirth. This qualitative study drew on 78 semistructured interviews to better understand the key themes that arose regarding women's satisfaction with their birthing experiences. The study compared women's birthing experiences in public and private sections of two selected National Guard hospitals in Saudi Arabia. The findings yielded three major themes as follows: *Hospitals, Doctors, and Nurses*. Overall, women in the public sections of hospitals were less satisfied with their quality care due to a lack of privacy, and the respondents reported receiving mediocre attention from nurses when compared with that received by women in private sections. The study's findings stand to inform policymakers about the current situation of the Saudi Arabian health-care system and the services rendered. Thus, leaders implementing strategic plans should pay careful attention to the three revealed themes to create better care quality and increase women's satisfaction during privatization.

KEYWORDS

birthing experiences, maternity services, National Guard hospitals (NGH), Saudi Arabia, women's satisfaction

Key points

- Women's satisfaction with birthing experiences is an essential indicator of quality care because satisfaction reflects the gaps between expected and actual care services.
- This study compares women's birthing experiences in public and private sections of two main Saudi National Guard hospitals. This comparison is important because of the ongoing privatization policy in the country.
- The findings yielded three major themes as follows: Hospitals, Doctors, and Nurses. Overall, women in the public sections of hospitals were less satisfied with their quality care due to a lack of privacy and receiving mediocre attention from nurses when compared with that received by women in private sections.
- The study's findings stand to inform policymakers about the current situation of the Saudi Arabian health-care system and the services rendered in the reform era.

INTRODUCTION

Previous research has found that women's satisfaction is a critical metric for measuring the quality and effectiveness of a health-care system (Demis et al., 2020; Paudel et al., 2015). Women's satisfaction with childbirth has been defined as a positive evaluation of distinct aspects of the birthing process (Linder-Pelz, 1982). These evaluations are formed when women compare what they have experienced with their expectations (Pascoe, 1983). Women value their psychosocial well-being and safety and that of their children (AlNemer et al., 2015).

Due to the socioeconomic transformation and the rapid urbanization of Saudi Arabia, women are seeking high-quality health-care services (AlNemer et al., 2015). Per the World Bank, about 96% of Saudi Arabian female adults are literate (World Bank, 2022). Rising literacy rates suggest advanced expectations for maternity care (Lamadah & Elsaba, 2012), and younger, highly educated working women are less satisfied with their childbirth experiences than older, noneducated housewives. Reaching high patient satisfaction is one objective of Saudi Arabia's 2030 vision, and the nation has allocated significant resources to its health-care system to achieve this end.

Obstetrician and gynecology departments are among the busiest as they deliver care supporting a high birth rate, reaching 14.56 births per 1000 population (2021 est.). While the maternal mortality rate in developed countries is 12 per 100,000 live births, the maternal mortality rate in developing countries is 216 per 100,000 live births (Abu-Shaheen et al., 2020). However, in Saudi Arabia, the rate was 7 deaths per 100,000 live births in 2017 (Almahmoud, 2019).

A health system's structure could affect women's satisfaction. For instance, available studies have reported that the perceptions of Saudi women of satisfaction with health-care providers are related to nonclinical factors such as health providers' good behaviors, kindness, and privacy (Alkhamis, 2017; AlNemer et al., 2015). In addition, nonclinical factors like long waiting lines and low-quality services are two major issues in public hospitals (Alkhamis, 2017). Women in public hospitals share rooms with other women and their newborns, and cannot have companions because of hygiene and infection fears. Conversely, women in the private sector may have private rooms when available.

The Saudi health system of National Guard hospitals (NGH) has public and private sectors. Although the private sector plays a more profound role in furnishing high-quality health-care services, it is costly (Alkhamis, 2017). Women utilizing private sector services may pay out-of-pocket expenses or require private insurance. However, some Saudis are dissatisfied with paying for health insurance after privatization, believing that the Saudi constitution assures free health-care services (Alkhamis, 2017).

Women in the private sector have private rooms and companions during their stay. In contrast, women in the public sector access public hospitals, receive free medical services, and often do not have companions. A recent qualitative study asked patients in a public hospital about their readiness to pay insurance to secure good health services, finding that most Saudi respondents were willing to pay more for high-quality services (Al-Hanawi et al., 2018).

Geographical diversity could affect participants' experiences, opinions, preferences, and viewpoints (Al-Hanawi et al., 2018). Thus, this study compared women's satisfaction with their maternity care during birthing and recovery from private and public sections in two NGH hospitals: one in Jeddah and one in Riyadh. However, the doctors and nurses providing maternity services in both sectors of each hospital are the same. Hence, this provides a qualitative understanding of what underlies satisfaction in private and public sections of hospitals with the same policies and procedures regarding maternity care.

METHODS

Research approach

This study used a purposeful sample employing qualitative semistructured interviews to obtain the experiences of 78 women who delivered in public and private sections of two NGHs in Jeddah and Riyadh. Data were gathered utilizing a standardized interview guide, and three interviewers were trained to follow the guide. All interviews were recorded, transcribed, coded, and analyzed using grounded theory. Data were analyzed thematically by NVivo qualitative software, and a conceptual framework for women's satisfaction with birthing experiences was built across the sectors and locations.

Setting and sampling strategy

This study used a convenience sample reflecting the study's population. Two NGH hospitals were selected: one in Jeddah and one in Riyadh. Cultures, lifestyles, and traditions differ in these locations, which provides different perspectives. The recruitment strategy and interview logistics were the following: First, co-investigators distributed recruitment flyers to all eligible women in public and private sections of the two hospitals, asking them if they could be interviewed after delivery, after recovery, and before discharge. The head nurse checked the eligibility of women before the interviews. Eligible women were adults experiencing their second or more childbirth, were in good health, had a healthy newborn, and gave informed consent to participate in the study.

Ethical approval and consideration

The study was directed according to the principles of the Declaration of Helsinki. Institutional Review Board (IRB) approval was obtained from King Abdullah International Medical Research Center and the University of South Carolina with reference numbers SP18.361J and PROO00078703, respectively. After a woman agreed to participate, the researchers explained the consent form and the research's objectives. Participants were advised that they could withdraw from the study at any time if they wished without providing any reason to the investigators and that participation was voluntary. They were assured that their information would be anonymous. Some interviews occurred in women's hospital rooms, and some occurred after discharge by telephone. The researchers also met some in a clinic affiliated with the hospital. The interviews, which ranged in length from 20 to 40 min, were recorded on an Olympus recorder and saved on a computer hard drive. Then, interviews were transcribed into a PDF, from which the co-investigators developed codes and themes. Only approved co-investigators viewed the transcripts, which were retained for study purposes.

Data collection procedure

Co-investigators used a semistructured, one-to-one interview with women. The interviews were conducted in Arabic from July 2018 to April 2019. The interview questions were based on the available online-published Middle Eastern and Saudi literature.

The interview comprised three sections. The first section gathered each participant's socioeconomic and demographic information and general perspectives regarding their satisfaction with the hospital's services. The second section gathered their perceptions of how interactions with physicians, nurses, and support staff contributed to satisfaction with their care, focusing on their perceptions of providers concerning courtesy and respect. The third section focused on hospital structure by asking women about their rooms' privacy, medical plan, and management policies.

Data analysis techniques

The study used a grounded theory strategy to analyze transcriptions (Bernard, 2006). The researchers independently familiarized themselves with the transcripts, coded the data, created a working analysis, developed a working analytical framework, placed data onto a matrix, and interpreted the results (Gale et al., 2013). Inductive analysis was used as the researchers reviewed the raw data to identify emerging ideas, patterns, or key themes (Thomas, 2006). Investigators employed constant comparison to review data to assure the emergence of the full breadth of concepts from the raw data. They reviewed each data unit multiple times so that meaningful concepts would emerge and to make connections between and among those concepts. Data were continuously compared and reviewed until a saturation point was reached, in which no new themes or ideas appeared to flow from the data.

The analysis also used NVivo qualitative software. The three investigators used open coding techniques to generate a preliminary emergent idea and code list. Five interviews were coded independently to ensure inter-rater reliability. The three researchers compared their coding schemes, discussed discrepancies, and agreed on a coding scheme. Codes were synthesized into a codebook outlining each code and its description. Following an initial open coding process, the researchers performed selective coding. The remaining interviews were categorized using established categories contained in the codebook. The selective coding process generated themes to explain and illustrate the study's observations. Finally, themes were summarized. Emergent concepts that might be used in a theoretical model for future study were identified. The theoretical model allowed the researchers to describe commonalities, patterns, and significant themes emerging from the transcripts. Then, the findings within and across the two hospitals were compared and contrasted.

FINDINGS

Descriptive characteristics of the participants

In this research, saturation was reached after interviewing 78 women (20 patients in the public department and 20 patients in the private department in Jeddah NGH and 18 patients in the public department and 20 patients in the private department in Riyadh NGH). Saturation is reached when “there is enough information to replicate the study when the ability to obtain additional new information has been attained, and when further coding is no longer feasible” (Fusch & Ness, 2015, p. 1413). This study assessed the satisfaction of women who had previous birth experiences. Although most women were giving birth to their second newborn when recruited, the number of births ranged as high as nine. The mean number of newborns for Jeddah's public section women was 3.2, higher than in the private section, which was 2.4 (see Table 1).

Satisfaction in the public sector in Jeddah's NGH

One critical subtheme for the hospital in Jeddah was privacy. Of the 20 women in the private section in Jeddah, 12 reported being satisfied with their private rooms. Woman 7 illustrated this. She said, “I had a private room for myself. I loved it. It was great and had good privacy. The room was clean and good.” Woman 18 added, “I had a private room because my husband asked them for one. Our insurance covers a private room for me right after the delivery.”

Not every woman in the private section had a private room from the beginning of their hospital experience. Some women struggled with the business center to move from a shared room to a private one. The “Poor Business Center” subtheme shows this. Woman 2 noted,

> I had another problem with the Business Center. My insurance coverage included that I would get a suite. I did not get a single room. They were not collaborative with me nor informative on why I did not get the suite that I should have. The second day, they moved me.

Woman 1 said,

> I did not like the room and the mattress. I can say the cleanliness of the room is 70 out of 100. I did not like it. I was very disappointed when in the beginning they

> put me in a shared room! I paid SR 19,000 ($5000), and it is common sense that I should have a room! A clean one.

In terms of satisfaction with the hospital, most women said that the fundamental reasons for delivering in an NGH were its good reputation and high-quality medical services. Nine women noted the subtheme "high-quality services." Woman 14 said, "I came to the National Guard due to its great reputation. I liked that it was clean. I felt that I was at home, not at a hospital. So warm and kind staff are here." Woman 8 said she came to the hospital "because of the good reputation. The doctors here are famous for their excellent performances." Woman 5 added, "I chose the best hospital in Jeddah because of the good reputation, especially with childcare. I knew that I might be in a shared room, but I accepted because I needed good care for my baby."

In terms of the major theme of physicians, women stated clearly that they paid for honest and trusted governmental physicians who supported normal deliveries. Women were mostly pleased with their physicians and most commonly saw them as respectful and caring. Specifically, Woman 6 said,

> I delivered the first baby in a private hospital. They delivered me via C-section. I planned to deliver in a public hospital as a private patient to deliver normally. It is well known that public hospital is not seeking an unnecessary C-Section. So I chose a well-known hospital with a good reputation for quality.

Woman 7 added,

> I delivered my first baby with a C-section, and during this pregnancy, I was following up in a private hospital. But I wanted to deliver normally, and I was advised to go to the National Guard. I came over late Friday, and I found two Saudi female doctors. They were wonderful. They helped me with a natural delivery. I would choose the National Guard next time I got pregnant.

Woman 19 said, "look, the doctors are the best. Their excellent experience and their diagnosis of the condition were very good actually. The surgery went great, and they were kind and respectful."

Many women talked about the nurses who cared for them. Most women in the private section of the hospital in Jeddah found their nurses caring, competent, and respectful. Woman 2 said, "the nurses were so kind and collaborative. They helped me a lot. Even in the bathroom, they helped me and massaged my back. They helped me with breathing and relaxing. They were so kind," Woman 10 said,

> After the delivery, I had the best care ever. Better than what you can imagine. The nurse I had was the best. She took me to the bathroom and gave me a bath; then, she gave me a meal and a hot drink. She was holding my hand during the delivery and the stitches. Great care and emotional support.

Nonetheless, some women also said that the nurses were frequently rude and uncaring. Some complaints about nurses' negative attitudes emerged from patient interviews. Woman 17 said,

> Not all nurses are nice. One nurse came at night and saw my sister as a companion. She yelled at us and asked my sister to leave. My sister said she is not leaving because she is a companion to a private patient (me), and we are

TABLE 1 Participant characteristics.

	Jeddah		**Riyadh**	
	Public ($n = 20$)	**Private ($n = 20$)**	**Public ($n = 18$)**	**Private ($n = 20$)**
Age				
20–25 Year	4 (20%)	2 (10%)	5 (28%)	1 (5%)
26–30 Year	8 (40%)	10 (50%)	5 (28%)	7 (35%)
31–35 Year	3 (15%)	3 (15%)	3 (17%)	5 (25%)
36–40 Year	2 (10%)	5 (25%)	4 (22%)	4 (20%)
41–45 Year	3 (15%)	0[a]	1 (6%)	3 (15%)
Mean age	30.9	30.7	30.36	3.22
Nationality				
Saudi	19 (95%)	17 (85%)	18 (100%)	17 (85%)
Non-Saudi	1 (5%)	3 (15%)	0[a]	3 (15%)
Education				
Masters	1 (5%)	0[a]	0[a]	0[a]
College	12 (60%)	13 (65%)	8 (44%)	11 (55%)
College student	0[a]	1 (5%)	1 (6%)	1 (5%)
Diploma	1 (5%)	0[a]	0[a]	0[a]
High school	4 (20%)	5 (25%)	4 (22%)	6 (30%)
Middle school	2 (10%)	1 (5%)	3 (17%)	1 (5%)
Elementary school	0[a]	0[a]	2 (11%)	1 (5%)
Employment				
Employed	6 (30%)	5 (25%)	2 (11%)	4 (20%)
Housewife	14 (70%)	14 (70%)	15 (83%)	15 (75%)
Student	0[a]	1 (5%)	1 (6%)	1 (5%)
Newborn order				
Second	9 (45%)	14 (70%)	6 (33%)	5 (25%)
Third	5 (25%)	4 (20%)	4 (20%)	5 (25%)
Fourth	4 (20%)	2 (10%)	2 (11%)	4 (20%)
Fifth	0[a]	0[a]	3 (17%)	3 (15%)
Sixth	1	0[a]	3 (17%)	2 (10%)
Ninth	1	0[a]	0[a]	1 (5%)
Mean newborns	3.2	2.4	3.6	3.9

[a] No reported data.

> moving to a private room. The nurse threatened to call security. My sister went to the head nurse to tell her what was happening; then, the nurse came to apologise for misunderstanding the situation.

Woman 19 complained, saying “the delay and nurses’ attitudes. They were rude and [acted] as if they were bothered.”

Satisfaction in the public sector in Jeddah's NGH

Of the three major themes, the hospital theme was the most-reported issue by women, followed by physicians. For the hospital theme, most women in the public section of the hospital in Jeddah had chosen the hospital because of its excellent reputation and high-quality medical care. What mattered most was the “quality of the services” in the NGH. Woman 20 said, “I know their great reputation in medical care, and I have a file here since my husband works in the National Guard.” Woman 8 added, “The National Guard has a well-known reputation for good services. It is much better than all hospitals of the Ministry of Health.”

However, women were dissatisfied with nonmedical policy issues. The NGH supports breastfeeding, and newborns are taken to their mothers for feeding and bonding. Women in the private section who had a shared room found bonding and feeding extremely difficult, especially without companions to help. For instance, Woman 5 said: “I wanted a companion to stay with me, and I wanted the nurses to take the baby to the nursery. Taking care of a newborn while you are tired is hard.” Woman 6 complained: “they don't take babies to the nursery room even if mothers are tired, and they don't allow a companion to stay and help.”

Nonetheless, women were pleased with their caring and respectful physicians, particularly when they were communicative. Woman 18 said,

> I was following up with a female doctor. She was so nice. And I was lucky enough to find her in the delivery room with me. She was so respectful and informative. She helped me a lot, and she was above and beyond.

However, some women found it challenging to communicate with their physicians. Some women tried to speak with their physicians to get more information but found that they were not open. For instance, Woman 19 said,

> Some doctors were not open to talking. I wanted to know sometimes more about test results, but the doctor talked very little about it or only said, “your test result is normal.” I couldn't ask her for more details because she was busy reviewing or writing on the computer.

Furthermore, some women complained about their physicians’ communication styles. Woman 1 mentioned that physicians did not listen to her or ask her about what she preferred, unlike physicians in the private section of the hospital. She said, “Do you think doctors here, like the ones in other private hospitals, listen to you and ask you about what you prefer? No, my dear, no negotiation whatsoever.”

Regarding the nurse's theme, most women found their nurses were medically competent. However, several complained about the nurse's carelessness and rudeness of the nurse's behaviors. Woman 3 said, “When I ask the nurse for any help, I feel as if I am begging her,” Woman 7 added, “Some of the nurses are rude and do not care to help me, and others are very slow in coming.”

Based on the women interviewed in Jeddah, some similarities and differences exist between the two sections of the hospital. The primary reason women wanted to deliver in the NGH was its reputation for high-quality medical services.

Both private-section and public-section patients had issues. For private section patients, one issue was that a private room was unavailable on admission, and the second was, challenges dealing with the business center. Public section patients reported issues with the breastfeeding initiative policy and the no companion policy. They found it challenging to have their newborns with them for their entire stay without a companion. They also found unhelpful nurses highly problematic, especially those who had delivered via C-section.

Women in the private sections of hospitals found their physicians caring and respectful, as did women in the public sections. However, some women in the public section found communicating with their physicians difficult, although others found them informative. Another similarity between the two sectors was that women found nurses medically competent. Most women in the private section found that nurses were kind and respectful. Some women in the private sections were in shared rooms and treated like those in the public section. These private section women in shared rooms and many women in public sections found nurses uncaring and rude.

Satisfaction in the private sector in Riyadh's NGH

The most distinct theme of women's satisfaction in the private section in Riyadh's NGH is the physician's theme, followed by hospitals and nurses. Women in the private section of the hospital in Riyadh came to the NGH seeking high quality. Many knew the hospital's reputation. Woman 10 said,

> I have been their loyal patient since the first delivery of my first baby 17 years ago. I delivered him in the National Guard and all my other kids. I love this hospital. You can trust them. They make the right decisions at the right time.

Woman 14 said, “In my point of view, I trust having medical care from a governmental hospital. This hospital has a good reputation in Riyadh concerning maternity care.” Women who had a private room were delighted with its comfort and privacy. Woman 17 said, “I had a private room, thanks to God; it was so nice and comfy.” Woman 5 added, “the room was private, clean, and comfortable.”

However, women who shared a room were disturbed and frustrated. They complained about hygiene issues, the absence of privacy, and noise. They were angry because they had paid for a private room. Unfortunately, they did not get one because of vacancy issues. For example, Woman 11 said,

> The nurses, after the delivery, told me that the obstetrics ward is fully private and shared beds. They took me to a shared room with old ladies. They were chatting and having visitors the whole time. I couldn't rest or nurse my baby. I asked the nurse multiple times to bring the baby to me, but she said she couldn't. The room was too dangerous for the baby! It was not safe for me as well. Emotionally I was divested! Not as I imagined at all. I had great insurance, and that did not help. I told them that I needed to go to another hospital then! I was so nervous. After 9 h or so, they took me to the obstetrics ward and gave me my baby but still in a shared room. I had no privacy in both locations.

In general, women were pleased by their physicians. Most women in the private section in Riyadh found the physicians caring and respectful, and some found them informative. Woman 1 said her physician was

> very nice, very respectful. I went to follow up in another private hospital closer to my house, but I did not feel comfortable. I went back to the National Guard, where I was very comfortable with its doctors.

Many women praised their physicians and were pleased by their excellent attitudes. Woman 2 said,

> The doctor was fast and professional; this is what I liked the most. She handled my pain with patience, and she supported me very kindly. She respected my privacy, and I was comfortable throughout my stay. She was very respectful and answered all my questions fully and kindly.

However, not all physicians were professional in communicating with mothers concerning their health and that of their newborns. For example, Woman 10 said,

> My OB was nice and kind; she respected my privacy, but the paediatrician was rude and disrespectful. Also, he scares me to death regarding my baby's health. The doctor scared me that my baby may not be able to hear or see, or my baby was fine and healthy. If these are possibilities, the doctor should learn how to talk to mothers gently so mothers can adjust to the information.

Some women complained about their physician's attitudes, and some felt barriers while dealing with them. Woman 16 complained about this issue, saying:

> The treatment of the female doctor who delivered me was disrespectful and uncaring. I told her that I felt the baby was coming, and she said, “no, not yet. In a rude manner.” I told her, “Can you check, please?” She checked and screamed: “do not push; hold yourself.” She covered my private area with a blanket and treated me without any respect. I was so angry and nervous. What kind of treatment is this?

Moreover, Woman 4 described a language barrier affecting her communication with her non-Arabic-speaking physician.

> It was very hard talking to my doctor, so I asked her a few questions that concerned me the most. It was hard talking to my doctor because she was Indian and could not speak Arabic well. And my English is not that much.

Concerning the nurse's theme, most women found nurses medically competent, and many women were pleased with their kind and caring attitudes. Woman 5 said, “They are respectful. They are caring. They are beyond nice; they do say ‘excuse me’ before entering my room. They stopped by frequently to ask about me and to see if I need anything.”

Nonetheless, some women complained about their rudeness and carelessness, especially those in shared rooms. Woman 16 said,

> They are the worst. Because the doctors are not usually around, the nurses are the ones who decide whether to make you comfortable or not. They were

> uncaring; I can't describe how much uncaring they were. I told a nurse that I needed juice; I needed some sugar [because] I was diabetic. She ignored me. Also, she saw me shaking because it was cold; I told her I needed a blanket, but she ignored me again. I am a private patient; I wish I had gone to another private hospital. I would receive the greatest services with the same money I paid here.

Satisfaction in the public sector in Riyadh's NGH

The most prominent theme was the hospital, followed by physicians and nurses. Regarding the hospital theme, women in the public section of the hospital in Riyadh, like the other women, came seeking high-quality care and trusted the NHG's reputation. Woman 10 said,

> I did not like my last delivery in another public hospital. So my husband told me to deliver here due to the good reputation of this hospital since I have access to it because my husband works for the National Guard. It is far away from our house, yet; I decided to deliver here seeking good quality.

Many women came to the public section of this hospital because they were dependents of National Guard employees, so they had access to it. Nonetheless, they were also seeking high-quality care. For example, Woman 14 remarked, “my husband works for the National Guard, but I delivered all my children here because it is the best hospital in Riyadh.”

Although women came to the National Guard seeking quality, many complained about shared rooms and the absence of privacy. Women also criticized hygiene issues and noise in these rooms. Woman 13 said she felt “suffocated! Curtains surround me in a small area. It is very annoying, and I am bothered having other women with their newborns all in one room.” Woman 6 added,

> I am not satisfied at all. The section of the room was fine, but the noise was very high. In addition, the cleanness is not very good, especially in the bathroom. Four women in one bathroom, and they clean the bathroom twice a day only! It is very gross.

Moreover, women complained about the policies just like the women in the public section of the hospital in Jeddah. Women felt it challenging to take care of their newborns in their shared rooms without help from family members or nurses. Woman 11 said, “the most important thing to me is to have a companion with me, or they take the baby in the nursery room for me to get some rest.”

Regarding the physician's theme, most women found physicians caring and respectful. Some felt their physicians were informative, and others felt their physicians were not. Woman 3 said, “I never had a problem with the doctors. They were caring and above respectful. I felt they were listening to me. They gave me the support and care I needed.” Furthermore, Woman 6 said, “I liked the mercy in Saudi doctors’ hearts. They are full of mercy, although my doctor did not listen to me from the beginning. I don't lie when I say he was so merciful and good.” However, Women 18 complained about the attitude of her physician. She said,

> But the doctor who was in the delivery room was angry because I was screaming out of pain. She asked me with anger, “why you are screaming?” I

> told her, “I think you know I am in pain!” She told me, “This is not even your first child!”

Regarding the nurse's theme, women were satisfied with their nurses’ medical competence. However, most complained about the attitudes of some nurses. Women 6 said,

> All the nurses here are acting very rudely. They are mean and rude. Even when they hand me the baby, they do so without mercy! They are not gentle. Not like the nurses in the delivery room, they were better. I asked a nurse to help me go to the bathroom; she told me, “Go by yourself!” I told her. “I am sick,” and the C-section is making me move hard. She told me: “go to ICU. Why you are here!” Imagine that!

Women 16 said, “…not all nurses are respectful. Some nurses are rude. For example, I called a nurse when I needed her to help the most. She came angry and rude; she did help me but with anger.” Yet, some women found nurses to be respectful and kind. Woman 5 said, “Nurses are the best! They are so professional and excellent.” Last Woman 9 said, “They are so respectful. Even when they measure the pressure, they [say excuse me]. They are informative too. They tell me in detail about any medication or procedure they do.”

Summary of major themes and subthemes

This research found that women's satisfaction across sections and locations was associated with three major themes stemming from the hospital, physicians, or nurses’ actions. Under the hospital theme, the most common subthemes were policies, quality of services, and privacy issues. For the hospital theme: caring, respectful, informative, and noncommunicative were some major subthemes for the physicians. For nurses theme, competent, uncaring, rude, respectful, and kind were some major subthemes (see Figure 1).

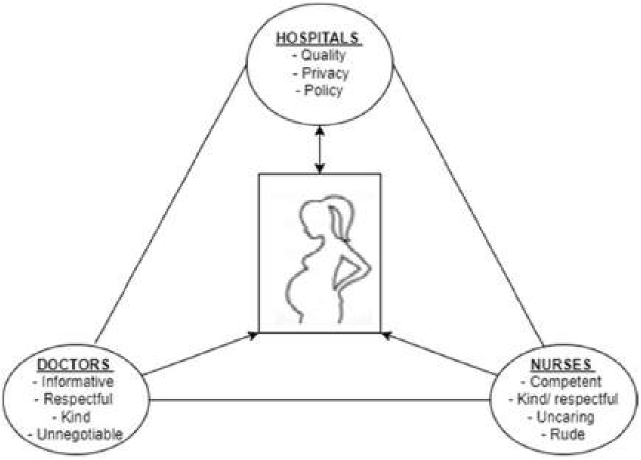

FIGURE 1 Themes and subthemes of women's satisfaction.

DISCUSSION

The study examined the similarities and differences in women's satisfaction with their birthing experiences between private and public sections of two NGH hospitals: one in Jeddah and one in Riyadh. The NGH's reputation for quality services was the first reason for choosing a hospital by the women interviewed. These women often said they trusted that their physicians knew what they were doing. Reputation and trust were why most women chose to deliver in a public hospital rather than a private, revenue-seeking hospital. Women in the public section chose the hospital because they had accessibility and because they were dependents of National Guard employees.

Women in the private and public sections of the two hospitals had the same doctors and nursing staff. What differs between the two sections are policies connected with rooms and companions. The companion policy is different between the public and the private sections. Although patients in private and public sections can have a family member support them during delivery after admission, private patients are the only ones who are permitted to have one companion to stay with them. Women in the public section could not have family support and help after admission (Sun et al., 2020). Private patients have private rooms because they are paying for medical services, unlike public patients, who must share rooms (Batalden et al., 2016). These women tend to be more dissatisfied than women in the private section, who had companions. However, having companions in public shared rooms can be challenging for a hospital because of the increased risk of noise and infections for the women (Batalden et al., 2016).

Many women in the public section suggested allowing help from their families to ease breastfeeding their newborns. While public and private section mothers had their newborns in their rooms during their hospital stays, women in the public section tended to be more dissatisfied with the new breastfeeding policy than private section. The reason for this dissatisfaction may be associated with the “No companion” policy in the public section (Assfaw et al., 2022). Added to this dissatisfaction, women in the public section had to share rooms.

Almost no women in both locations felt their privacy was violated during check-ups and delivery (Hussein et al., 2020). Nonetheless, the absence of privacy in a shared room was an issue for many women in the hospital's public section and women in the private section who had shared rooms. Women in the public section of Riyadh hospital were bothered more than those in the public section of the hospital in Jeddah. The major complaints about women in shared rooms regarded noise and hygiene issues, particularly during visiting hours. The shared rooms tend to be overwhelmed when visitors come, and women find it challenging to use the bathroom during visiting hours (Williams et al., 2018).

Not all women in the hospital's private section were guaranteed a private room; this depended upon a vacancy on the day of delivery. Some women in the private section were moved to shared rooms after delivery because vacant private rooms were unavailable. Nurses working in those shared rooms had no idea of a woman's ability to pay, so such women were treated as public patients. This was an issue more in Jeddah than in Riyadh. As a result, some angry women complained about the business center, which is responsible for arranging services for private patients.

Relative to satisfaction with physician's care, most women across the locations and sectors were very pleased with their physicians, finding them respectful and caring. Nonetheless, some women in the public section of the Jeddah hospital felt that physicians were informative but not empathetic (Chaitoff et al., 2017). The same feeling was present among women in both hospital sections in Jeddah. Some women felt physicians were challenging to deal with because of a language barrier or a physician's attitude. Some physicians were from India. Because some Saudi women could not speak English well, and

Indian physicians could not speak Arabic well, language barriers were created, and women did not feel they could communicate with their physicians (Al Shamsi et al., 2020).

Moreover, women experienced emotional distress while dealing with some physicians. This study included all types of physicians that women interacted with, not just obstetricians. Some women complained about how physicians pushed them to make fast decisions when they were worried and considering other options (Chaitoff et al., 2017). Other women in both locations complained about pediatricians' attitudes and how they communicated their newborn's health (Al Shamsi et al., 2020).

Besides dealing with physicians, managing relationships with nurses was also critical to achieving women's satisfaction. Dealing with nurses is essential because nurses spend the most time with these patients (Al-Bsheish et al., 2022; Jarrar et al., 2021). Because more public patients are served in the NGH than private patients, nurses may be under time pressure when caring for a large number of women in the public sector. Moreover, women in the public section of a hospital may demand more care from nurses because of the absence of family support after admission (Assfaw et al., 2022). Because private patients can have companions stay in their private rooms, they may demand less attention from the nursing staff.

Although women across the two locations and two sectors found nurses to be medically competent, some issues existed. For instance, most women in the public sections in both locations felt that nurses could be rude, slow, or uncaring (Hegney et al., 2019). Few women found them universally kind and complained about delays in nurses' responses. Some women distinguished between nurses in the delivery room and those who worked in their hospital rooms (Hegney et al., 2019). The women found delivery room nurses kind and caring, unlike those working in their rooms. Apart from this, women in the private sector, who had private rooms in both hospitals, were more satisfied with the kindness and respectfulness of the nursing staff. Women in shared rooms often found nurses uncaring and rude. As mentioned, some private patients did not have private rooms during their stay because these were unavailable. These women shared rooms with other women and reported the same low-quality treatment that public sector women had attested to private patients with companions tended to be more satisfied with nursing services than public patients in both locations. This disparity may be because private patients may be less demanding of care, are more comfortable in their private rooms, and have companions. Most women reported that their experiences were good but experienced some issues.

Many women reported an excellent experience (Murray et al., 2010). Women in Riyadh tended to have had a better experience than those in Jeddah, and women in the public section in Riyadh often reported excellent experiences. The group with the second-highest approval rating for their hospital experience was women in the public sector of the same hospital. Because the breastfeeding initiative policy was a common issue for women in the public section of these hospitals (Scott & Mostyn, 2003), research is warranted to determine what is necessary to ease the process for public section patients.

Study implications

This study has implications for leaders implementing Saudi Arabia's Vision 2030 strategic plan. Hospital administrators and health-care managers should consider the essential need for adequately training physicians and nurses to deal with women under pressure and treat women with kindness, especially in a hospital's public section. The social behavior of health providers has a tremendous impact on women (Mannava et al., 2015; Srivastava et al., 2015). Furthermore, providing sufficient staffing for each ward may boost nurses' attitudes and, thus, improve women's satisfaction (Jarrar et al., 2019), especially in a hospital's public section. Innovation education and research among nurses and doctors should be considered to increase patient satisfaction (Al-Mugheed & Bayraktar, 2020, 2021a, 2021b). Bed management and decreasing the number of women per shared room are other important considerations as far as possible to guarantee the privacy and boost satisfaction. Hospital management is responsible for enhancing patient and staff safety and well beings (Al-Bsheish et al., 2019; Al-Mugheed et al., 2022).

Moreover, responses to women's complaints and voices should not be underestimated because women addressing these could aid in the continuous improvement of hospital performance and help avoid the future. Hospital administrations should deem women's complaints as one indicator of women's satisfaction, prioritizing it and allocating resources to solve as much as possible. Finally, hospital administrators should consider Arabic-language classes and cultural awareness courses for non-Saudi physicians and nurses, which is important because about one-half of all physicians and two-thirds of all nurses in Saudi are non-Saudis (Ministry of Health Saudi Arabia, 2018; Statista, 2022). Such training would reduce miscommunication.

Because leaders implementing Saudi Arabia's Vision 2030 are currently debating the success of privatization and questioning its outcomes (Al-Hanawi et al., 2018), this comparative study fills the gap between the public and the private sectors in terms of maternity services provided. Highlighted are the advantages of services provided in the private department. Measured against the call for more privatization in health services, the study provides a pathway for making strategic improvements in public sector hospitals during the transition to privatization.

Study limitations

This study was limited in geography, the sample, and perspective. This study was limited to two major cities in the Kingdom of Saudi Arabia and used convenience sampling. The data were collected from a sufficiently large sample size for thematic analysis, achieved the saturation level in the two locations, and provided multiple perspectives from women. However, it did not consider the perspectives of health-care professionals like physicians and nurses, which would have added differing viewpoints.

CONCLUSION

This study compares and contrasts women's satisfaction during delivery and recovery experiences in public and private sections of two NGHs. The first major difference between the sectors was that most private-section women did not complain about the hospital's policies. Conversely, public section women complained about the new breastfeeding policy and the inability to have companions to help during their hospital stay. Moreover, public section women found nurses to be rude and uncaring. However, this was not an issue in the private section, except for women who had shared rooms.

Furthermore, some women found doctors challenging to communicate with, especially in the public sections of hospitals. In short, women complained about social interactions with health providers, not medical services. Because privatization is underway and many new hospitals are under construction, considering privacy during delivery and admission is essential. Future research should explore ways to maintain the level of care provided in private sector hospitals while expanding care to meet the needs of all women given finite resources.

AUTHOR CONTRIBUTIONS

Hanin Almahmoud: conceptualization; data curation; investigation; methodology; writing–original draft. **Mohammad Al-Bsheish**: validation; supervision, writing–review and editing the final draft. **Melanie Cozad**: formal analysis; supervision; visualization. **Taghreed Shams**: conceptualization; methodology; supervision. **Hadeel Almahmoud**: methodology; formal analysis; validation; data collection.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author.

ETHICS STATEMENT

The study was conducted in accordance with the Declaration of Helsinki, and approved by Institutional Review Board from King Abdullah International Medical Research Center and the University of South Carolina with reference numbers SP18.361J and PROO00078703, respectively.

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Compliance with World Health Organization's COVID-19 guidelines among Iraqi health workers

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Abstract

During the COVID-19 pandemic, the World Health Organization (WHO) introduced guidelines with respect to hygiene practices, quarantine policies, and medical practices for health institutions to follow. Most studies examining compliance with WHO guidelines have been conducted at individual level but not at institutional level. This study investigates the availability of resources of health institutions in Iraq and their compliance with WHO COVID-19 guidelines. A total of 234 health workers, including physicians, nurses and medical technicians, were recruited in Babylon, Iraq. Self-reported number of health workers available in the health centre and the levels of compliance with the WHO's guidelines were assessed. Implementation of preventive measures for infected persons, fogging procedures, and having a crisis management team in the health centre were the top three common practices as recommended by WHO. There was a weak but significant positive relationship between the number of health workers in the healthcare centre and the levels of compliance with the WHO's COVID-19 guidelines ($\rho = 0.243$, $p < 0.05$), indicating that manpower may determine the implementation of these guidelines. There is a correlation between the quantity of health workers and the levels of compliance with the WHO's COVID-19 guidelines, showing that it is important to ensure sufficient human resources available in the health centre to implement the standard practices. In addition, more financial resources are needed to provide sufficient protective equipment and disposable supplies to health workers in Iraq.

KEYWORDS
compliance, Coronavirus disease, preventive measures, quarantine policies, World Health Organization

INTRODUCTION

For more than three years running, preventing the spread of the coronavirus disease (COVID-19) has been a primary goal of every nation. To support nations in this effort The World Health Organization (2020) has introduced guidelines for health institutions in an attempt to ensure that hygiene practices, quarantine policies, and medical practices have been in order and lead to optimal effects against the spread of COVID-19. For examples, guidelines with respect to the training of health service providers, the availability of crisis management teams, the procedures used in screening and managing COVID-19 cases including infection control practices, the availability of personal protective equipment and disposable supplies, and the fogging procedures applied in high-risk places within the health centre (Lamontagne et al., 2020).

Resources are scarce in developing countries which have been subjected to lack of human power, and medical and protective equipment (Martin-Delgado et al., 2020), which may lead to low level of compliance with WHO guidelines. As a result, developing countries are often vulnerable to infectious diseases (Bloom & Cadarette, 2019), leading to an increase in mortality (Hopman et al., 2020). Most studies examining compliance with WHO guidelines have been conducted at individual level (Banai et al., 2021; Pak et al., 2021; Wright & Fancourt, 2021; Wright et al., 2021), it is unclear whether health care institutions have followed the official recommendations. This study, therefore, aims to investigate the availability of resources of health institutions in Iraq and the compliance with the WHO COVID-19 guidelines.

METHODS

This cross-sectional study was conducted in Babylon, Iraq. Babylon has a population of more than three million with 56 health centers. The target participants of this study were health workers, including physicians, nurses, and medical technicians working in the health centres in Babylon. A total of 234 health workers, out of a possible 850 in the region, were randomly selected. The sample size was determined considering the effect size of 0.15, power of 0.8, and significant level of 0.05.

Participants were asked to complete a self-administered questionnaire, which consists of two parts. The first part collects demographic data and the second part assesses the levels of compliance with WHO COVID-19 guidelines based on a scale with responses “never,” “sometimes,” and “always.” The self-reported number of health workers available in the health centre was also assessed. Ethical approval was obtained from the research and ethics committee of the University of Babylon, and written informed consent was obtained from all participants.

Descriptive statistics including frequency and percentage were presented. Spearman correlation tests were conducted to identify association between levels of compliance with WHO COVID-19 guidelines and number of health workers in the health centre. All analyses were conducted using SPSS version 24 with significance level set at $p < 0.05$.

RESULTS

Table 1 shows the socio-demographic characteristics of 234 participants. Over 52% were female, about 35% of participants were aged 20–29 years, the majority (56%) were nurses, attained Bachelor's degree (47%), and living in urban areas (56%).

Table 2 shows the self-reported number of health workers in the health centre. It shows that about 24% of participants reported having 20–40 health workers in the health centre, and 11% of participants reported having 121–200 health workers.

Table 3 indicates the levels of compliance with WHO COVID-19 guidelines, with responses "never," "sometimes," and "always". The findings show that the implementation of preventive measures for infected persons (87.2%), fogging procedures (84.7%), and having

TABLE 1 Sociodemographic characteristics of participants ($n = 234$).

Variable	Categories	Frequency	Percent
Gender	Female	122	52.1
	Male	112	47.9
Age	20–29	81	34.6
	30–39	76	32.4
	40–49	59	25.2
	50–59	18	7.8
Specialty	Nurses	131	56
	Physician	45	19.2
	Laboratory technical	58	34.8
Education level	Secondary degree	10	4.2
	Diploma degree	70	29.9
	Bachelor's degree	111	47.4
	Postgraduate	43	18.5
Residency	Urban	131	56
	Rural	103	44

TABLE 2 Self-reported number of health workers in the health centre.

Self-reported number of health workers in the health centre	Frequency	Percent
20–40 health workers	57	24.4
41–60 health workers	38	16.2
61–80 health workers	43	18.4
81–100 health workers	44	18.8
101–120 health workers	27	11.5
121–200 health workers	25	10.7
Total	234	100.0

TABLE 3 Compliance with WHO's COVID-19 guidelines ($n = 234$).

WHO COVID-19 Guidelines	Never		Sometimes		Always	
	N	%	*N*	%	*N*	%
Have health service providers been trained about preventive health measures against the Covid-19 epidemic, according to the standards of the World Health Organization?	42	17.9	129	55.1	63	27
Has a crisis management team (of specialists) been formed within the center?	30	12.8	139	59.4	65	27.8
Have possible cases of Covid-19 infection been investigated, with special attention to health care workers? This includes reviewing consultations, records, and entry restrictions, laboratories, public health facilities, and epidemiological corridors to date	40	17	134	57.2	60	25.8
Document the procedures used in screening and managing cases, including infection control practices applied.	35	14.9	128	54.7	71	30.4
Investigating the availability of drugs such as antivirals. Supportive treatment methods such as antipyretics and antibiotics, sample collection supplies, cold chain storage, and transport packaging.	47	20	120	51.2	67	27.8
Apply standard measures of personal protective equipment and standard precautions	53	22.6	122	52.1	59	25.3
Sufficient amounts of personal protective equipment and disposable supplies; hand hygiene, and personal hygiene supplies such as the use of tissue paper and the use of sterilizers and disinfectants	149	63.6	50	21.4	35	15
Other guidance on the use of personal protective equipment in health care contexts such as training and gaining experience in its optimal use.	48	20.5	120	51.3	66	28.2
Have daily fogging procedures been applied in high-risk places such as quarantine places, initial examination, and laboratories?	36	15.3	133	57	65	27.7
Has a new and approved health promotion and education guide on the virus been prepared and implemented by the health institution for health service providers?	41	18	131	56	61	26
The extent of application of the epidemiological definitions about the virus? Was it approved according to the updates of the World Health Organization in dealing with the case and its diagnosis?	47	20	126	54	61	26
The application of effective monitoring and epidemiological proactive survey of the community and population	151	64.5	48	20.5	35	15
Did the Crisis Management Cell operate in accordance with documented and approved international health standards and did it include a public health specialist? Does it have a working guide and a framework to be applied to the patch within the policies and PR?	50	21.4	124	53	60	25.6
Implementing comprehensive health care and preventive standards against the virus for the infected and those who touch them; health service providers; community institutions	30	12.8	129	55.2	75	32

a crisis management team (of specialists) in the health centre (87.2%) were the top three common practices as recommended by WHO (with responses “sometimes” or “always”). In contrast, application of effective monitoring and epidemiological proactive survey of the community and population (64.5%) and providing personal protective equipment and disposable supplies (63.6%) were the least common practices (with responses “never”). Spearman correlation tests indicate that there was a weak but significant positive

TABLE 4 Correlation between self-reported number of health workers in the healthcare centre and the levels of compliance with WHO COVID-19 guidelines.

Variables	Levels of compliance with the WHO's COVID-19 guidelines
Self-reported number of health workers in the healthcare centre	Spearman $\rho = 0.243$*

*$p < 0.05$.

relationship between the self-reported number of health workers in the healthcare centre and the levels of compliance with the WHO's COVID-19 guidelines ($\rho = 0.243$, $p < 0.05$), indicating that manpower may determine the implementation of these guidelines (Table 4).

DISCUSSION

The findings of this study indicate the levels of compliance with WHO COVID-19 guidelines in the health centres in Babylon, and the relationship with human power within the health centre. The healthcare systems of developing countries are confronted with a combination of increased risk and a diminished ability to respond. There are insufficient intensive care units (ICUs), advanced equipment, and clinical staff. ICUs are vital to the treatment of COVID-19. However, ICUs in Iraq are poorly equipped. Most medical devices are old and outdated and there is a severe shortage of health personnel working in these units, such as physicians and nurses. This is common in developing nations. As a comparison, Bangladesh, a country with a population of almost 165 million people, has fewer than 7000 isolation beds and only 1622 healthcare professionals, with only 595 physicians to treat COVID-19 patients (Khan et al., 2020). Similarly, Iraq only had 2.1 nurses and midwives per thousand people and the number of physicians was only 0.83 per thousand people.

Controlling the spread of COVID-19 requires preventive and curative measures. In this study, we found that these measures were followed by most health workers in a way that reflects human capabilities and infrastructure. There is a critical need for worldwide collaboration to provide reliable guidance at local level, and implement global policy and practice to prevent infectious diseases. In this regard, WHO has provided recommendations to patients, physicians, and policymakers with up-to-date, evidence-based information concerning medication (Lamontagne et al., 2020).

The results of the current study indicate a positive correlation between the number of health workers in the health centers and the levels of compliance with WHO COVID-19 guidelines. This is expected as human resources influence the operation routine in the health centre. At the same time, the implementation of guidelines could be easier. For example, hospitals with more human resources can develop new rules and procedures for medical management, redesign the format of outpatient services, and set up specific spaces for inpatient services for confirmed or suspected patients (Yan et al. 2020). It is worth noticing that the "application of effective monitoring and epidemiological proactive survey of the community and population" and "providing personal protective equipment and disposable supplies" were the least common practice among health workers. Our findings reflect the circumstances one would expect to find in a poorly developed healthcare system as well as the particular economic status in Iraq. More resources are needed to reinforce effective monitoring of the community and increase the supplies of personal hygiene and protective equipment. Despite the findings, this study has some limitations, including the reliance on self-reported data, which may be subjected to recall bias.

CONCLUSIONS

In this study, a majority of health workers followed WHO COVID-19 guidelines. There is a correlation between the quantity of health workers and the levels of compliance with those guidelines. It is therefore important to ensure sufficient human resources in the health centre to implement standard practices. In addition, more financial resources are needed to provide protective equipment and disposable supplies to health workers in Iraq.

AUTHOR CONTRIBUTIONS

Burhan Hadi: conceptualization, methodology, formal analysis, writing—original draft. **Kadhim H. Jassem, Reheem M. Abadi, Mohamed A. Igrish, Ali F. Abdul Hussein**: Methodology, investigation, writing—original draft, writing—review and editing. **Ka Y. Lee**: Methodology, investigation, formal analysis, visualization, writing—original draft, writing—review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

ETHICS STATEMENT

Ethical approval was obtained from the research and ethics committee of the University of Babylon, and written informed consent was obtained from all participants. We comply with all necessary international and national ethical guidelines.

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ORIGINAL ARTICLE

Temperature screening and detection of Covid-19 in school-aged children: A retrospective cohort study assessing the efficacy of temperature screening in schools

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Abstract

In July 2020, Corinth School District was the first in Mississippi to return to the classroom setting. Coronavirus disease 2019 (Covid-19) protocols were developed to maintain the safety of students. These included mandatory masking, seating charts, desk spacing, sanitizing protocols, lunch within classrooms, alteration of extracurriculars, cancellation of assemblies, and quarantine policies. Temperature screenings were also performed. Students registering as febrile would undergo Covid-19 testing. To evaluate the efficacy of temperature scanning as a surveillance method for Covid-19 in the school setting, deidentified data was obtained from the Corinth School District. Overall incidence and grade level incidence of Covid-19 were calculated in children attending school from July 27, 2020 to September 25, 2020. Data were examined for a correlation between documented fevers and Covid-19 positivity. Reports provided by the school district were investigated for positive test groupings signifying a school-related outbreak. Of 28 children with fevers at school, zero tested positive for Covid-19. Twenty-six children tested positive for Covid-19; none were febrile at school. The incidence of Covid-19 in our population during the study period was 1.03%. Incidence in elementary students was 0.34%, 0.93% in middle school, and 2.51% in high school students. There were no school outbreaks during the study period. Both relative risk and odds ratio were calculated as equal to zero (0.00). Temperature scanning is not a sensitive screening method for Covid-19 in school children.

KEYWORDS

infection prevention, pandemic response, pediatric Covid-19 screening, public health in schools, temperature screening

Key points

- In the pediatric population temperature screening was not found to be a reliable means of coronavirus disease 2019 (Covid-19) screening and detection.
- Fever is often not the primary presenting symptom of Covid-19 within the pediatric population.
- Covid-19 screening and outbreak prevention methods within pediatrics must take into account differing presentations to effectively prevent outbreaks.

INTRODUCTION

The first coronavirus disease 2019 (Covid-19) school closure in the United States was on February 27, 2020. By March 30, 2020, all but one US public school district was closed, representing the largest-ever synchronized national school closure in US history and affecting more than 50 million kindergarten–12th-grade students (Zviedrite et al., 2021). On July 27, 2020, Corinth School District in Corinth, Mississippi, was one of the first in the nation and the first in Mississippi to resume traditional classes for its 2530 students. Corinth School District developed a progressive Covid-19 safety policy to bring students back into the classroom. Students who resumed in-person classes were observed daily, over 9 weeks, to determine if this policy effectively detected and mitigated the spread of Covid-19 in school-age children. Approximately 10% of students in the district elected to pursue a virtual format, though this number fluctuated minimally throughout the school year due to factors such as postexposure quarantine.

Multiple resources today guide the development of Covid-19 policies relating to the safety of children in schools, but few were available in the summer of 2020. The initial Covid-19 policy implemented by Corinth School District was a mask mandate, temperature screening, and additional mitigation strategies, which included all prekindergarten through 12th-grade students (PreK-12). In-person attendance required compliance with these policies. Five Fotric 226b series thermal cameras were purchased to scan the temperature of individuals directly at the lacrimal duct. These scanners provide a quick and accurate method of temperature screening and two were placed in each of the elementary and middle schools and one in the high school. Each school required all individuals to enter at controlled access points with a daily screening at the middle and high schools and twice daily at the elementary school. Students with a lacrimal duct temperature of 100.4°F or more had an oral temperature taken manually. If confirmed febrile, students left campus with a parent or guardian and were encouraged to obtain Covid-19 testing. Students were not required to retest on subsequent days of febrile illness if initially negative for Covid-19. Students were required to be fever-free without the use of antipyretics for 72 h before returning to school, whether they tested for Covid-19 or not.

Other measures implemented included seating charts (grouped by siblings for bus rides), removing excess furniture to allow desk spacing, and restricting lunch periods to the classroom. Staggered recess times were instituted, and playground equipment was banned. Sports teams and band members practiced outside in small groups, and band members were required to maintain a distance of 6 feet or more while using an instrument. No field trips or assemblies were permitted.

If students were within 6 feet of a Covid-19-positive individual for 15 min or longer, they were required to quarantine for 14 days from the last day of contact per the July 2020 CDC quarantine length guideline (self-reported off-campus exposures followed the same policy). Parents received education to keep any child at home experiencing Covid-19 symptoms and were encouraged to obtain Covid-19 testing. Because rapid testing was not available, symptomatic children were required to be absent from school while awaiting Covid-19 test results; children with a known Covid-19 exposure remained in quarantine for 14 days from the last contact. Quarantined children were tracked through spreadsheets for evidence of an "outbreak." Mississippi Department of Health classified an outbreak as three or more students within the same classroom testing positive for Covid-19 within 2 weeks, resulting in a 14-day classroom closure.

METHODS

In our retrospective cohort study, a deidentified data set was obtained from Corinth School District with expedited Institutional Review Board approval obtained through Nova Southeastern University before any data were available to our investigators. Scanners placed on tripods measured the temperatures of all students automatically at the lacrimal duct as they entered designated entry points with the ability to take 30 frames per second from up to 10 feet away. Nurses monitored the scanners between July 27, 2020, and September 25, 2020, representing the first of four 9-week modified blocks of the academic calendar (Block 1). Students with a fever, which is defined as a temperature of 100.4°F or higher, were escorted to the school nurse's office for oral temperature confirmation. School nurses collected and placed data into excel spreadsheets and included all students attending in-person classes within Corinth School District across grades PreK-12 during Block 1. Spreadsheets recorded fever along with the date and whether that individual subsequently tested positive for Covid-19. All febrile students during this period did receive testing and results were subsequently shared with school nurses. Data also included afebrile students with positive Covid-19 tests reported to the school by parents. Using Microsoft Excel and Stata, the investigators calculated the overall incidence of Covid-19 in students attending Corinth School District during Block 1, and the incidence was grouped by grade level. Relative risk and odds ratios were calculated to assess the association between fevers recorded at school and Covid-19 positivity.

RESULTS

A total of 2530 students attended Corinth School District during Block 1; 1179 students in the elementary school (ages 4–11 years), 754 students in the middle school (ages 10–16 years), and 597 students in the high school (ages 14–21 years) (Figure 1). Due to the inclusion of students with special needs, age groupings ranged higher than traditionally seen for the grade level. One hundred ninety-nine elementary school students, 68 middle school students, and 64 high school students qualified for special education during Block 1 (Table 1). Nine students in the elementary school, 19 in the middle school, and 20 in the high school had a 504-plan protected under the American Disabilities Act (Table 1). Fifty-one percent of students in the district were male, 56% White, 30% African American or Black, 13% Hispanic, and 1% Asian (Table 1). Three students identified their race as "other": one elementary school student and two high school students. Students qualifying for free or reduced-price lunch made up 69% of total students (Table 1).

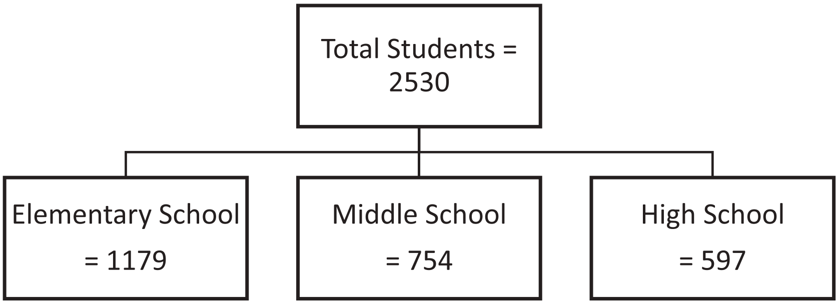

FIGURE 1 Corinth School District student roster distribution during Block 1.

TABLE 1 Student demographic statistics for Corinth School District during Block 1.

	Corinth School District demographic			
	Elementary school ($n = 1179$)	**Middle school ($n = 754$)**	**High school ($n = 597$)**	**Corinth School District ($n = 2530$)**
Gender	Male: 609	Male: 379	Male: 306	Male: 1294
	Female: 570	Female: 375	Female: 291	Female: 1236
Race/ethnicity	Black: 362	Black: 217	Black: 175	Black: 754
	White: 644	White: 442	White: 337	White: 1423
	Hispanic: 158	Hispanic: 84	Hispanic: 74	Hispanic: 316
	Asian: 14	Asian: 11	Asian: 9	Asian: 34
Special education	199	68	64	331
	504 Plan: 9	504 Plan: 19	504 Plan: 20	504 Plan: 48
Free/reduced lunch	860	521	360	1741

Twenty-eight children were sent home with fevers detected at school during Block 1 with no subsequent positive Covid-19 tests within this group (Figure 2). All 28 children did receive Covid-19 testing, which was shared with Corinth School District, though rapid testing was not yet available. Twenty-six children tested positive for Covid-19 during Block 1, who were afebrile at school; 4 were in elementary school; 7 in middle school; and 15 in high school (Figure 2). There were no outbreaks during Block 1 requiring classroom closure. The incidence of Covid-19 among PreK-12 students in Corinth School District during Block 1 was 1.03%. The incidence in elementary school students was 0.34% compared to 0.93% in middle school students, and 2.51% in high school students. In the absence of positive Covid-19 tests within the student group with detected fevers, the odds ratio and relative risk were both calculated as zero (0.00).

DISCUSSION

Fever detected at school did not correlate with Covid-19 positivity, with no students febrile at school during Block 1 subsequently testing positive for Covid-19. Furthermore, none of the 26 students who tested positive for Covid-19 during Block 1 was febrile at school. There is

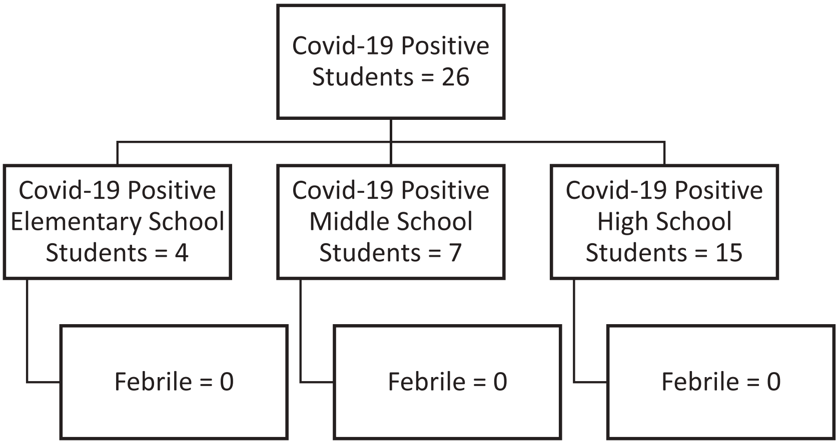

FIGURE 2 Positive coronavirus disease 2019 (Covid-19) tests correlating with measurable fevers across student groups in Corinth School District during Block 1.

no significant association between fevers detected at school and Covid-19 positivity. Given that there was no association between detectable fever and Covid-19 positivity, we conclude that temperature measurement alone is not an accurate method of Covid-19 screening within our study population.

A meta-analysis by Li et al. of 1994 patients with Covid-19 early in the pandemic suggested fever was a reliable early symptom of the infection and was present in 89% of patients (Li et al., 2020). Similar studies indicated fevers in 89% of hospitalized patients, while only 64% of Covid-19-positive hospital workers in New York were febrile (Clemency et al., 2020; Guan et al., 2020). Subsequent studies suggested fever was present in only 45% of patients with headache, loss of taste or smell, cough, nasal congestion or rhinorrhea, and other upper respiratory symptoms presenting more commonly (Lechien et al., 2020; Liu et al., 2020). An Australian study demonstrated an even lower association between Covid-19 and fever, finding it in only 19% of positive Covid-19 individuals and increasing to 24% with repeat testing (Mitra et al., 2020). In all of these studies, patients were adults over 18 years, providing uncertain guidance for screening for Covid-19 to the pediatric population.

Children do not have the same Covid-19 presentations as adults, usually presenting with less severe or even no symptoms (Naja et al., 2020). When symptomatic, data reveal that children appear to be febrile less frequently than adults, with percentages ranging between 48% and 64%. Primary pediatric symptoms consist of upper respiratory symptoms, gastrointestinal symptoms, or rash (Ding et al., 2022; Islam et al., 2021; Souza et al., 2020; Yasuhara et al., 2020) Our data suggest that the presence of fever does not aid in detecting Covid-19 in children. We suggest that more valid screening tools in children would focus on the presence of other symptoms such as upper respiratory and gastrointestinal.

Our data showed a low incidence of Covid-19 in elementary students with a higher incidence in middle school students and the highest in high school students. Though it is difficult to find exact incidences of Covid-19 in the pediatric age group during this period, studies using February 2020 data from China showed 0.9% for children aged 0–10 years and 1.2% for children aged 10–19 years (Lee et al., 2020). Leeb et al. showed that between May and September 2020, the average weekly incidence of Covid-19 in children aged 5–11 years was 19 per 100,000 and in those aged 12–17 years was 37 per 100,000 (Leeb et al., 2020). This data is consistent with our results, showing that younger ages are less likely to contract Covid-19. In contrast, studies performed later in 2020 and 2021 indicated that children of younger ages may have a similar incidence of Covid-19 as adults, but more frequently experience asymptomatic or less severe infection (Bajema et al., 2021; Dawood et al., 2022). This supports our understanding that when infected with Covid-19, children present differently than adults and fever monitoring may not be the best screening method for detecting Covid-19 in this age group and will likely lead to continued missed infections (Ding et al., 2022; Islam et al., 2021; Naja et al., 2020; Souza et al., 2020; Yasuhara et al., 2020).

Despite positive tests in all age groups during Block 1, no outbreaks occurred requiring classroom closures. We conclude that the infection control measures implemented were beneficial even if temperature screening was insufficient to detect Covid-19. Previously, there was almost no reference for managing school closures and exposure risk during a pandemic caused by respiratory pathogens. However, measures implemented by the Corinth School District provide practical guidance for bringing children safely back into the classroom.

The American Academy of Pediatrics (AAP) warns that remote learning exacerbates existing educational inequalities, is detrimental to the education of children of all ages, and is thought to worsen the growing mental health crisis among children and adolescents (AAP, 2022). The National Academies of Sciences, Engineering, and Medicine emphasize, for students of low socioeconomic status in particular, the benefit of meal programs, healthcare services, and mental health services in schools (Dibner et al., 2020). As remote learning is unable to replace these critical services, vulnerable students are disproportionately negatively impacted by not attending school in person.

When strict mitigation methods are enforced, reopening schools does not significantly increase community transmission nor were children found to be the primary transmission source for Covid-19 (Goldhaber-Fiebert et al., 2020; Zhu et al., 2021). The AAP recommends that if school closures are necessary due to in-school outbreaks or community surges, they should be as brief as possible. Mitigation methods recommended by the AAP include vaccination for all children and adolescents aged greater than 5 years who do not have a contraindication to the Covid-19 vaccination, isolation when sick or symptomatic, testing based on CDC guidelines, mask-wearing for all children 2 years and older, improved ventilation of schools, use of outside spaces with measures taken to appropriately distance students from each other indoors, and provision of adequate and frequent hand hygiene opportunities with appropriate school-wide sanitation protocols in place (AAP, 2022). Mask-wearing and improved building ventilation were associated with lower Covid-19 transmission (Budzyn, 2021; Gettings, 2021; Jehn, 2021).

LIMITATIONS

Early pandemic studies such as ours reflect the original strain of Covid-19 and do not encompass later variants. Children were less susceptible to earlier variants of Covid-19, which may have led to a lower incidence than with more recent variants. Parents were aware of daily temperature screenings on arrival. They may have premedicated their children with an antipyretic to pass the temperature screening or purposely kept the child home from school. These children may have later tested positive for Covid-19. It is hypothesized that younger children require childcare if kept home from school causing parents to pre-medicate them more often; therefore, all elementary school-age children were screened twice every morning to detect elevated temperatures more accurately. Febrile students testing negative for Covid-19 were not required to retest, which may have led to false negatives if still early in the disease process. Finally, students with special needs were included in our data, which caused us to include some students up to age 21 years and may have skewed, particularly Covid-19 incidence among high-school students.

CONCLUSION AND POLICY IMPLICATIONS

Early in the pandemic, many assumed that temperature screening was an effective method of Covid-19 screening and one of the few feasible strategies readily available. Thus, it was used broadly in schools despite children with Covid-19 presenting with fever much less commonly than adults (Ding et al., 2022; Souza et al., 2020; Yasuhara et al., 2020) Our data indicate that temperature screening could not detect any positive Covid-19 cases within Corinth School District between July 27, 2020 and September 25, 2020, and should not be used as a stand-alone screening method for Covid-19 in pediatrics. Covid-19 incidence was lowest among elementary students at 0.34%, intermediate in middle school students at 0.93%, and highest among high school students at 2.51%. Lastly, we believe infection control measures such as face masks, hand hygiene, cleaning policies, seating maps, social distancing, and contact tracing were able to mitigate outbreaks of Covid-19.

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CONFLICT OF INTEREST STATEMENT

The authors would like to disclose that Dr. Amy Davis had children enrolled in Corinth School District during Block 1. The authors declare no conflict of interest.

ETHICS STATEMENT

Expedited IRB approval was obtained through Nova Southeastern University prior to investigator acquisition of data. This study follows the policies of Committee on Public Ethics (COPE).

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ORIGINAL ARTICLE

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Confidence in public institutions is critical in containing the COVID-19 pandemic

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Abstract

This paper investigates the relative importance of confidence in public institutions to explain cross-country differences in the severity of the coronavirus disease 2019 (COVID-19) pandemic. We find that a 1 SD increase (e.g., the actual difference between the United States and Finland) in confidence is associated with 56.3% fewer predicted deaths per million inhabitants. Confidence in public institutions is one of the most important predictors of deaths attributed to COVID-19, compared to country-level measures of health risks, the health system, demographics, economic and political development, and social capital. We show for the first time that confidence in public institutions encompasses more than just the unobserved quality of health or public services in general. If confidence only included the perceived quality, it would be associated with other health and social outcomes such as breast cancer recovery rates or imprisonment as well, but this is not the case. Moreover, our results indicate that fighting a pandemic requires citizens to cooperate with their governments, and willingness to cooperate relies on confidence in public institutions.

KEYWORDS

confidence in public institutions, COVID-19, death rate, machine learning

Key points

- There is substantial heterogeneity in COVID-19 prevalence and deaths across countries.

- We employ regression and machine learning methods to identify the most critical predictors of deaths attributed to the pandemic.
- We find that confidence in public institutions is one of the most important predictors of deaths attributed to COVID-19.
- Our results suggest that effective policy implementation during pandemics relies on confidence in public institutions.

INTRODUCTION

There is substantial heterogeneity in coronavirus disease 2019 (COVID-19) prevalence and deaths across countries (Sorci et al., 2020). The severity of the pandemic has been shown to correlate with the prevalence of comorbidities and the demographic composition of countries (Sorci et al., 2020), their political systems (Karabulut et al., 2021), the role of culture in terms of following regulations and obeying laws (Gelfand et al., 2021), the timing and stringency of social distancing measures (Deb et al., 2020; Nouvellet et al., 2021), access to vaccines (Mallapaty et al., 2021; Meslé et al., 2021), mass testing (Kahanec et al., 2021), social capital (Bartscher et al., 2021), government effectiveness (Liang et al., 2020), the geographical mobility of people (Nouvellet et al., 2021), and what this paper is focusing on, confidence in public institutions (Elgar et al., 2020; Helliwell et al., 2021). As ample evidence shows that higher confidence in public institutions increases compliance with health regulations, such as social distancing or quarantining (Bargain & Aminjonov, 2020; Bavel et al., 2020; Brodeur et al., 2021; Lalot et al., 2020; Soveri et al., 2021), confidence could be a key element in containing the pandemic.

A series of papers have emerged in the last 2 years looking at the role of confidence in public institutions in the containment of the pandemic (e.g., Amara et al., 2022; Lenton et al., 2022; Yuan et al., 2022 see Table A5 in Supporting Information: Appendix A for a detailed review). While most of this literature agrees that confidence in public institutions is negatively correlated with the severity of the pandemic, there are exceptions. Chang et al. (2022) show that public trust in the government is significantly negatively correlated with COVID-19 infections and deaths, while Charron et al. (2022) document that trust in public institutions is negatively correlated with excess mortality across European regions. Lenton et al. (2022), on the other hand, found that although the resilience of countries (how quickly the number of cases and deaths goes down after a peak in the pandemic) is positively correlated with generalized trust in people, it is not significantly associated with confidence in public institutions.

As confidence in public institutions is not randomly allocated to countries, such empirical work can only look for its correlational relationship with pandemic outcomes. To decrease selection bias, the main approach of the literature is to control for all observable characteristics of countries that could be related both to the pandemic and confidence in public institutions. In this endeavor, however, the articles mentioned above use different sets of control variables (see a comparison in Table A5 in Supporting Information: Appendix A), and it is not clear whether the statistical associations found by each of them would survive after controlling for a more comprehensive set of empirically important measures.

Building on these precedents discussed in the previous paragraphs, this paper investigates the importance of confidence in public institutions (the government, parliament, the press, the political parties, the courts, and the police) in predicting the severity of the COVID-19 pandemic. We make three contributions to the literature. First, while the previous socioeconomic literature used divergent sets of potentially important control variables for similar exercises, we cover all types of these factors. We identify 15 variable sets used in the previous studies and include variables from each set as control variables. In contrast, previous studies cover only 4–7 sets of these variable groups at a time (Table A5 in Supporting Information: Appendix A).

Second, to the best of our knowledge, ours is the first paper to look at the relative predictive power of these country-level socioeconomic factors in general and confidence in public institutions in particular. As it is detailed in Section "Empirical methods," we use regression and machine learning methods to predict the severity of the pandemic, captured by the number of deaths attributed to COVID-19 per million people. We exploit data on 75 countries (selected based on data availability, see more details in Section "Data") and follow the number of deaths until March 21, 2021. This end date is ideal, as mass vaccination was still at an early stage in all countries in the sample. Thus, we measure pandemic outcomes before the effects of mass vaccination phased in, which was of unequal pace and magnitude by country.

Our third contribution is that while Elgar et al. (2020) conclude that further investigation is needed to uncover the mechanisms behind the significant statistical relationship between confidence and COVID-19 deaths, we take a step further and look into its potential drivers. In particular, we test whether confidence in public institutions measures some unobserved qualities of health or public services by investigating its relationship with breast cancer survival rate and imprisonment rate. We assume that any meaningful (conditional) statistical relationship between confidence in public institutions and these two alternative outcomes would suggest that confidence in public institutions might capture some latent features of the health or the public system that is not observed by observable data like public spending or the number of hospital beds.

We include all countries in our estimations for which data is available. We find that confidence in public institutions is key for explaining cross-country heterogeneity in the severity of the pandemic. In our main regression specification, 1 SD higher confidence is associated with a 56.3% (or in raw numbers, 350.9) lower number of deaths per million population. This relationship is significant at the 1% level and robust to an extensive series of robustness checks, including restricting the sample to democracies and Organization for Economic Co-operation and Development (OECD) countries, using alternative outcome variables (number of cases, fatality rate, and excess deaths compared to the previous 5 years), earlier observation periods, different estimation methods, and applying a variable selection model to identify the empirically most efficient set of control variables. Machine learning methods, random forest regressions, and a least absolute shrinkage and selection operator (lasso) suggest that confidence in public institutions is among the most important predictors of the number of deaths attributed to COVID-19.

In terms of channels, we find no evidence that in countries with higher confidence in public institutions, people would reduce their mobility more than in countries with lower confidence. However, we find that the role of confidence is two times as large in countries conducting comprehensive contact tracing as in countries not using this method. This result suggests that in countries where confidence in public institutions is higher, people are more willing to comply with rules and regulations that would require them to become visible to the authorities, for example, by supplying their personal data for contact tracing. Furthermore, while confidence in public institutions has a strong and robust statistical association with the severity of the pandemic, it is not associated with either breast cancer recovery rates or imprisonment. This result suggests that confidence in public institutions encompasses more than simply the perception of people about how well institutions work in general, which is unobserved in the available data. If it only encompassed the latent quality of public services, confidence in public institutions should be correlated with other health and social outcomes as well, but this is not the case.

Lastly, all our results up until this point are estimated before mass vaccination started. Exploiting vaccination data until January 1, 2022, we also find evidence that confidence in public institutions is related to the vaccination rate. In our main model, 1 SD higher confidence is associated with a 3.4 percentage points higher vaccination rate (in terms of the number of fully vaccinated people per 100 population). This relationship is significant at the 10% level. This result supports that confidence in public institutions is indeed related to compliance with government guidelines.

DATA

We provide a detailed description of the data (including the definitions of all variables) in Supporting Information: Table A1. The final database and all Stata codes for gathering the data and replicating the complete analysis are available on GitHub.[1]

We measure country-level confidence in public institutions before the pandemic using the joint World Value Survey (WVS) and European Value Survey (EVS) 2017–2021 data set (EVS/WVS, 2020). The interviews were conducted in 2017–2020 (see the end of fieldwork by country in Supporting Information: Table A2). Note that in 5 countries out of the 75 that we use, fieldwork ended in March–August 2020, after the onset of COVID-19. Thus, we provide a robustness check where we exclude these countries in Supporting Information: Appendix B.

First, we estimate the survey-weighted country-level averages of individual answers to the following question (and multiply them by −1): "I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence" (coded as 1), "quite a lot of confidence" (coded as 2), not very much confidence (coded as 3), or none at all (coded as 4). We use six items: the government, the press, the police, the political parties, the parliament, and the courts.[2] Then, we conduct principal component analysis (PCA) on the six country-level aggregates and use the first predicted score (share of explained variation: 0.75; Cronbach's α: 0.93) as an index of *confidence in public institutions*.[3] The correlation matrix of these measures is presented in Supporting Information: Table A3.

We replicate our main results on the individual items of confidence and provide two further robustness checks regarding these data. First, individual-level nonresponse varies between 0% and 9.3% across countries (Supporting Information: Table A4). Thus, we control for the share of nonresponse (missing values) in a country in addition to our standard control variables. Second, there seem to be some nondemocratic countries where confidence in institutions is surprisingly high (China, Vietnam, and Tajikistan; Figure 1). This may be due to a type of conformity bias toward the authorities. To mitigate the effect of these outliers, we replicate our main results by restricting the sample to democracies (i.e., excluding countries from the sample that are categorized as "not free" by Freedom House [FH], 2020) and to OECD countries. We also provide a robustness check where we keep all countries and introduce an interaction term of confidence in institutions and democracy.

We retrieve the data on the number of COVID-19-induced deaths from the online resource: https://ourworldindata.org/ (Ritchie et al., 2020). They collect COVID-19 data from the COVID-19 Data Repository by the Center for Systems Science and Engineering at Johns Hopkins University. We look at the total number of confirmed deaths per one million inhabitants for all countries until March 21, 2021 in our main models. Following Gelfand et al. (2021), we take logs and use the log number of deaths as our primary outcome variable. We replicate our main results using several alternative outcome measures: the raw number of deaths per one million inhabitants, the log number of cases, the log fatality rate (the ratio of deaths to cases), excess deaths in 2020, and the log of excess deaths in 2020, the mean

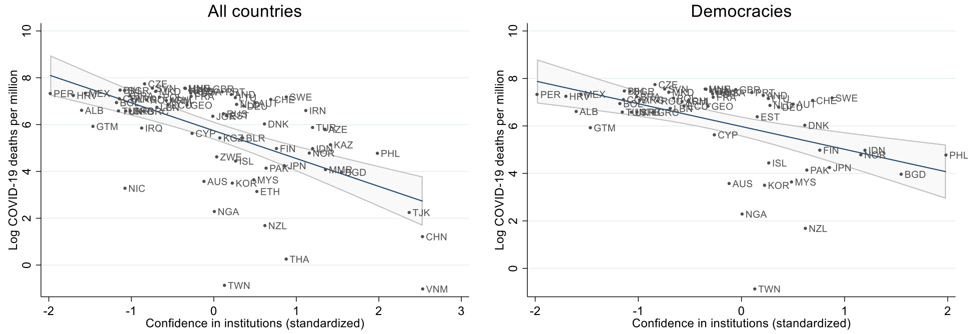

FIGURE 1 Log total deaths attributed to coronavirus disease 2019 (COVID-19) and confidence in institutions. Number of countries: 75 and 58. The confidence in institutions measure is standardized to mean 0 and SD 1. The subsample of democracies: countries categorized as "Not free" by Freedom House are excluded from the baseline sample (Freedom House, 2020). The list of countries is shown in Supporting Information: Table A1.

positivity rate of tests, and the log number of tests and 14 alternative observation periods ending between October 21, 2020 and December 21, 2021. Furthermore, we also control for the *method of how countries register deaths as attributed to COVID-19*, whether it is based on clinical diagnosis or is test-based (Karanikolos & McKee, 2020). Lastly, we repeat the analysis using the vaccination rate (share of those fully vaccinated per 100 population) on January 1, 2022 as the outcome variable.

Following the literature, in the main analysis and the robustness checks, we control for a rich set of country-level characteristics, all measured before the onset of COVID-19 (see more Supporting Information: Table A1): economic and social development (gross domestic product [GDP] per capita, life expectancy, Gini index); political development (government efficiency [Worldwide Governance Indicators] and democracy score [FH], summarized into an index using PCA), the lack of corruption index by Transparency International, demography (share of those above age 65, mortality rates before the pandemic, share of migrants as a % of the population); health (summary index using PCA, from the following health measures: body mass index [BMI] and share of deaths by risk factors (Institute for Health Metrics and Evaluation, 2019), including alcohol and smoking, air pollution, dietary risk, and known comorbidities (high blood pressure, obesity, diabetes mellitus, chronic kidney diseases, air pollution); the resources of the health system (health expenditures per capita, number of hospital beds per thousand people, number of medical doctors per thousand people; again, summarized into a PCA index); presence of the epidemic (number of days since the first reported death in the country); population, population density; 5-year survival rate of breast cancer; average years of education; social capital (trust in people via PCA from joint EVS/WVS, 2020 data and voter turnover from International IDEA); tightness of following rules (Gelfand et al., 2021). Gelfand et al. (2021) measure tightness via six survey questions, for example, how much do you agree with that "There are many social norms that people are supposed to abide by in this country," "There are very clear expectations for how people should act in most situations," "In this country, if someone acts in an inappropriate way, others will strongly disapprove," and "People in this country almost always comply with social norms."

We also use two contemporaneous measures. *Mobility* is the average change in Google mobility trends data (number of visitors) in retail, pharmacies, transit stations, and workplaces. More negative values indicate larger percentage drops in mobility until March 16, 2021, relative to median mobility between January 3, 2020 and February 6, 2020. *Stringency is* a composite index based on nine response indicators, including school closures, workplace closures, testing policy, and travel bans from the Oxford COVID-19 Government Response Tracker (Hale et al., 2021). We use the highest value for each country by March 21, 2021 in our main specifications and provide alternative models using the mean.

Note that our setup does not allow us to look at the causal effects of reduced mobility or social distancing measures. These two contemporaneous measures are likely affected by the severity of the pandemic in a country, and thus they are considered *bad controls* (Angrist & Pischke, 2009). We use them to show that even if we control for them, there is still a meaningful statistical relationship between confidence in institutions and the deaths attributed to COVID-19. Furthermore, we also use two elements of stringency measures separately: *restrictions on personal gatherings of small groups* and *comprehensive contact tracing*.

The descriptive statistics of our key variables are reported in Table 1, while their correlation table is reported in Table A6 in Supporting Information: Appendix A. The descriptive statistics of all remaining variables that we use in the paper are reported in Table A4 in Supporting Information: Appendix A. As Table 1 shows, there are some outlier values in the data set. For instance, the total cases per million, deaths, and share of migrants are reported to be outstandingly low in China, Taiwan, and Vietnam. On the other hand, the share of migrants is 59.71 in Andorra (as in most cases, migrants would only get citizenship after 20 years). In some countries like New Zealand and Australia, the number of excess deaths is negative and close to zero, implying that the pandemic did not have a toll in terms

TABLE 1 Descriptive statistics of our main measures.

Variable	Observations	Mean	SD	Min	Max
Ln total deaths per million	75	5.741	2.046	−1.022	7.742
Confidence in institutions	75	0	1	−1.983	2.531
No. of days since the first death	75	369.427	21.848	233	424
Log population	75	16.688	1.716	11.255	21.087
Log population density	74	4.338	1.119	1.164	7.143
Log GDP per capita	73	9.755	0.837	7.456	11.079
Gini	67	35.566	7.431	24.09	53.5
Index of democracy and government	74	0	1.327	−2.514	2.042
Log mortality rate before the pandemic	75	8.953	0.386	7.9	9.808
Share of those above age 65	73	12.736	6.32	2.751	27.049
Life expectancy	75	76.873	5.343	54.69	84.63
Share of migrants	74	8.484	10.383	0.071	59.714
Trust in others	75	−0.061	0.794	−1.842	1.796
Resources of the health system	72	0	1.317	−2.34	2.333
Index of health risks	75	0	2.174	−6.191	4.295
Stringency of COVID-19 measures	72	82.8	15.475	24.07	100
Decrease in mobility	63	−19.11	7.848	−39.694	−5.484

Note: The descriptive statistics of the remaining variables are presented in Table A4 in Supporting Information: Appendix A.
Abbreviations: COVID, coronavirus disease; GDP, gross domestic product; Ln, log number.

of deaths. Nigeria has the lowest life expectancy at 54.69 years. In terms of the pairwise correlations of our main measures, per-capita GDP is highly correlated with democracy, life expectancy, healthcare resources, and the share of those above age 65 (Table A6 in Supporting Information: Appendix A), and the correlation is high among these variables as well. This is not surprising as these variables capture the most prominent features of developed countries.

Figure 1 shows the raw association between the log number of deaths per million population and confidence in public institutions. The statistical relationship between deaths and confidence in institutions is significantly negative.

EMPIRICAL METHODS

We start by estimating linear regressions to investigate the statistical relationship between the log number of deaths attributed to COVID-19 per million people and confidence in institutions. In Model 1, we do not include any additional control variables and have 75 countries. In Models 2–7, we add the above-mentioned control variables sequentially to the model. In our preferred specification, Model 7, we have 55 countries. We provide robustness checks where we also control for variables that would further reduce our sample size. As we only have 55 countries in our preferred specification, we re-estimate all models using full information maximum likelihood (FIML) estimation. FIML infers available information from the total sample of 75 countries, even if some variables are missing for some countries. Throughout the analysis, we assume that conditional on all other variables we have, country-level variables are missing at random.

Once we have established a robust statistical relationship between confidence in institutions and the number of deaths attributed to COVID-19, we investigate the relative importance of this measure in predicting the outcome. We use two machine learning algorithms for this purpose: lasso and random forest regression.

The lasso procedure determines the empirically optimal set of control variables, applying a regularization on the coefficient estimates. Holding out a subset of the sample, we estimate the model on the training sample and test the model's predictive power on the held-out part. We use 100-fold cross-validation (we repeat the sampling and model estimation 100 times). The procedure selects the optimal subset of explanatory variables that produces a model with the lowest mean-squared prediction error in predicting the outcome variables in the held-out subsamples (Ahrens et al., 2020). As a result of this process, we find the most efficient set of control variables and re-estimate our main results controlling for these variables only. Furthermore, we also interpret the lasso coefficients as indicators of relative predictive importance.

As both the ordinary least-squares regression and the lasso procedure assumes a linear relationship between the number of deaths and the explanatory variables, we also employ a random forest regression to model any potential nonlinearities and interaction terms. In particular, we are interested in the relative predictive importance of the control variables in predicting the number of deaths. The relative importance of predictors is determined by the Increase in mean-squared errors (MSE) measure, which captures the increase in MSE should predictors be replaced by their own randomly permuted values (Hastie et al., 2009).

Last, we provide two further robustness checks. We look at how the estimated coefficient in the main model using our 55-country sample compares to the distribution of the same coefficients estimated on 35-country simulated random samples to show that country choice is not leading our results. Then, we estimate quantile regressions to investigate whether the association between confidence and COVID-deaths changes along the distribution of the log number of deaths.

RESULTS AND ROBUSTNESS CHECKS

Based on our regression results, the log number of deaths attributed to COVID-19 is significantly lower in countries where confidence in public institutions is higher (Table 2 and Supporting Information: Table B1). This relationship prevails even after sequentially adding the following control variables to the model (Supporting Information: Table B1): number of days since first death, population, population density, GDP per capita, Gini, index of political development, mortality rate before the pandemic; share of those above age 65, life expectancy, the share of migrants, trust in others, resources of the health system, index of health risks, stringency of COVID-19 measures, and decrease in mobility. In our preferred specification, Model 7, we find that 1 SD higher confidence in public institutions is associated with 56.3%[4] ($\beta = -0.828$, $p < 0.01$) fewer deaths per a million population (Table 2 and Figure 2).

Considering the number of deaths per a million population as the dependent variable (Supporting Information: Table B3), we find that 1 SD higher confidence in public institutions is associated with 350.9 fewer deaths ($p < 0.01$) per million. To put this into perspective, for instance, if people in the United States (confidence in public institutions = –0.19) had about

TABLE 2 Log total deaths attributed to COVID-19 and confidence in institutions (Model 7 of Supporting Information: Table B1).

Explanatory variables	Estimated coefficients	95% Confidence intervals	Robust *p* values
Confidence in institutions, standardized	–0.828	–1.169 to –0.486	0.000
Days since the first death	0.014	–0.003 to 0.031	0.100
Log population	–0.124	–0.431 to 0.183	0.419
Log population density	0.180	–0.213 to 0.573	0.361
Log GDP per capita	0.510	–0.787 to 1.806	0.431
Gini	–0.006	–0.052 to 0.041	0.803
Index of political development	0.240	–0.664 to 1.145	0.593
Log mortality rate before the pandemic	–1.427	–4.689 to 1.836	0.382
Share of those above age 65	0.034	–0.243 to 0.311	0.806
Life expectancy	–0.168	–0.416 to 0.080	0.178
Share of migrants	–0.044	–0.114 to 0.026	0.214
Trust in others	0.049	–0.462 to 0.561	0.847
Resources of the health system	0.712	–0.034 to 1.457	0.061
Index of health risks	0.211	–0.059 to 0.482	0.122
Stringency of COVID-19 measures	0.032	0.005 to 0.058	0.021
Decrease in mobility	–0.029	–0.081 to 0.022	0.257
Constant	19.575	–25.830 to 64.979	0.388
Observations	55		
R^2	0.769		

Note: Linear regression model estimated by OLS. Outcome variable: log total deaths attributed to COVID-19 per one million inhabitants.

Abbreviations: COVID, coronavirus disease; GDP, gross domestic product; OLS, ordinary least squares.

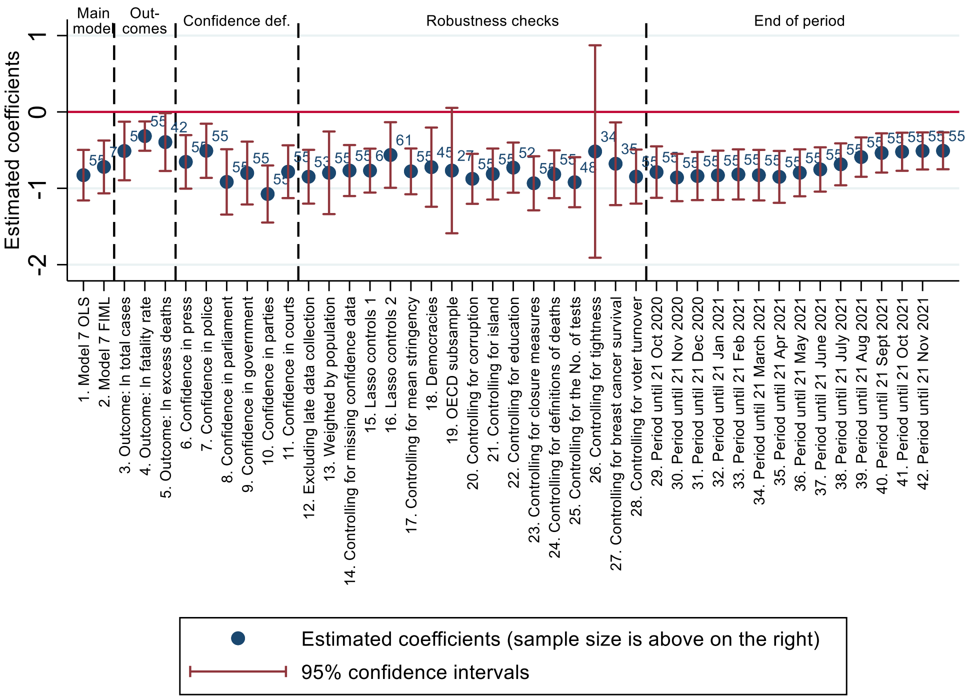

FIGURE 2 Robustness checks. All models (except for Models 15 and 16) control for days since first death, population, population density, gross domestic product (GDP) per capita, Gini index, index of political development, mortality rate before the pandemic, share of those above 65, life expectancy, share of migrants, trust in others, healthcare resources, index of health risks, stringency of coronavirus disease (COVID-19) measures, and decrease in mobility. On top of these measures, Model 14 also controls for the share of missing values of confidence in the individual-level data of the country; Model 20 also controls for an index of corruption; Model 21 also controls for whether the country is an island; Model 22 also controls for educational attainment; Model 23 also control for closure measures; Model 24 also controls for the way how COVID-related deaths are defined; Model 25 also control for the number of COVID tests, Model 26 also controls for the measure of tightness (following the rules), Model 27 also controls for breast cancer survival rate, and Model 28 also controls for voter turnout. Model 17 controls for all the main controls as the original specification, but controls for the mean of stringency of COVID-related measures in a country instead of the maximum. Model 15 controls for a subset of the main controls as set by a lasso procedure: the days since first death, index of political development, healthcare resources, index of health risks, stringency of COVID-19 measures and decrease in mobility. Model 16 controls for a subset of more detailed measures as set by a Lasso procedure: health expenditures, number of doctors per a thousand population, body mass index (BMI), obesity rate, blood sugar and kidney-related illnesses, physical activity, days since first COVID death, population density, index of political development, life expectancy, share of migrants, stringency of COVID-19 measures and decrease in mobility.

1 SD higher confidence in public institutions, such as people in Finland (confidence in public institutions = 0.76), our model would predict about 116,000 fewer deaths attributed to COVID-19.

In line with the medical strand of the literature (e.g., Caramelo et al., 2020; Dietz & Santos-Burgoa, 2020; Gao et al., 2020), the index of health risks, which summarizes how large the contribution of specific risk factors to death rates before the pandemic was (such as obesity, high blood sugar, high blood pressure, etc.), shows a positive correlation with the number of deaths attributed to COVID-19, although this relationship is not significant (Table 2). Theoretically, countries facing a higher COVID-19 burden must have higher related healthcare spendings, although we cannot check this as we have no available data on this. Nevertheless, this proposed association could be the reason why the index capturing the available resources (but not the quality) of the health system could show a weak positive correlation with the number of deaths. As in Gelfand et al. (2021) and Sorci et al. (2020), the stringency of the social distancing measures is positively correlated with the number of deaths, probably because countries hit harder by COVID-19 established more rigorous restrictions. Similarly, a decrease in mobility is associated with more deaths as people respond to the severity of the pandemic, although this relationship is small and insignificant.

We report the detailed results of all robustness checks in Supporting Information: Appendix B and summarize all comparable estimates on our main variable of interest in Figure 2. There are several ways to measure how severe the pandemic is in a country, and they all have their advantages and disadvantages. We have chosen the number of deaths attributed to COVID-19 per one million people as our primary outcome variable because this measure could be the least prone to underreporting. While the number of cases in a country relies heavily on their testing protocols, those who become very sick (and thus unfortunately die) usually get tested (or diagnosed). The protocols attributing deaths to COVID-19, however, also differ country by country (HSRM, 2020). Despite these potential problems, we find similarly strong associations if we replicate model 7 using the following alternative outcome variables (Supporting Information: Table B3): the raw number of total deaths per million people ($\beta = -350.876$, $p < 0.01$), log number of cases per million people ($\beta = -0.511$, $p < 0.05$), log fatality rate ($\beta = -0.316$, $p < 0.01$), excess deaths in 2020 compared to the average of 2015–2019 ($\beta = -4.711$, $p < 0.1$), and the log of excess deaths ($\beta = -0.395$, $p < 0.1$). Looking at the share of positive tests as an outcome again reveals a negative relationship ($\beta = -0.051$, $p < 0.01$), while we find no association with the log number of tests ($\beta = 0.034$, $p = 0.822$). Furthermore, our results stay very similar if we use the log number of deaths as an outcome variable and control for the different protocols of countries in attributing deaths to COVID-19 ($\beta = -0.934$, $p < 0.01$) (Supporting Information: Table B6).

Figure 2 plots the main estimated coefficients across all robustness checks. The first block (*Main model*) shows the main estimate of the statistical relationship between log number of deaths attributed to COVID-19 per million inhabitants and confidence in public institutions, estimated by OLS and FIML. The second block (*Outcomes*) plots three comparable estimates using the log number of cases, the log fatality rate, and the log number of excess deaths as outcome variables. The third block (*Confidence definitions*) shows the same estimates as the main model using confidence in specific institutions instead of the summary index. The block *Robustness checks* shows estimates in alternative model specifications, subsamples, and extra explanatory variables. The last block (*End of period*) plots the estimates using alternative observation periods.

Looking at confidence in specific institutions instead of the summary measure reveals that they all matter similarly (Table B4 in Supporting Information: Appendix B). In terms of the magnitude of the coefficients, the one on confidence in political parties is the highest ($\beta = -1.074$, $p < 0.01$), followed by parliament ($\beta = -0.916$, $p < 0.01$) and the government ($\beta = -0.800$, $p < 0.01$).

These results also prevail if we estimate models 1–7 by FIML instead of OLS to keep the sample size at 75. Supporting Information: Table B2 shows that the estimated coefficient on confidence in institutions decreases from −1.190 ($p < 0.01$) to −0.720 ($p < 0.01$) between models 1 and 7, but remains highly significant. The point estimate of model 7 indicates that a 1 SD increase in confidence is associated with a 51.3% decrease in the number of deaths, conditional on our set of country-level characteristics.

Both the lasso and the random forest algorithms find that confidence in public institutions is one of the most important predictors of the number of deaths attributed to COVID-19. When the regressors of the main specification are included in the models (lasso 1 in Table B5 and Figure B1 in Supporting Information: Appendix B), confidence in public institutions has the highest relative predictive importance compared to all control variables. As the lasso and random forest procedures can handle relatively large number of explanatory variables compared to the number of observations, we repeat the same procedures using the individual items of the PCA scores for health risks, resources, and political systems as covariates (lasso 2 in Table B5 and Figure B2 in Supporting Information: Appendix B). In these models, confidence in public institutions is the most important (lasso) or the second most important factor after BMI (random forest) to predict the outcome.

In Table B5 in Supporting Information: Appendix B we support our results with further robustness checks: we weight by population, control for the share of nonresponse in the confidence measures, re-estimate the main model controlling for only covariates found to be important by the lasso procedure (confidence in institutions, number of days since the first death, the index of political development, resources of the health system, index of health risks, stringency of COVID-19 measures, decrease in mobility), restrict the sample to democracies[5] and OECD countries, and exclude two countries where the data collection on confidence was not completed by March 1, 2020; all resulting in statistically equivalent estimates as before. In Table B6 in Supporting Information: Appendix B, we show that controlling for further potentially important variables does not change our baseline estimates in a statistical sense. These additional control variables, if all added in one model, would radically decrease sample size; thus, we add them one by one on top of our main specification. Adding the tightness measure of Gelfand et al. (2021) does not make the magnitude of our estimated coefficient on confidence in institutions statistically significantly different ($\beta = -0.518$, 95% confidence interval [CI]: -2.022 to 0.986, $p = 0.476$) from our baseline estimate ($\beta = -0.828$, 95% CI: -1.169 to -0.486, $p = 0.000$) (two-tailed t-test $p = 0.6046$). In addition, we obtain similar estimates to our main specifications if we control for a measure of corruption, the number of COVID-19 tests, the 5-year survival rate of breast cancer, the average years of education, whether the country is an island, social capital measured as voting turnover, and use the mean of stringency measures in a country instead of the maximum that we used in our main model.

In our models, the number of observations is between 27 and 75, and our main result is estimated on a sample of 55 countries. These are fairly small samples, and it might matter which countries fall into them. Figure B3 in Supporting Information: Appendix B compares our main estimate in model 7 to the distribution of estimates on 35-country random samples. It shows that our main 55-country estimate is almost precisely in the middle of this distribution, suggesting that our results are reasonably robust to leaving out various subsamples of countries from the estimations.

POTENTIAL CHANNELS

In this section, we try to understand the relationship between confidence in public institutions and the severity of the pandemic more clearly. One potential concern could be that confidence in institutions measures some unobserved quality of the public sector, hence it is correlated with COVID-19 outcomes. If, for example, besides what we can measure in our data, people knew something more about how "good" their health system is, and this knowledge is reflected in their confidence in public institutions, we would expect to find a similarly strong statistical relationship between confidence in public institutions and other health-related outcomes. We would like to exclude this possibility, because this would mean that, at the end of the day, it is not confidence, but public service quality that matters for COVID-19 outcomes.

Thus, we first test whether confidence in institutions is associated with the 5-year survival rate of breast cancer (Table B8 in Supporting Information: Appendix B). This is an illness that is likely to be cured if caught early and appropriate care is given. The breast cancer survival rate captures many things at the same time, that is, how quickly people would go to see a doctor in case of health problems, how likely they are to attend regular screening, whether there is regular screening in the first place, and the quality of the health system that is not captured by other measures in the models (i.e., number of beds/doctors, health expenditures). Using this measure as an outcome variable, we find no significant association between confidence in public institutions and cancer survival.

Second, we test whether confidence in public institutions captures the unobserved quality of public services overall. Again, it is very hard to measure the quality of public services. We proxy the quality of public services, in general, using the share of the prison population. We assume that criminal behavior is the result of deep, long-term social problems that well-working public institutions should be able to solve without imprisonment. Thus, a high share of the prison population is a sign that public institutions are not successful in solving social problems, and we assume that our other measures cannot capture this. Nevertheless, the quality of the police force works in the opposite direction. To test whether confidence in public institutions captures people's perception of the quality of public services, we re-estimate our main model using the share of the prison population as an outcome variable. Again, we find no significant statistical association between confidence in public institutions and prison population (Table B8 in Supporting Information: Appendix B). We also look at whether there is an association between the decrease in people's mobility (again, measured with Google mobility trends data) and confidence in public institutions. We find no significant relationship (Table B8 in Supporting Information: Appendix B).

We make two further attempts to understand the nature of the relationship between confidence in institutions and COVID-19-related deaths better. First, we test the restriction compliance hypothesis and examine whether data sharing and cooperation in contact tracing can be a possible channel. In particular, we investigate whether confidence in public institutions matters more in countries that employ particular measures in Supporting Information: Table B9. We examine two submeasures of the stringency index: one captures whether countries had more restrictions on small private gatherings that are hard to force if people do not cooperate, and the other captures countries that applied comprehensive contact tracing that requires people to provide their own personal data as well as the data of others they had contacts with. We find that the association between confidence in public institutions and deaths attributed to COVID-19 does not differ across countries employing more or fewer restrictions on personal gatherings. On the other hand, in terms of contact tracing, we find heterogeneity: confidence in public institutions has a higher correlation with deaths in countries that relied more on contact tracing. This result points to cooperation in contact tracing as a potential channel between confidence in public institutions and deaths attributed to COVID-19. Theoretically, this result could also imply that confidence matters more in countries where the pandemic was less severe (i.e., it is probably difficult to trace contacts when there is a considerable number of cases). We test this by estimating quantile regressions in Table B10 in Supporting Information: Appendix B. While the estimated coefficient is somewhat larger at the 20th percentile of log deaths than at the 80th percentile, they do not differ in a statistical sense. Thus, the association we find between confidence and deaths exists along the whole distribution of deaths.

Lastly, we test whether there is a statistical association between confidence in public institutions and the vaccination rate (Table C1 in Supporting Information: Appendix C). In our main specification, we find that a 1 SD increase in confidence in public institutions is related to a 3.4 percentage points higher vaccination rate. This is a 6.3% effect that is significant on a 10% significance level.

DISCUSSION

This article investigates the relative predictive importance of confidence in public institutions to explain cross-country differences in the severity of the COVID-19 pandemic. We look at the statistical association between the number of deaths attributed to COVID-19 and confidence in public institutions, while we control for the potentially important factors covered so far by the related socioeconomic literature. We find that the number of deaths is significantly lower in countries with higher confidence in public institutions, and this relationship is robust to an extensive series of robustness checks. Although these findings do not reflect causal relations, they measure a meaningful statistical relationship.

Our results are in line with Elgar et al. (2020), Helliwell et al. (2021), and Yuan et al. (2022) in finding that countries with less confidence in public institutions suffered more losses due to COVID-19. We show that this relationship is not attenuated by including additional socioeconomic measures that these papers did not take into account. Furthermore, all of our methods point to the conclusion that compared to country-level measures of individual health risks, the health system, demographics, economic and political development, and social capital, confidence in public institutions is one of the most crucial predictors of deaths attributed to COVID-19.

Besides confidence in public institutions, countries might also have cultural differences in terms of how tightly people tend to follow rules and norms in general. As mentioned earlier, the cultural tightness–looseness measure of Gelfand et al. (2021) aims at capturing these differences, and they find that the number of COVID-19 cases and deaths are lower in "tighter" countries (such as China, Vietnam, or Sri Lanka, e.g.) than in "looser" countries (like the United Kingdom or the United States, e.g.). While confidence in public institutions could be related to cultural tightness (i.e., might make more sense to follow the norms in a country where people trust public institutions), when we add tightness to our model as an additional control variable (at the cost of decreasing the sample size), our previously estimated statistical relationship between confidence in public institutions and COVID-19 deaths do not change in a statistical sense. Thus, we view confidence in public institutions and cultural tightness as two distinct concepts.

The statistically significant relationship between confidence in public institutions and the severity of the pandemic could be overestimated if there were some unobserved characteristics of countries that were positively correlated with both. While we cannot control for unobserved characteristics, we can look at the relationship between confidence in public institutions and other health and social outcomes. We do not find a significant statistical relationship between confidence and either the survival rate of breast cancer or the share of the prison population. Thus, confidence in public institutions is likely not a proxy of people's health behavior, their unobserved knowledge about the quality, or problem-solving ability of these institutions (that could theoretically predict well how effective institutions would be in containing COVID-19). Looking at the potential mechanisms behind these results, we find suggestive evidence that confidence in public institutions has a role in how effective contact tracing would work in a country, that is, how willing people might be to expose their personal data, social networks, and become visible to the authorities. This result coincides with those of Amara et al. (2022).

Our results imply that, as a complementary factor of restriction measures in pandemics, it is crucial to enhance the cooperativeness of citizens with the authorities and, as a result, increase implementation effectiveness. This is especially important in the case of those measures that cannot be enforced legally (i.e., providing personal data for contact tracing). As pandemics are expected to occur more often in the future, it is vital to enhance confidence in public institutions to build capacities to contain such crises.

AUTHOR CONTRIBUTIONS

Anna Adamecz: Conceptualization; data collection; data analysis; writing—original draft; validation; verification of the data. **Ágnes Szabó-Morvai:** Literature search; data collection; data analysis; writing—review and editing; validation; verification of the data.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

We did not use any data or material from other sources which require permission. We use publicly and freely available data. All data and Stata codes used for this analysis are shared on GitHub (https://github.com/szabomorvai/covid_deaths).

ETHICS STATEMENT

This article utilizes country-level data collected by third parties and is available for further use. Moreover, the research involved no human participants or animals, thus, it was not required to be approved by an Ethics Committee.

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NOTES

[1] https://github.com/szabomorvai/covid_deaths.

[2] We also provide a robustness check in Table B11 in Supporting Information: Appendix B, where we also include the item "*The civil service*" in the index (Model 1; share of explained variation: 0.76; Cronbach's α: 0.94).

[3] Constructing a latent "confidence in institutions" index (as opposed to using the items separately) provides the advantage of reducing measurement error in each question. However, when we replicate the main analysis with separate measures, the results are very similar.

[4] As the dependent variable is log-transformed, we approximate the percentage change of y per unit change of x from the raw coefficients as $\exp(\beta) - 1$. For example, $\exp(-0.828) - 1 = -0.563$.

[5] We provide a robustness test where we interact confidence in institutions with democracy in Table B11 in Supporting Information: Appendix B.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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RESEARCH ARTICLE

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Stringency and timeliness of COVID-19 policies in managing the pandemic in Queensland: Lessons from 2020

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Abstract

Queensland experienced relatively low case numbers during the first year of the coronavirus disease 2019 (COVID-19) pandemic. This may be due to timely, stringent policies, yet there is currently no research evaluating this link, despite the state government playing such a primary role in the pandemic response. This ecological study used a cross-sectional design to examine the stringency and timeliness of Queensland's containment policies and their impact on COVID-19 cases in 2020. To achieve this, the authors generated a stringency index for Queensland in 2020 in line with the Oxford COVID-19 Government Response Tracker (OxCGRT) method, since these data were not available at the time. The national context was also provided by examining the relationship between case numbers and policies in Australia. The findings demonstrated a statistically significant relationship between policy stringency and case numbers in both Australia and Queensland. While Australia experienced two waves of COVID-19 in 2020, Queensland only experienced one. In terms of timeliness, there was a reactive approach to the first wave, with rapid escalation of policy stringency in both Queensland and Australia as a whole. Queensland's ability to prevent a second wave in 2020 may be due to a more systematic, gradual de-escalation of policies and the maintenance of strategies such as interstate border controls. This study suggests that preventing the reintroduction of new cases after a period of elimination is important. Recommendations are made for the application and interpretation of the stringency index. Further research is needed to understand the relationship between de-escalation strategies and outcomes.

KEYWORDS

COVID, OxCGRT stringency index, policy

Key points

- Approaches to de-escalating containment policies following an initial wave of cases should be evaluated to ensure gradual de-escalation.
- Measures that delay re-entry of the virus to the state are likely to reduce case numbers.
- Rapid response to community transmission is vital in preventing further waves of cases.

INTRODUCTION

Did containment polices help to reduce case numbers during the coronavirus disease 2019 (COVID-19) pandemic? This is a question that has been researched extensively at the international level, with several studies finding a relationship between containment policies and infection rates across multiple geographic regions (Cross et al., 2020; Ma et al., 2021). Yet, in decentralized federations such as Australia, where statutory powers for health sit largely with state and territory governments, examination of subnational data may provide a more nuanced picture. The state of Queensland, Australia, with a population of just over 5 million, experienced relatively low COVID-19 case numbers in the first year of the pandemic compared with other Australian jurisdictions (Australian Bureau of Statistics, 2020a; Department of Health, 2020). It is possible that this is due to the timeliness and stringency of Queensland's COVID-19 containment policies, yet this has not previously been researched.

On January 29, 2020, the first Queensland case of COVID-19 was confirmed. On that same day, the Honorable Annastacia Palaszczuk, Premier of Queensland, became the first Australian leader to declare COVID-19 a public health emergency under the *Public Health Act 2005 (Qld)* (Edwards et al., 2022). What ensued in the following months was a set of stringent closure and containment policies aimed at “flattening the curve,” beginning with restrictions on mass gatherings and the closure of nonessential businesses, and later escalated with interstate border restrictions and quarantine requirements (Edwards et al., 2022; Miles, 2020). At the end of March, stay-at-home orders were implemented, although schools remained open for children of “essential workers,” with all other students not required to study for the remainder of the school term (Palaszczuk & Grace, 2020; Ryan, 2020; Storen & Corrigan, 2020). Less than 2 months later, the Queensland Premier released a roadmap for the staged easing of restrictions beginning from May 15, including the easing of stay-at-home orders and limits on gatherings and movement (Palaszczuk, 2020). This was further expanded in October, with the easing of border restrictions, increases in the size of gatherings, and unseated eating and drinking permitted at venues with a “COVID Safe Plan” (Palaszczuk & Miles, 2020). By the end of 2020, Queensland's total cases per 100,000 sat at 24.22, with 0.12 deaths per 100,000 (Department of Health, 2020). This is a feat scarcely seen in other jurisdictions of Queensland's size (McKenna, 2020). For example, by the end of 2020 the state of Victoria, with a similarly sized jurisdiction, had recorded 304.23 COVID-19 cases per 100,000 and

12.25 deaths per 100,000 (Australian Bureau of Statistics, 2020a; Department of Health, 2020). Of all Australian jurisdictions, Queensland had the lowest cases per 100,000 in 2020 (Australian Bureau of Statistics, 2020a; Department of Health, 2020). This suggests that Queensland provides a unique learning opportunity to understand the relationship between COVID-19 containment and closure policies and case numbers.

The diversity of policies makes the examination of outcome measures difficult, however, the Oxford COVID-19 Government Response Tracker (OxCGRT), a tool developed by the University of Oxford to systematically evaluate COVID-19 policies, has facilitated this process (Hale et al., 2022). The OxCGRT collects COVID-19 policy information relating to containment and closure policies, economic response, health systems, and vaccines. This information has been coded by researchers from the University of Oxford into standardized indicators across more than 180 countries. Four composite measures have also been created, including the stringency index (SI), the economic support index, the containment and health index, and the overall government response index. The SI measures the strictness of closure and containment policies as well as public information campaigns (Hale et al., 2022). At the time of conducting this project, there was national data available for Australia from 2020 to 2022, however, data for Australian states and territories had not been formally published for 2020. This presented an important gap in the research given the primary role state governments played in the pandemic response during the first wave. Since completing the current project, OxCGRT have published subnational data for 2020, allowing comparison between the stringency data generated by the University of Oxford team and the current project. This type of comparison is useful to support the inter-coder reliability of the OxCGRT coding system.

At the international level, several studies have examined the relationship between policy stringency and outcome measures using the OxCGRT data set. In a study evaluating 2021 global data across 118 countries, Yang et al. (2021) found that policy stringency had an inverse relationship with confirmed cases, with larger effects seen 14–21 days after policy implementation. Similarly, in a study of eight European countries during the first 6 months of 2020, Violato et al. (2021) found that stringency had a large impact on reducing COVID-19 infection and mortality rates. Studies have also found a relationship between the speed of policy implementation and outcome variables such as viral transmission (Cross et al., 2020), fatalities (Stockenhuber, 2020), early arrival of peak daily cases (Ma et al., 2021), and duration of containment measures (Stockenhuber, 2020). This research suggests that swift, timely policy responses are key to reducing the impact of COVID-19, although it is noted that timeliness was not specifically operationalized in these studies, nor is there currently a clear definition in the literature of what constitutes "timeliness." For instance, Stockenhuber (2020) defines the speed of implementation as the number of days from the first COVID-19 death to the maximum stringency score being reached, yet do not state how many days is considered timely. Similarly, Ma et al. (2021) examined the days from the first response initiation to a "high stringency index" (> 80) yet do not provide a threshold for what is considered timely. Cross and colleagues (2020) evaluated several characteristics of the SI, including the number of days from January 1 to the first stringency score above 0, and number of days from January 1 until the first maximum stringency score is reached. Again, no specific definition is provided by Cross et al. (2020) regarding how many days of escalation represents a timely response. This is not surprising, given the challenging nature of defining timeliness in the context of a pandemic on an unprecedented scale, where little was known about COVID-19 at the time. To the authors' best knowledge, there is currently no research evaluating the temporal relationship between policy stringency and case numbers at the state-level in Queensland, despite the state government being responsible for much of the closure and containment policies enacted. There are also no known studies in this area that offer an operationalized definition of timeliness.

The aim of this study is to examine the timing and stringency of Queensland's policy responses in the first year of the COVID-19 pandemic (January 2020–December 2020) in the hope that this may guide an operationalization of “timeliness.” To reach this aim, there are three key objectives. First, to generate SI data for Queensland for 2020. Second, to provide national context by examining the temporal relationship between stringency and case numbers in Australia for 2020. This is to account for the concurrent public health powers held by both state and federal governments in Australia. Third, to utilize the newly generated data set to examine the temporal association between the SI and case numbers in Queensland for 2020. It is expected that this research will help to inform future pandemic preparedness.

METHODS

We employed a cross-sectional design to examine the temporal relationship between COVID-19 case numbers and policy stringency. Below we describe the specific measures used, the data collection process and data analyses conducted.

Measures

The Oxford SI

The Oxford SI was employed in this study to understand the strictness of containment policies in both Queensland and Australia between January 1, 2020 and the December 31, 2020, and understand the temporal pattern with daily case numbers. The Oxford SI is a composite score of nine key indicators including school closures, workplace closures, cancellation of public events, stay-at-home orders, closure of public transport, restrictions on internal movement, restrictions on gatherings, international travel restrictions, and public information campaigns (Hale et al., 2022). The nine indicators are coded by extracting information from key sources such as government press releases and news articles. Each indicator is given a score per day based on the relevant policies in place on that day. As each indicator falls on a different ordinal scale, a subindex score is calculated for each indicator, per day, to normalize the scales. The subindex score falls between 0 and 100, with each value being evenly spaced. An adjustment is made for the presence of a flag variable, where policies specific to a certain geographic region (a flag value of 0) as opposed to being more general (a flag value of 1) are treated as a halfway mark between normalized ordinal points. A subindex score is calculated by using the formula created by Hale and colleagues (2022), which factors in the presence or absence of a flag variable, the value of the flag variable, the indicator score, and the maximum value of the indicator's ordinal scale. The SI is then calculated by averaging the subindex scores on that day.

Data collection

A deidentified line list of daily case numbers from January 1 to December 31, 2020 was obtained from the Notifiable Conditions register of the Queensland Health Communicable Disease Branch. As COVID-19 was a notifiable condition in Queensland in 2020, positive lab results required mandatory reporting and inclusion on the Notifiable Conditions System. The notification date was used as the measure of daily case numbers. Australian case number data was extracted from the Commonwealth government website (Department of Health States and Territories, 2022).

Australian SI data for 2020 were obtained from the OxCGRT (Hale et al., 2021). Specifically, the Australian SI with the label "NAT_TOTAL" was used to reflect the overall policy environment in Australia at the time. This means that the Australian SI reflects all policies enacted by the federal government, as well as measures implemented by state and territory governments if those policies are more stringent than the national level.

As the OxCGRT had not yet published stringency data for Queensland at the beginning of this project, this was generated by the authors. To generate the Queensland SI, a thorough literature search was conducted to identify all containment and closure policies implemented by the state government in 2020. This was achieved by reviewing relevant Queensland Minister press releases (Department of the Premier and Cabinet, 2022), Queensland Health press releases (Department of Health, 2022a), and Chief Health Officer directions (Department of Health, 2022b) from January 1, 2020 to December 31, 2020. The literature search was also supplemented by ad hoc review of news articles where needed (e.g., ABC news, Brisbane Times). Evidence of public information campaigns was obtained by reviewing references to the same in Minister and Queensland Health press releases, as well as reviewing social media posts from 2020 (e.g., Instagram and Facebook). Using the OxCGRT codebook an ordinal value was scored for each indicator per day of 2020. For example, for "cancel public events" a score of 0 represents no measures in place on that day, a score of 1 represents recommended canceling of public events and a score of 2 represents required canceling of public events on that day. The OxCGRT Coding Interpretation Guide Version 2.0 (University of Oxford, 2022) was used to aid coding. Where there was uncertainty about scoring, the researchers discussed their interpretations to reach a unanimous decision. Using the formula adopted by Hale and colleagues (2022), a subindex score was then calculated for each indicator, per day. The SI was then calculated by averaging the nine subindex scores for each day of 2020. As the authors were interested only in state-level policies to understand Queensland's unique story, the data generated were consistent with the OxCGRT "STATE_GOV" label, which refers to only those measures implemented by state government. Since the completion of this project, the OxCGRT have now published subnational data for all Australian States and Territories for 2020. As such, the Queensland SI data with the "STATE_GOV" label was pulled from the OxCGRT (Hale et al., 2021) in preparation for this publication and compared with the index generated by the authors.

Data analysis

In preparation for data analysis, data cleaning was performed. No missing data points were found. The SI and case number data were plotted graphically for both Queensland and Australia to understand the temporal relationship between these two variables. The interaction between case numbers and stringency was examined to evaluate the timeliness of policy implementation. Timeliness was assessed using similar operationalizations described in the literature, including the number of days from January 1 to the first SI score (> 0) and to the maximum stringency (Cross et al., 2020), and the number of days from response initiation to a high stringency score (> 80) (Ma et al., 2021). Evaluating data from the beginning of January is important in understanding the sequence of preventative measures given the state of affairs globally at that time—there were already 27 confirmed cases of COVID-19 on January 1 (Cross et al., 2020).

To extend the definition of "timeliness," the authors also examined the initiation of policies (SI > 0) in relation to case numbers, how many days it took for stringency to reach a maximum score in relation to the peak number of cases (i.e., did this occur before or after the peak of cases), and whether stringency reduced with case numbers falling or not. Pearson's correlation tests were then conducted, using SPSS Statistics software (version 28.0.1.1), to determine whether there was a statistically significant relationship between case numbers and policy stringency in both Queensland and Australia.

The newly published OxCGRT SI for Queensland was plotted alongside the current authors' index for comparative purposes. This graph was evaluated for noteworthy differences, such as directional differences in coding (e.g., one data set increasing while the other decreases or plateaus), with indicator scores and associated notes then reviewed to understand the reason for these differences across the two datasets.

RESULTS

Table 1 displays descriptive statistics for the SI and daily case numbers from January 1, 2020 to December 31, 2020 (366 days in total) for both Queensland and Australia. Both the author-generated SI and OxCGRT SI for Queensland are displayed for comparative purposes. As shown in Table 1, Queensland's maximum stringency (90.74, author-generated index) was higher than that of Australia (75.64) although the mean stringency value was lower. Mean incidence (per million) of COVID-19 cases was higher in Australia than in Queensland. The author-generated index for Queensland appears to be slightly more stringent than that of the OxCGRT.

Figure 1 displays policy stringency and daily case numbers per million in Australia in 2020. As can be seen from Figure 1, Australia had two distinct waves of COVID-19 in the first year of the pandemic. Australia's initial policy response appeared to be reactive, with the SI reaching > 0 on the same day that the first case was notified. Policy stringency reached the first maximum score (73.15) within 5 days of the first wave's peak. The response to the second wave appeared to be more proactive, with policy stringency reaching its highest maximum score (75.46) as daily cases rose to around 150, 28 days before the second peak of cases on August 5. However, policy stringency was temporarily reduced shortly after this despite case numbers continuing to rise, before returning to a peak SI of 75.46 by August 3rd and remaining at this peak through to the end of September. It took 25 days from January 1 for Australia to implement its first policies (SI > 0) and 93 days from January 1 for Australia to reach its first maximum stringency score. It took 68 days from the first implementation of policies (SI > 0) until stringency reached the first maximum score. While stringency reduced following the first wave of cases, it remained above 50 for the remainder of the year. This stringency did not, however, prevent a second (higher) wave from occurring.

Figure 2 displays the daily case numbers and SI for Queensland from January 1 to December 31, 2020, using the author-generated index. For ease of comparison, Figure 3

TABLE 1 Descriptive statistics for policy stringency and case numbers.

	Minimum	Maximum	Mean	SD
Queensland Stringency Index (author-generated)	0	90.74	53.05	24.82
Queensland Stringency Index (OxCGRT)	0	85.19	46.78	25.56
Queensland daily cases (per million)	0	12.56	0.66	1.98
Australia Stringency Index	0	75.46	55.85	23.78
Australia daily cases (per million)	0	27.17	3.02	5.03

displays the same data for both Australia and Queensland. Queensland's COVID-19 response began before the first reported case in the state, with preventative measures through public information campaigns enacted as early as January 21 (4 days before Australia scored > 0 on stringency). Compared with Australia's two waves of cases in 2020, Queensland only had one wave, followed by smaller clusters of cases for the remainder of the year. Queensland had a higher maximum SI score than the Australian data, reaching its peak of 90.74 at the end of March (Australia's maximum SI of 75.46 was not reached until July). This peak stringency score was maintained until the beginning of May, where there was a steady decrease in stringency coinciding with daily case numbers remaining below 5.

Queensland's initial response to the pandemic appears to be proactive, with SI reaching > 0 7 days before the introduction of cases into the state and 4 days before the introduction of cases into the country. Queensland's escalation of stringency, however, appears to be more reactive in the first wave when compared with Australia's data, with policy stringency reaching its maximum value 6 days after cases reached their peak. However, unlike Australia as a whole, Queensland appeared to take a much more gradual approach to easing restrictions over a 3-month period, compared with Australia's more rapid reduction over a 1-month period during the first wave. As shown in Figure 3, Queensland maintained a maximum stringency of 90.74 for a period of 33 days after the first wave, compared with a smaller 13-day period at maximum stringency for Australia. For the remainder of the year, daily case numbers stayed below 10 and Queensland was able to avoid a second wave of COVID-19 cases in 2020.

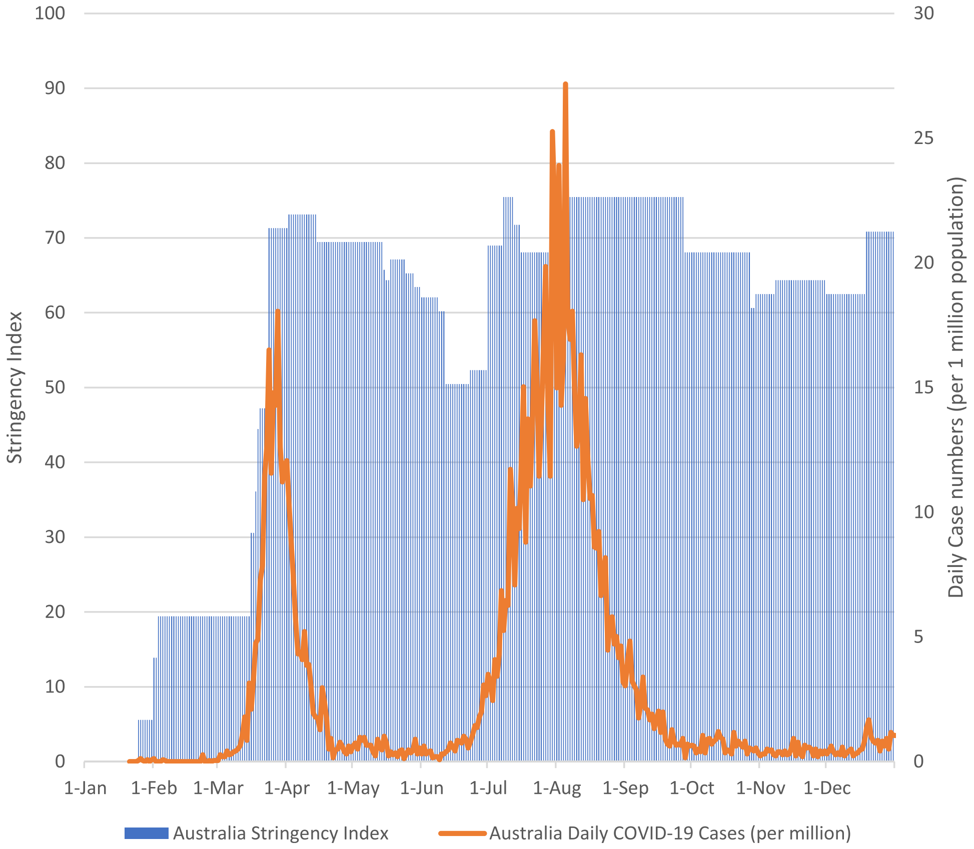

FIGURE 1 Case numbers and policy stringency in Australia, 2020.

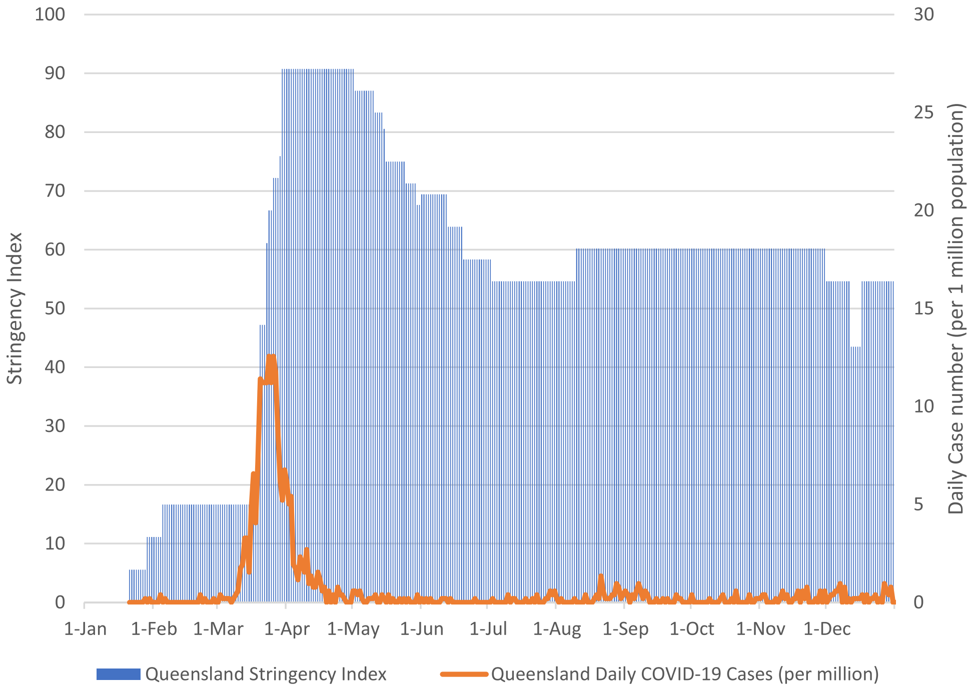

FIGURE 2 Case numbers and policy stringency in Queensland, 2020.

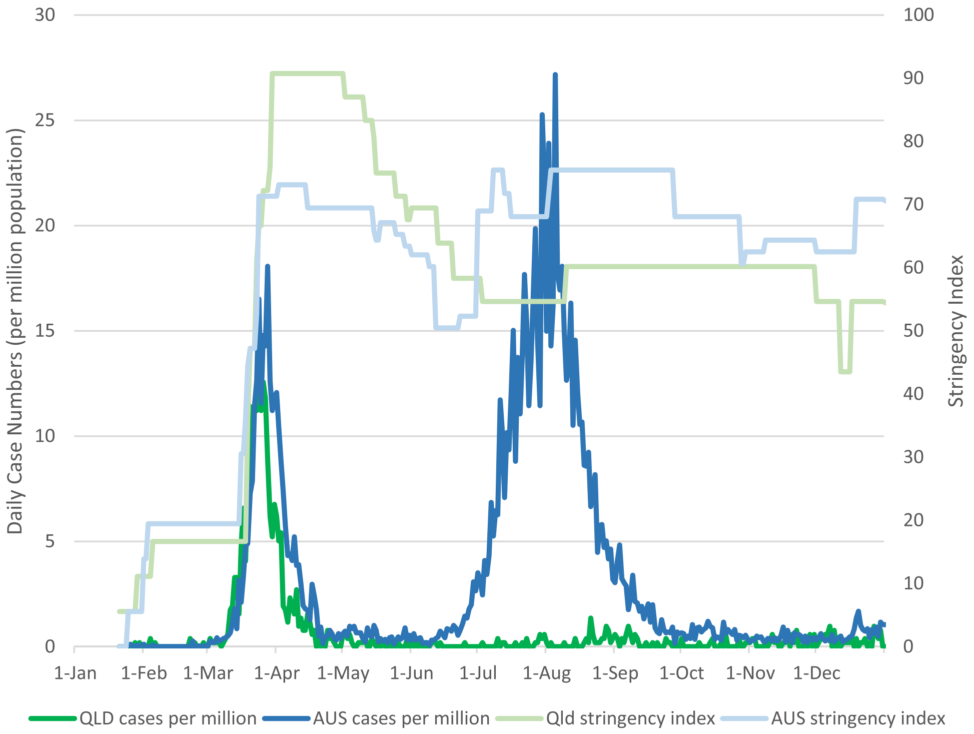

FIGURE 3 Policy stringency and case numbers in Australia and Queensland (2020).

Queensland's first COVID-19 policies (SI > 0) were implemented 21 days after January 1, a shorter time period than the national level (25 days). Queensland also reached their first maximum score a few days before Australia as a whole, with maximum SI reached 90 days after January 1 versus 93 days for Australia. The escalation period (number of days from SI reaching above 0 to the maximum SI) was similar in Queensland (69 days) to the national level. Also similar to Australia as a whole, Queensland's SI remained above 50 for most of the remainder of the year, other than a short dip in December during which there was a brief easing of restrictions on internal movements, when Queensland's interstate borders were opened to all states. Unlike Australia however, Queensland did not see a second wave of cases in 2020. Queensland's daily incidence per million also stayed well below that of the national level throughout 2020. These data demonstrate unique features of Queensland's policy implementation, including the use of preventative measures (public health campaigns) before the presence of the virus in the state, the longer period of maximum stringency, and the more gradual approach to easing restrictions.

While direct comparisons cannot be made between Australia and Queensland due to the differing statutory powers across Commonwealth and state governments, an examination of both the Queensland and Australian data can help to understand the totality of policies at play during the first year of the pandemic (i.e., both the subnational and national policies). It can also aid in understanding the differences in policy implementation and COVID-19 incidence at the state level compared with Australia as a whole, including the influence of subnational policies where they are stricter than that of the federal government.

Statistical analysis

Pearson correlation tests showed a significant positive correlation between case numbers and policy stringency in Australia, $r = 0.348$, $p < 0.05$. There was also a significant positive correlation between case numbers and policy stringency in Queensland, $r = 0.115$, $p < 0.05$. This demonstrates that there is a significant positive link between stringency and daily cases.

Comparison of the OxCGRT and author-generated stringency indices

As OxCGRT have now published a complete SI for Queensland in 2020, comparisons can be made between the OxCGRT index and that generated in the current project. Figure 4 displays this comparison.

As can be seen from Figure 4 the overall trend of the stringency indices appears similar. There are some notable differences. The OxCGRT SI did not reach a value of more than zero until March 1, whereas this occurred on January 21 in the author-generated SI. Based on notes from the OxCGRT index, the increase in SI on March 1 was related to the "Public Information Campaigns" indicator, where they noted that there was frequent, consistent COVID-19 reporting on the Queensland Health website at that time. However, the author's note that from January 21, the Chief Health Officer had already begun a co-ordinated public information campaign by urging those returning from China with respiratory issues to immediately visit their GP, and sending advice to Queensland GPs, public and private hospitals and clinical groups (ABC News, 2020; Lyons, 2020). Also, the first social media posts with links to the formal Queensland Health COVID-19 website were published from as early as January 29, suggesting a coordinated public information campaign began well before March 1.

The OxCGRT SI is noted to have a slight increase on May 21 followed by a steep decrease in stringency on May 28 compared with a continued gradual decrease in stringency in the author-generated index from May to August. On review of OxCGRT notes, this increase appears to be due to a one-point rise in the “Workplace Closures” indicator, although the rationale for this increase is unclear. Based on the current authors' index, stringency at this time was continuing to reduce, including on the indicator “Workplace Closures,” where from May 16, restaurants and cafés were reopening for reduced numbers of patrons and other nonessential businesses were also reopening (Storen & Corrigan, 2020). The steep decrease in the OxCGRT SI from May 28 is due to a reduction across a number of indicators, including “School Closures,” “Workplace Closures,” “Cancellation of Public Events,” and “Stay-At-Home Orders.” The current authors had a more gradual reduction across these indicators, however, reflecting the staged easing of restrictions by the Queensland Government from May (Storen & Corrigan, 2020).

Between mid- to late-September, the OxCGRT SI has a further steep decrease in stringency while the author's index plateaus. This decrease begins on September 16 with reductions across the “Close Public Transport,” and “Restrictions on Internal Movement” indicators. While the “Close Public Transport” indicator was reduced to a zero value by the OxCGRT team from September 16 due to public transport being open with social distancing requirements, the current authors did not reduce this indicator to a zero until June 13, since travel services were still reduced, with many rail lines suspended until this date, reflecting a significant change from normal procedures (Bailey, 2020). “Restrictions on Internal Movement” was reduced from two to zero from September 16 in the OxCGRT coding, due to Queenslanders being allowed to travel unrestricted within the state from that time. However, there was no change on this indicator in the current authors' coding due to the ongoing restrictions on entry from other states, which the OxCGRT guidelines include in their definition of this indicator for subnational data.

The final key difference between the two datasets occurs in December 2020, where there is a gradual decrease in stringency in the current authors' coding, but a plateau in the OxCGRT coding. This is again due to the differences in coding of the “Restrictions on Internal Movement” indicator, where the current authors reduced this indicator from a two to a zero on December 12 due to the final state border closure being lifted by the Queensland

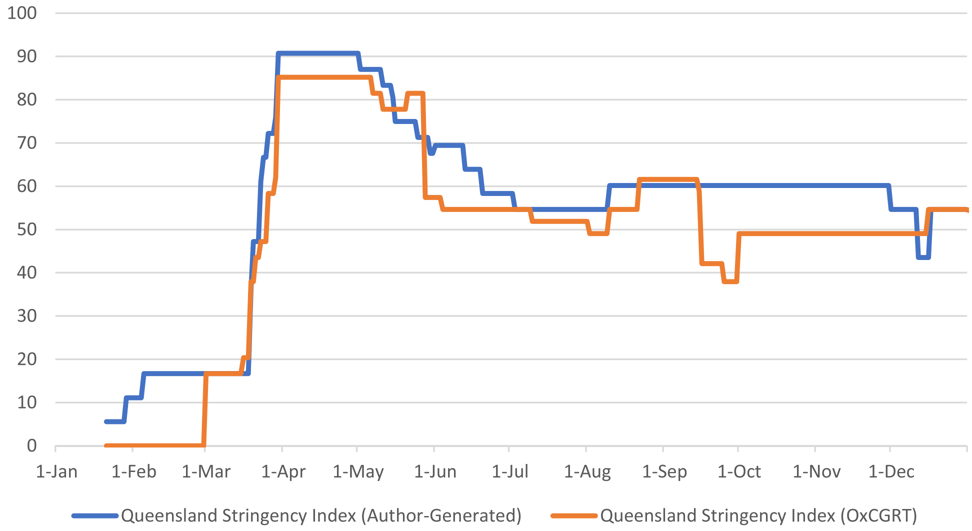

FIGURE 4 The author-generated stringency index and the OxCGRT stringency index for Queensland, 2020.

Government (Hyam, 2020), compared with the OxCGRT coding where there was no change in his indicator. There was also a decrease in the value of the "International Travel Controls" indicator on December 12 due to the Queensland border opening to travelers from New Zealand, with no quarantine requirement (Queensland Health, 2020), while the OxCGRT coding remained unchanged on this indicator despite this easing of restrictions. While there are some key differences in the two datasets, the overall trend appears similar enough to support the use of the author-generated data set for this study.

DISCUSSION

Despite state and territory governments playing a primary role in the implementation of COVID-19 policies in Australia, little research has examined the pattern between case numbers and policy implementation at both the national and subnational levels. This study set out to address this gap, using the OxCGRT SI to understand the temporal relationship between policy stringency and case numbers. At the national level, the results demonstrate a reactive approach to cases in Australia in the first wave of 2020. This was followed by a more proactive approach in the second wave. Australia's data reflected a rapid escalation of policy stringency, where peak stringency was met within 5 days of peak cases. Rapid escalation and response timing have been shown in prior research to be associated with reduced COVID-19 infection rates (Cross et al., 2020; Ma et al., 2021) and are also highlighted as fundamental in response to other outbreaks such as Ebola virus (Bell et al., 2016). Therefore, it is not surprising to see this same timely response pattern being presented in Australia, a country with a total of 110.59 cases per 100,000 by the end of 2020 (Australian Bureau of Statistics, 2020a; Department of Health, 2020). Yet, these strategies were not enough to prevent a second wave of cases later in the year, unlike Queensland's pattern. It is possible that this may be due to the more rapid de-escalation of stringency during the postpeak phase of the first wave, a differing picture to Queensland's more gradual approach. However, as Australian data are an aggregate of both national and subnational policies, it is worth considering other differences across states and territories that may contribute to this disparity. For example, factors such as "lockdown fatigue," cultural diversity, trust in the government, and socioeconomic status may differ from state to state, influencing public response to measures (Edwards et al., 2022). What also needs to be considered is the greater number of international arrivals accepted by states such as New South Wales and Victoria during this time, a clear spread risk (Australian Bureau of Statistics, 2020b). The reduced number of international arrivals accepted by Queensland may have afforded greater protection from further waves of cases in 2020.

Queensland's initial response to the pandemic appeared to be more proactive, with the initiation of policies 7 days before the presence of COVID-19 cases in the state. This included the implementation of public information campaigns from January 21, 2020, 4 days before the first Australian case of COVID-19 and 4 days before the same measures were implemented in Australia as a whole (Storen & Corrigan, 2020). This was followed by a rapid escalation of policy stringency in response to the first wave of cases, with maximum stringency reached 6 days after the peak number of cases. Maximum stringency was maintained in Queensland for a period of 33 days following the first wave, compared with only 13 days in Australia, despite Australia having higher cases per million population. It is likely that these factors contributed to the flattening of the epidemic curve in Queensland, given research demonstrating the importance of public information campaigns and the rapid escalation of stringency in reducing infection rates (Cross et al., 2020; Hyland-Wood et al., 2021; Ma et al., 2021).

While this study set out to further operationalize “timeliness,” it must be considered within the context of the threat presented. When looking at the threat of COVID-19 at the beginning of 2020 within the state of Queensland, there were no cases within the state of Queensland yet there was a clear awareness of the presence of COVID-19 in other countries and later in nearby states. This meant there were increased levels of alertness and response, leading to the initiation of policies from January 21. Despite this threat being equivalent in Australia, stringency did not reach a score above zero until January 25, the same day that the first case was notified. In addition, Australia's SI took 14 days to increase following the first community transmission on March 2 (Murphy & Hunt, 2020). Meanwhile, Queensland's stringency began increasing 1 day after the first community transmission on March 18 (Read, 2020). Thus, in considering “timeliness” of response, it is important to take into account several contextual factors including, but not limited to, the introduction of cases to the state, community transmission, the presence of cases in nearby states (in the case of subnational policies), and, of course, disease-specific factors. As such, these findings highlight the complexity of the construct of timeliness and demonstrate the need for future research examining this in theory and practice.

Unlike other regions of Australia, Queensland did not experience a second wave of COVID-19 in 2020. It is possible this may be due to the gradual approach to easing restrictions, as shown in the data, followed by the maintenance of moderate levels of stringency. On closer review of the data, this ongoing moderate stringency is influenced by continued restrictions on international arrivals, internal movement within the state, interstate borders, and gatherings. This suggests that Queensland's containment of cases may be due, in part, to maintained stringency on border controls—specifically, the strict interstate border restrictions and strict caps on international arrivals. This is supported by looking at international arrival data across the states and territories, where states with the highest cases per capita in 2020 (New South Wales and Victoria) also accepted the most international arrivals in both May and June of 2020 (Australian Bureau of Statistics, 2020b). This finding is also consistent with prior research evaluating 2021 subnational Australian data, that showed states and territories with strict border controls had lower COVID-19 exposure (Edwards et al., 2022). This suggests that not only was *rapid escalation* of policies important in responding to the COVID-19 pandemic but also *gradual de-escalation* of policies and *maintenance* of strategies (such as border controls) that reduced the likelihood of the reintroduction of new cases, since this acted as a preventative measure against future waves. Certainly, such a gradual de-escalation approach has been suggested in other ecological studies (Han et al., 2020), although further research is needed to support a causal link.

This study involved generating a complete SI data set for Queensland from January to December 2020, due to these data not being published at the time of data collection. Since the completion of the current study, however, the OxCGRT has published 2020 stringency data for Queensland. This provided an opportunity to examine differences between how an external researcher applies and interprets the coding framework compared with the OxCGRT team. While the overall trends appeared similar, there were some notable differences in the interpretation of some indicators. For example, international travel restrictions were scored higher in this study compared with the OxCGRT. This appears to be due to a difference in interpretation regarding “banning” arrivals (score of 4) versus only “quarantining” arrivals (which receives a lesser score of 2). While the federal government held governance for bans on international travel, there were also subnational policies that could be argued to be bans on foreign arrivals. For example, in April the Chief Health Officer, with new powers under the *Public Health Act 2005 (Qld)*, placed a hard close on Queensland's borders, including the banning of foreign-flagged cruise ships (Young, 2020). This could be construed as a ban on international travel, thus attracting a score of 4 during this period, as per the current authors' scoring, although the OxCGRT team gave this period the lesser score of 2. Interpretation differences such as this highlight the need for additional guidelines in the OxCGRT codebook interpretation, to ensure inter-coder reliability for external researchers. It also highlights the importance of considering both national and subnational policies when evaluating the impact of governmental decision-making on pandemic outcomes, since examining either in isolation does not accurately reflect the reality of policy implementation in a decentralized federation.

CONCLUSIONS AND POLICY IMPLICATIONS

While the findings suggest that both Queensland and Australia as a whole executed a rapid escalation of policy stringency in response to the first wave to flatten the curve, there were notable differences in the outcomes in Queensland, particularly the staving off of a second wave in 2020. The current research suggests that it may be pertinent to not only evaluate the implementation and timeliness of pandemic policies but also the de-escalation procedures applied following the first wave of cases, with attention being paid to those strategies that are maintained following de-escalation (such as measures that delay re-entry of the virus to the state) and the gradual easing of restrictions postpeak. This research may help to inform the recommended actions in the postpeak phase of a pandemic to inform future preparedness. In addition, this study reinforces the importance of public information campaigns in the early phases of a public health emergency, as well as rapid responsiveness to community transmission. This study also highlights possible changes that could be made to the OxCGRT coding guidelines to improve data collection, such as including more detail in the definitions of each indicator and providing multiple examples for each code per indicator. Finally, the current research demonstrates the complexity of the construct of “timeliness,” suggesting future research is needed to elaborate on the understanding of what constitutes a “timely” response. Future research may also wish to expand on the current study by systematically evaluating the differences in policy stringency and case numbers between Australian states and territories now that the OxCGRT has published these data in full.

LIMITATIONS AND BIAS

As this study only evaluated those policies that make up the SI, there are several other measures that were not examined which are also important in understanding Queensland's low case numbers. This includes contact tracing, testing, mask wearing, and specific strategies to protect older persons, all of which are covered by other OxCGRT indices and therefore easily studied. Future research examining the impact of these strategies on case numbers in the Queensland context may offer additional insights. Finally, as this study was only ecological in nature, it is difficult to prescribe which specific policies contributed the most to the changes in case numbers. Further research is needed to demonstrate reproducibility of the study findings to inform the prescription of appropriate strategies.

ACKNOWLEDGMENTS

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

As case number data was obtained from Queensland Health, restrictions apply to the availability of this data set. Requests for access to this data must be directed to Queensland Health. The Queensland 2020 stringency index is available from the corresponding author upon reasonable request. Australian case number data and stringency index data are openly available at (https://www.health.gov.au/health-alerts/covid-19/case-numbers-and-statistics) and (https://github.com/OxCGRT/covid-policy-tracker/tree/master/data), respectively.

ETHICS STATEMENT

Ethics approval was granted by the Griffith University Human Research Ethics Committee (GU Ref No.: 2020/943) and organizational approval was received from Queensland Health (PHA 2020.943).

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RESEARCH ARTICLE

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A discussion of critical errors in a longitudinal study on the deterrent effect of drug-induced homicide laws on opioid-related mortality across 92 counties and the District of Columbia in the United States

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Abstract

Drug overdose claimed more than 100,000 lives in the United States in 2021. Drug-induced homicide (DIH) laws create specific criminal liability for individuals who provide drugs that cause or contribute to the death of another person. DIH prosecutions in the United States have increased substantially over the past decade despite the absence of meaningful evidence of their individual- or community-level impacts. Recently, Lee et al. analyzed the impact of DIH laws on county-level opioid overdose mortality across 92 counties in 10 states and concluded that DIH laws are associated with significant reductions in rates of opioid overdose death. In this commentary, we present evidence demonstrating that the Lee et al. study is fundamentally flawed. Specifically, the legal data used by Lee et al. to define their treatment condition (the presence or absence of a state-level DIH law) is incorrect in almost every aspect. We also describe significant methodological weaknesses, including flawed sampling strategies that resulted in a biased sample of county overdose rates as well as flawed modeling strategies that cannot effectively evaluate the hypothesis that DIH laws negatively impact opioid overdose mortality. More

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research on the individual- and community-level impacts of DIH laws is needed. In the meantime, we advise policymakers to strengthen state 911 Good Samaritan laws, as DIH laws appear to erode the efficacy of this proven overdose-prevention strategy.

KEYWORDS

deterrence theory, drug-induced homicide, drug policy, methods, overdose

Key points

- Drug-induced homicide laws create specific criminal liability for individuals who provide drugs that cause or contribute to the death of another person and are increasingly used in the United States despite little evidence of their impact on overdose and other harms.
- This paper critically evaluates a recent paper that analyzed the impact of these laws on county-level opioid overdose mortality across 92 counties in 10 US states, concluding that these laws are associated with reduced opioid overdose deaths.
- We present evidence demonstrating that the previous paper is fundamentally flawed, detailing serious errors in the underlying legal research as well as significant methodological weaknesses that render the results of the paper unreliable.
- Reliable research on the impact of these laws is urgently needed. In the meantime, policymakers are urged to implement policies with robust evidence demonstrating their overdose-prevention impacts: medications for opioid use disorder, naloxone access, and syringe services programs.

INTRODUCTION

Drug overdose claimed more than 107,000 lives in the United States in 2021 (Ahmad et al., 2022). Between 2019 and 2020, the national rate of overdose deaths involving synthetic opioids, such as fentanyl, increased by 5%, representing more than 80% of all opioid-related fatalities (US Centers for Disease Control and Prevention, 2022b). Current evidence suggests that illicitly manufactured fentanyl has become pervasive in the US drug supply (Jones et al., 2018; Martinez et al., 2021; Park et al., 2018). Though the changing nature of the drug supply is producing shifts in consumer preference—including some consumer preference for fentanyl above other opioid products (Ciccarone, 2019)—evidence overwhelmingly indicates that fentanyl has entered the US drug supply as a result of supply-side forces and not in response to clear demand from drug consumers (Carroll et al., 2017; Hempstead & Yildirim, 2014; Mars et al., 2018). The end result is a drug supply that is more varied, less predictable, and, as a direct consequence of that unpredictability, deadlier compared to previous decades.

State-level drug-induced homicide (DIH) laws create specific criminal liability for individuals who sell or deliver drugs that subsequently cause or contribute to the death of another person. Although most state DIH laws were first enacted during the height of the "War on Drugs" in the 1980s and 1990s (Keilman, 2018), their use has dramatically increased over the past few years due to both a resurgence in prosecution under existing laws and the enactment of new state laws. According to research from the Health in Justice Action Lab, the number of DIH prosecutions (2021) has grown approximately 10-fold over the last decade (Figure 1).

DIH laws are often described as efforts to deter illegal drug distribution or, at a minimum, deter the distribution of potent synthetic opioids such as fentanyl and fentanyl analogs (Perrotti, 2018) by increasing the severity of the penalties that can be levied against people who provide drugs that contribute to another person's death—a cornerstone of criminal deterrence theory (Braga & Weisburd, 2015). Moral and ideological purposes, such as seeking justice for surviving family and friends of the deceased and "honoring" the life of the person who suffered a fatal overdose, have also been claimed by prosecuting attorneys as motivations for pursuing these charges (Doiron, 2018; Office of the DuPage County State's Attorney, 2021; Rothberg & Stith, 2018). While emerging evidence suggests that media coverage of DIH prosecutions may be associated with fluctuations in the local drug supply, potentially increasing the risk of fatal overdose (Carroll et al., 2021), the impact of DIH laws on overdose deaths has not been systematically evaluated. Despite this lack of evidence, DIH laws have been enthusiastically promoted by many law enforcement officials, prosecutors, and legislators across the United States (Office of the Attorney General, 2018; United States Drug Enforcement Administration, 2018).

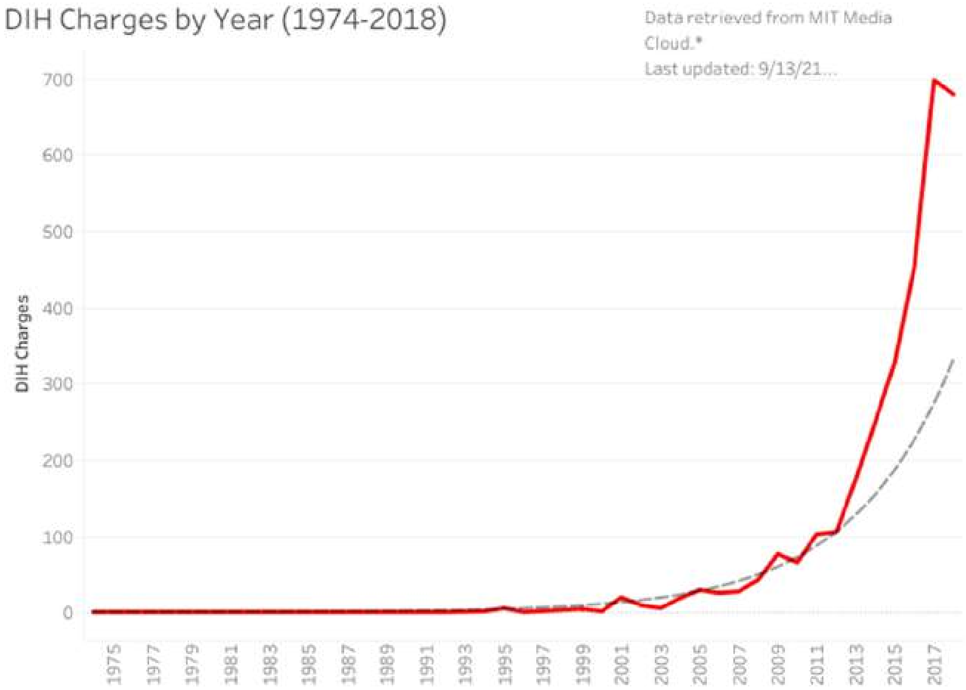

FIGURE 1 Number of drug-induced homicide charges in the United States from 1974 to 2018. This figure was produced by the Health in Justice Action Lab and made publicly available online at https://www.healthinjustice.org/drug-induced-homicide.

Studies on the impacts of other criminal drug policies offer reason to question whether DIH laws (or their enforcement through arrest, prosecution, and conviction) are capable of having a meaningful impact on opioid overdose, however they are implemented. Current literatures provide evidence that deterrence through threat of criminal punishment largely reshapes how drug suppliers act, altering not *whether* but *the manner in which* individuals go about producing or distributing illicit substances—often pressuring behavior changes that have a deleterious effect on community health, such as increased HIV risk (Friedman et al., 2006) and risk of other drug-related harms among people who use drugs (Barratt et al., 2005; Dickinson, 2017). Furthermore, a growing body of evidence from the United States and Canada indicates that strong social ties between drug suppliers and drug consumers may be protective against overdose, suggesting that the prosecution and incarceration of suppliers (which DIH laws ostensibly aim to do) may have the potential to *increase* opioid-related mortality (Carroll et al., 2017, 2020; McKnight & Des Jarlais, 2018; Rhodes et al., 2019). A recent case study examining the community-level impacts of a high-profile DIH case in North Carolina supports this conjecture (Carroll et al., 2021).

In an analysis published in the *Journal of Drug Issues* in April 2022, Lee et al. (2022a) respond to the current gap in evidence by evaluating the impact of DIH laws on opioid overdose mortality in a sample of 92 US counties in 10 US states and the District of Columbia. From their analysis, Lee et al. (2022a) conclude that the enactment of a DIH law carrying a life sentence is associated with an average annual reduction of 2.24 opioid overdoses per 100,000 population. To illustrate the size of that effect, a hypothetical reduction of 2.24 deaths per 100,000 would represent a decrease of more than 8% in statewide opioid overdose mortality in Arizona and Colorado—two states in which a DIH conviction carries a life sentence—based on 2020 data (Arizona Department of Health Services, 2022; Colorado Department of Public Health & Environment, 2022). This finding is noteworthy, because, to date, few policy interventions have been identified that are capable of such sizeable impact on opioid overdose mortality rates in the United States. In fact, we are aware of only two such interventions that have been identified over the now decade-long course of the US overdose epidemic; first, the establishment of low-barrier, long-term treatment with medications for opioid use disorder for persons incarcerated by the Rhode Island Department of Corrections was associated with a 12.5% reduction in overdose mortality statewide (Green et al., 2018); second, naloxone access laws and Good Samaritan laws—key pillars in the US Center for Disease Control and Prevention's (CDC) strategies for overdose prevention (Carroll et al., 2018)—have been associated with reductions in fatal overdose of 14% and 15%, respectively (McClellan et al., 2018). To the best of our knowledge, no other policy intervention has been shown to be as effective in preventing overdose as these. Thus, the identification of another policy intervention capable of producing similar reductions in opioid overdose death, which Lee et al. (2022a) suggest DIH laws may be, would be truly momentous.

Unfortunately, we find the analysis presented by Lee et al. (2022a) to be fundamentally flawed due to incorrect data and a poor methodological approach—concerns that, together and independently, merit the rejection of their conclusions. In the sections below, we briefly describe the study undertaken by Lee et al., after which we outline errors in measurement, sampling, and modeling that render the findings produced through this analysis completely uninformative. Specifically, we offer the following observations: (1) virtually all legal data about state-level DIH laws (including, but not limited to, the dates upon which those laws were enacted or amended) included in the analysis—the primary exposure variable used in the study—are incorrect; (2) the sample of US counties included in the analysis is highly selected, representing a mere 14% of counties in the 10 states of interest among which urban counties with higher populations are problematically over-represented; and (3) the estimation strategy used is incapable of identifying the causal effect of DIH laws and likely to produce a spurious correlation even if a true causal relationship were to exist.

AN OVERVIEW OF THE LONGITUDINAL STUDY ON DIH LAWS BY LEE ET AL.

Lee et al. (2022a) provide some information regarding the methods used in the paper, although they fall short of minimal methodological reporting standards, especially for papers that include variables created through novel legal research (i.e., research into the history of state-level legislative actions). Approximately one year after the publication of the original article, the authors published a correction, in which certain—but not all—methodological details were clarified (Lee et al., 2022b). In brief, they use the existence or absence of a state-level DIH law as a predictor variable and county-level annual opioid overdose mortality rate as their outcome variable. They use a sample of counties from states with DIH laws carrying a minimum sentence of more than 2 years that they describe in their original article as being "effective as of 2018" (Lee et al., 2022a). In the correction to the original article, they state that they "operationalized the DIH [law] effective date as when those amendments explicitly referenced opioids as controlled substances or included specifications to minimum and maximum penalty" (Lee et al., 2022b). Asserting the use of these selection criteria, they include 10 states (Colorado, Florida, Illinois, Kansas, Louisiana, North Carolina, New Jersey, Nevada, Oklahoma, and Washington) representing a total of 656 unique counties, and the District of Columbia.

Neither in the original article nor in the correction do the authors provide any information as to how the legal information used in the analysis, including information about the state laws and the respective provisions within those laws as presented in the paper, was collected or analyzed. Nevertheless, Lee et al. separate those 10 states into six, which they claim require a mandatory minimum sentence of less than life imprisonment and four, which they claim require a life sentence. The authors include individual counties within those 10 states in the sample only if county-level opioid mortality rates were calculated and published in the US Centers for Disease Control and Prevention Wide-ranging ONline Data for Epidemiologic Research (CDC WONDER) database for every year beginning in 2013 and ending in 2018, the observation period chosen for the study (Lee et al., 2022b). Importantly, counties with low overdose rates are suppressed from WONDER due to privacy concerns through deductive disclosure (we discuss this in detail below), though the authors make no mention of this limitation. The final sample excludes 86% of counties in these states, leaving only 92 counties and the District of Columbia for the analysis (Lee et al., 2022a).

With this subsample, Lee et al. (2022a) run a regression that models county-level opioid-related mortality rate on:

- six dichotomous variables describing opioid-related state policies (minimum life sentence for DIH convictions; minimum sentence of less than life for DIH convictions; mandatory prescription drug monitoring program laws; the existence of medical marijuana dispensaries; treatment capacity for MOUD; and naloxone access laws), though how the presence or absence of a naloxone access law was defined and how the presence or absence of such laws in each state was assessed is not described;
- three continuous variables describing county-level socioeconomic conditions (opioid prescription rate; unemployment rate; uninsured rate); and
- a 1-year lag of the county's opioid-related mortality rate.

The state sentencing policies (minimum life sentence and minimum sentence of less than life) of DIH laws are the "treatment variables" for which the authors wish to investigate association or effect. The authors also include subsequently described county-level fixed effects in their analysis to address the potential correlation between DIH laws and time-invariant, omitted county characteristics. Following Arellano and Bover (1995), they also attempt to correct for endogeneity in the socioeconomic variables and opioid-related mortality lag by using opioid morality lags as instrumental variables. However, it is the endogeneity of DIH laws that is problematic for this analysis (also discussed further below). Rather than addressing this issue, the authors assume that all policy indicators, including enacted DIH laws, are "strictly exogenous."

Based on this model, Lee et al. (2022a) conclude that county-level opioid overdose mortality rates significantly declined after DIH laws with a mandatory minimum sentence of life imprisonment became effective in each county's respective state, stating that "DIH [law] implementation may have deterred drug dealers from supplying illicit opioids to populations at risk for opioid dependence and abuse." More briefly, in their abstract, the authors state that these findings "suggest that DIH [law] implementation has curtailed the rate of opioid mortality" (Lee et al., 2022a).

MEASUREMENT ERRORS CONTRIBUTING TO PROBLEMS WITH INTERNAL VALIDITY

As stated above, the presence or absence of a state-level DIH law (with and without an accompanying minimum life sentence) was chosen as the treatment variable for the authors' model. Lee et al. do not provide any citations to the specific laws referenced or included in the study, nor do they describe what they consider to be a DIH law, how state laws were identified, or what legal analysis was undertaken to ensure that the laws included in the model meet the inclusion criteria. Perhaps because none of the authors are lawyers, the key legal variables that Lee et al. define and use in the paper are incorrect in nearly every particular. In fact, a thorough legal analysis, conducted by trained attorneys (authors Davis, Lieberman, and Dennis), reveals that *every single effective date presented by Lee et al. for the 10 states and the District of Columbia—the entire sample included in the analysis, however that date is operationalized—is incorrect*.

The errors in effective dates presented by Lee et al. take several forms. In many cases, the dates listed in Lee et al's. table 1 (2022a), which includes more states than the 10 included in the analysis, are not the dates the relevant law was first enacted (see Table 1). In some cases, the dates provided by Lee et al. coincide with recent modifications to the already enacted state law in question—often extremely minor modifications. In other cases, our legal analysis was unable to identify any legislative action related to DIH laws that corresponds to the dates Lee et al. provided. In any case, the enactment dates given by Lee et al. for all 10 states included in their analysis (Colorado, Florida, Illinois, Kansas, Louisiana, North Carolina, New Jersey, Nevada, Oklahoma, and Washington) and the date given for the District of Columbia are incorrect.

Additionally, despite sentence length being a key "treatment variable" according to Lee et al., many of the minimum and maximum sentences presented in the paper are also incorrect (see Table 2). In the methodology provided by Lee et al., there is no explanation of how the minimums and maximums were determined, which is especially relevant for states that use presumptive sentencing ranges such as Alaska, Kansas, North Carolina, and Washington, where the presumptive minimums and maximums may differ depending on the criminal history of the individual charged with violating the DIH law.

We detail these factual errors below:

- The authors list the effective date of Colorado's law as July 1, 2016. In fact, the relevant section of Colorado's law, Colo. Rev. Stat. Ann. § 18-3-102(1)(e), has existed since 1990. 1990 Colo. Legis. Serv. S.B. 90-121 (West). Contrary to the claims made by the authors,

TABLE 1 Comparison of effective dates of DIH laws in Lee et al. to actual effective dates.[a]

State	Effective date in Lee et al.	Actual effective date	Citations and notes
RI	6/29/1981	1981[b]	R.I. Gen. Laws § 11-23-6
WV	6/5/1991	6/5/1991[c]	W. Va. Code Ann. § 61-2-1
VT	7/1/2003	7/1/2003	18V.S.A. § 4250
TN	7/1/2007	**Before May 1990**[d]	Tenn. Code Ann. § 39-13-210(a)(2)
AZ	9/30/2009	**Pre-1993**[e]	Ariz. Rev. Stat. § 13-1105(A)(2)
DC[f]	6/11/2013	**Before Oct. 1992**[g]	The District of Columbia has had a DIH law since at least September 1992. See 1992 District of Columbia Laws 9-153 (Act 9–213).
NV[f]	7/1/2013	**7/1/1983**[h]	Nevada has had a DIH law since July 1983. 1983 Nevada Laws Ch. 218 (A.B. 389). While this law only applied to minors, a more comprehensive DIH law was enacted in 1985. 1985 Nevada Laws Ch. 527 (A.B. 620).
NJ[f]	8/8/2013	**7/9/1987**[i]	The law we presume Lee et al. to refer to, N.J. Stat. Ann. § 2C:35-9, has been in effect since July 1987. L.1987, c. 106, § 1 (1987).
WA[f]	7/24/2015	**Before Aug. 1987**[j]	The relevant law, Wash. Rev. Code Ann. § 69.50.415 was first enacted in 1987. 1987 Wash. Legis. Serv. Ch. 458 § 2. It does not appear to have been modified in 2015.
LA[f]	8/1/2015	**9/1/87**[k]	Under La. Rev. Stat. Ann. § 14:30.1(A)(3), Louisiana has criminalized the unlawful distribution of a controlled substance that directly causes the death of another since September 1987. S.B. 191, 1987 La. Sess. Law Serv. 465 (West). Though parts of Louisiana's homicide laws were modified in 2015, the section of this law pertaining to DIH was not.
CO[f]	7/1/2016	**7/1/1990**[l]	The relevant section of Colorado's law, Colo. Rev. Stat. Ann. § 18-3-102(1)(e), has existed since 1990. 1990 Colo. Legis. Serv. S.B. 90-121 (West).
DE	7/21/2016	7/21/2016	16 Del. C. § 4752B
KS[f]	7/1/2017	**7/1/2013**[m]	The Kansas law, Kan. Stat. Ann. § 21-5430, was enacted on July 1, 2013, and has not been changed since then.
FL[f]	10/1/2017	**Before 10/1/1987**[n]	Florida's DIH law has existed since before October 1987. Before the 1987 amendments it covered deaths that result from “the unlawful distribution of opium or any synthetic or natural salt, compound, derivative, or preparation of opium.” The October 1, 1987, amendments added “any substance controlled under S.893.03(1)” and “cocaine as described in S.893.03(2)(A).” 1987 Fla. Sess. Law Serv. 87-243 (West). The October 1, 2017 amendment modified the statute to include fentanyl, carfentanil, sufentanil, and controlled substance analogs. 2017 Fla. Sess. Law Serv. Ch. 2017-107 (C.S.H.B. 477) (West). See 1987 Fla. Sess. Law Serv. 87-243.
OK[f]	11/1/2017	**5/19/1989**[o]	Okla. Stat. Ann. tit. 21, § 701.7(B) has defined first-degree murder to include the taking of the life of another human being through the unlawful distribution or dispensing of a controlled substance or trafficking in illegal drugs since 1989. 1989 Okla. Sess. Law

(Continues)

TABLE 1 (Continued)

State	Effective date in Lee et al.	Actual effective date	Citations and notes
			Serv. 259. In 2012 synthetic controlled substances were added to the list of included drugs. SB 987, 2012 Okla. Sess. Law Serv. Ch. 208. It does not appear to have been modified in 2017.
AK	11/27/2017	**6/3/2006**[p]	AS § 11.41.120(a)(3)
NC[f]	12/1/2017	**6/25/1980**[q]	North Carolina's homicide law (N.C. Gen. Stat. § 14-17(b)(2)) has defined death "proximately caused by the unlawful distribution of opium or any synthetic or natural salt, compound, derivative, or preparation of opium" as second-degree murder since 1980. See 1979 North Carolina S.B. 1054 (1979).
IL[f]	1/1/2018	**1/1/1989**[r]	Illinois has had a DIH law since January 1, 1989. 1988 Ill. Legis. Serv. P.A. 85-1259. The act was amended on January 1, 2018 to allow for the prosecution of acts constituting DIH in violation of the law of other jurisdictions. See 2017 Ill. Legis. Serv. P.A. 100-404.

Dates in bold indicate incorrect dates listed by Lee et al. in their tab. 1.

Abbreviation: DIH, drug-induced homicide.

[a] Analysis by Corey Davis, JD, MSPH and Amy Lieberman, JD, harmreduction@networkforphl.org.

[b] Note that this law applied only to the delivery of drugs to a minor. The state did not enact a general DIH law until 2018. See R.I. Gen. Laws § 11-23-7.

[c] 1991 West Virginia Laws Ch. 38 (S.B. 323).

[d] The relevant language originally applied only to Schedule I and II drugs, and was present prior to April 30, 1990, originally as Tenn. Code Ann. § 39-13-206. 1990 Tennessee Laws Public Ch. 980 (West). Fentanyl and carfentanil were added effective July 1, 2018. 2018 Tennessee Laws Pub. Ch. 995 (S.B. 1787).

[e] Some form of the DIH provisions of this law has existed since at least 1993. See 1993 Ariz. Legis. Serv. Ch. 255 (S.B. 1049).

[f] Dates included in the Lee et al. analysis.

[g] The relevant language existed as of September 26, 1992, if not earlier, at D.C. Code § 22-2401. See 1992 District of Columbia Laws 9-153 (Act 9–213) (West).

[h] 1983 Nevada Laws Ch. 218 (A.B. 389). Note that the original law only applied to minors. A more comprehensive law became effective July 1, 1985. 1985 Nevada Laws Ch. 527 (A.B. 620).

[i] This law has been in effect since July 8, 1987, and has not been altered since that time. The law was being discussed in the legal literature at least as early as 2004. See Knight (2004).

[j] 1987 Wa. Laws Ch. 458 (H.B. 1228). The law was slightly modified effective June 6, 1996 and July 1, 2004. It was not modified in 2015.

[k] S.B. 191, 1987 La. Sess. Law Serv. 465 (West).

[l] This law was specific to an individual who "commits unlawful distribution, dispensation, or sale of a controlled substance to a person under the age of eighteen years on school grounds…and the death of such person is caused by the use of such controlled substance." Colo. Rev. Stat. Ann. § 18-3-102(1)(e). Enacting legislation: 1990 Colo. Legis. Serv. S.B. 90-121 (West).

[m] The law was enacted in its present form effective July 1, 2013. It was not modified on July 1, 2017.

[n] The law existed prior to the 1987 amendments. Prior to the 1987 amendments, it covered deaths that result from "the unlawful distribution of opium or any synthetic or natural salt, compound, derivative, or preparation of opium". The October 1, 1987, amendments added "any substance controlled under S.893.03(1)" and "cocaine as described in S.893.03(2)(A)". 1987 Fla. Sess. Law Serv. 87-243 (West). The October 1, 2017 change modified the statute to include fentanyl, carfentanil, sufentanil, and controlled substance analogs. 2017 Fla. Sess. Law Serv. Ch. 2017-107 (C.S.H.B. 477) (West).

[o] The relevant language was first added effective May 19, 1989. 1989 Okla. Sess. Law Serv. 259 (West). The law was modified effective November 1, 2012, to add synthetic controlled substances. 2012 Okla. Sess. Law Serv. Ch. 208 (S.B. 987) (West).

[p] The relevant language was added effective June 3, 2006. 2006 Alaska Laws Ch. 53 (H.B. 149).

[q] North Carolina was one of the first states to adopt a DIH law. It originally only pertained to "opium or any synthetic or natural salt, compound, derivative, or preparation of opium." See 1979 North Carolina S.B. 1054 (1979). The law has since been modified several times to add other drugs.

[r] The law was first effective January 1, 1989. 1988 Ill. Legis. Serv. P.A. 85-1259 (West). That version provided that "a person who violates [sections of the state Controlled Substances Act] by unlawfully delivering a controlled substance by unlawfully delivering a controlled substance to another, and any person dies as a result of the injection, inhalation or ingestion of any amount of that controlled substance, commits the offense of drug-induced homicide." It has been modified several times.

TABLE 2 Mandatory minimum and maximum penalties.[a,b]

State	Lee et al. mandatory minimum/maximum	Actual mandatory minimum/maximum	Citation
RI	Life/life	Life/life	R.I. Gen. Laws § 11-23-6
WV	Life/life	Life/life	W. Va. Code Ann. § 61-2-2
VT	1/19	**2/20**	18 Vt. Stat. Ann. § 4250(a)
TN	14/59	**15/60**[c]	Tenn. Code Ann. § 40-35-111(b)(1)
AZ	Life/death	Life/death	Ariz. Rev. Stat. § 13-1105(D)
DC	29/life	**30/**life	D.C. Code § 22-2104(a)[d]
NV	24/life	**25/death**	Nev. Rev. Stat. § 200.030; 453.333[e]
NJ	9/19	**10/20**	N.J. Stat. Ann. § 2C:43-6(a)(1)[f]
WA	9/9	**4.25[g]/10 or $20,000 fine[h] or both**	Wash. Rev. Code Ann. §§ 9A.20.021(1)(b); 9.94A.518; 9.94A.517[i]
LA	Life/life	Life/life	La. Rev. Stat. Ann. § 14:30.1(B)[j]
CO	Life/death	Life/death[k]	Colo. Rev. Stat. Ann. § 18-1.3-401(1)(a)(I)
DE	1/24	**2/25**	Del. Code. Ann. tit. 11, § 4205(b)(2)
KS	19/22	**12.25/13.75**	Kan. Stat. Ann. § 21-6804[l]
FL	40+/life	**Life/death**	Fla. Stat. § 775.082[m]
OK	Life/death	Life/death	Okla. Stat. Ann. tit. 21, § 701.9(A)[n]
AK	2/19	**5/20**	Alaska Stat. Ann. § 12.55.125 (effective November 27, 2017)[o]
NC	10/13	**10.42–13.08/13.5–16.75[p]4.83–6.08/6.83–8.33**	N.C. Gen. Stat. § 15A-1340.17
IL	20/59	**6/30**[q]	730 Ill. Comp. Stat. 5/5-4.5-25(a)
MI	Not included in study	1.75[r]/life	Mich. Comp. Laws Ann. §§ 750.317a; 777.16p and 777.62
MN	Not included in study	10.67[s]/25 and/or $40,000 max fine	Minn. Stat. Ann. §§ 609.195 and 244.09; Sentencing Guidelines, Guideline 4, subd. A, M.S.A. ch. 244 App (2018)
NH	Not included in study	None[t]/life	N.H. Rev. Stat. Ann. §§ 318-B:26(IX); 651:2(I)
PA	Not included in study	5/40[u]	18 Pa Stat. and Cons. Stat. Ann. §§ 2506; 303.15; 303.16(a)
WI	Not included in study	None[v]/40 and/or $100,000 max fine	Wis. Stat. Ann. §§ 940.02; 939.50

(Continues)

TABLE 2 (Continued)

State	Lee et al. mandatory minimum/maximum	Actual mandatory minimum/maximum	Citation
WY	Not included in study	1/20	Wyo. Stat. Ann. §§ 6-2-108(b); 6-10-107

[a] Analysis by the Network for Public Health Law's Harm Reduction Legal Project, harmreduction@networkforphl.org.

[b] Effective dates as of the end of 2018. Any changes to the mandatory minimum or maximum between January 1, 2010 and December 31, 2018 are noted in footnotes. For states with grid-sentencing, the minimum and maximum is determined based on an individual with no prior criminal history.

[c] Effective July 1, 2018, an individual convicted of Tenn. Code Ann. § 39-13-210(a) is subject to one sentencing range higher punishment if the victim was a minor. 2018 Tennessee Laws Pub. Ch. 934 (S.B. 1875) (West).

[d] Subsection (e) related to limiting fines was added effective July 11, 2013. 2012 District of Columbia Laws 19-317 (Act 19-641) (West).

[e] As stated in footnote g, the statute containing penalties for murder (Nev. Rev. Stat. § 200.030) was modified effective July 1, 2013 solely to replace "mental retardation" with "an intellectual disability." 2013 Nevada Laws Ch. 186 (S.B. 338) (West). There were no substantive changes on that date.

[f] The statute was amended effective August 8, 2013 to make changes related to firearm enhancements. 2013 NJ Sess. Law Serv. Ch. 113 (Senate 2804) (West).

[g] This number reflects the presumptive range minimum outlined in Washington State's drug offense sentencing grid. Washington State's DIH is not subject to the state's mandatory minimum statute (Wash. Rev. Code Ann. § 9.94A.540).

[h] Effective July 24, 2015, the fine applies solely to adults. 2015 Wash. Legis. Serv. Ch. 265 (S.S.S.B. 5564) (West).

[i] Washington's sentencing grid was amended in 2013 to change the presumptive range for an offense with a seriousness level I and offender score of 3–5. 2013 Wash. Legis. Serv. 2nd Sp. Sess. Ch. 14 (S.S.S.B. 5892) (West). This change does not affect Washington's DIH law as it is a seriousness level III offense (Wash. Rev. Code Ann. 9.94A.518).

[j] The statute was amended in 2015 to clarify terms related to rape. 2015 La. Sess. Law Serv. Act 184 (H.B. 139) (West). On June 25, 2012, the United States Supreme Court found mandatory life without the possibility of parole for individuals under the age of 18 unconstitutional. (*Miller v. Alabama*, 567 US 460; see also *State v. Brooks*, 51,917 (La. App. 2 Cir. April 11, 2018), 247 So. 3d 1071, 1073.

[k] This minimum and maximum reflects the presumptive range, which may only be modified under "unusual and extenuating circumstances." Colo. Rev. Stat. Ann. § 18-1.3-406. The law was amended multiple times between January 1, 2010 and December 31, 2018; however, no changes were made to the presumptive range.

[l] Kansas's DIH law classifies distribution of a controlled substance causing death as a nondrug, severity level I, person felony; therefore, the applicable presumptive sentencing grid is Kan. Stat. Ann. § 21-6804 (see Kan. Stat. Ann. § 21-5430). Kan. Stat. Ann. 21-6804 has been modified multiple times including July 1, 2017; however, none of the modifications are related to the presumptive range for severity level I, category I. A judge may only depart from the presumptive range for mitigating factors that are substantial and compelling. Kan. Stat. Ann. 21-6815.

[m] The section been modified multiple times to incorporate amendments made to other Florida statutes. In 2014, the penalty was amended to remove the death penalty for individuals who were under the age of 18 when the capital felony was committed. 2014 Fla. Sess. Law Serv. Ch. 2014-220 (C.S.H.B. 7035) (West).

[n] Effective November 1, 2017, the penalty was amended to require "an overwhelming amount of mitigating evidence" to allow "the benefit of receiving imprisonment for life or deferment of the sentence" when the victim is an on duty a law enforcement officer, correctional officer or correctional employee. 2017 Okla. Sess. Law Serv. Ch. 169 (H.B. 1306) (West).

[o] As indicated in footnote o, the sentence outlined in Alaska Stat. Ann. § 12.55.125 was amended effective November 27, 2017 to increase the presumptive sentencing range from 5–9 to 7–11 years for a first-time felony where the conduct was directed at an on-duty emergency responder. 2017 Alaska Laws 4th Sp. Sess. Ch. 1 (S.B. 54) (West). A judge may order a sentence less than 5 years if there are mitigating factors or extraordinary circumstances (Alaska Stat. Ann. §§ 12.55.155; 12.55.165; 12.55.175).

[p] The first range is the presumptive range for a first-time offense for a B2 felony. North Carolina's original DIH offense is classified as a B2 felony (N.C. Gen. Stat. § 14-17(b)(2)). The newer DIH law provides two different classifications "(1) Death by distribution of certain controlled substances is a Class C felony. (2) Aggravated death by distribution of certain controlled substances is a Class B2 felony" (N.C. Gen. Stat. § 14-18.4). The second set of dates is the presumptive range for a first-time offense for a Class C felony. Both ranges are presumptive; there is a lower range if there are mitigating circumstances and a higher range if there are aggravated circumstances. An additional 3 months was added to all maximum penalties in 2011. 2011 North Carolina Laws S.L. 2011-192 (H.B. 642) (West).

[q] The determinate sentence for a Class X felony is 6–30 years; an extended sentence for aggravating circumstances is 30–60 years (730 Ill. Comp. Stat. 5/5-4.5-25(a)). Illinois's DIH law, in addition to classification as a Class X felony, provides an additional sentence of 15–30 years, extended 30–60 years if the person also violates "subsection (a) or subsection (c) of Section 401 of the Illinois Controlled Substances Act or Section 55 of the Methamphetamine Control and Community Protection Act" (720 Ill. Comp. Stat. 5/9-3.3(b)).

[r] This number reflects the presumptive minimum. Mich. Comp. Laws Ann. § 777.62. In 2018, a sentence could only depart from this range if the court found a "substantial and compelling reason," which was stated on the record. 2002 Mich. Legis. Serv. P.A. 666 (H.B. 5395) (West). The current departure standard effective March 21, 2021 is if the departure is "reasonable." Mich. Comp. Laws Ann. § 769.34.

[s] This number reflects the minimum of the presumptive range included in Minnesota's sentencing guidelines effective 2018. Sentencing Guidelines, Guideline 4, subd. A, M.S.A. ch. 244 App (2018). In 2021, the DIH law was reduced in severity level leading to a reduction in minimum presumptive range. Sentencing Guidelines, Guideline 4, subd. A, M.S.A. ch. 244 App (2021). There were no reductions or increases between January 1, 2010 and December 31, 2018.

[t] Pursuant to N.H. Rev. Stat. Ann. § 651:2(I), the minimum sentence possible is unconditional discharge, essentially imposing no sentence.

[u] Effective June 18, 2014, the 40-year maximum “shall not apply to a person convicted under section 2502(c) (relating to murder) when the victim is less than 13 years of age and the conduct arises out of the same criminal act.” The 40 year maximum is effective as of July 7, 2011 by an amendment that removed the mandatory minimum. 2011 Pa. Legis. Serv. Act 2011-40 (H.B. 396) (West). The minimum sentencing matrix and offense list has been amended multiple times between January 1, 2010 and December 31, 2018 to add additional offenses; however, there had been no modification during that time to level 13, the level that corresponds to 18 Pa Stat. and Cons. Stat. Ann. § 2506. If a court finds mitigating circumstances, it may impose a 12-month shorter sentence (18 Pa Stat. and Cons. Stat. Ann. § 303.13).

[v] Wisconsin has a mandatory minimum of 5 years for a subsequent “serious violent crime,” which includes the DIH law located at Wis. Stat. Ann. § 940.02. (Wis. Stat. Ann. § 939.619). If the jury finds that the victim was pregnant, and the defendant knew the victim was pregnant at the time of the offense, there is a mandatory higher penalty of 10–30 years.

no amendment to this law was enacted in 2016. The penalty statute located at Colo. Rev. Stat. Ann. § 18-1.3-401(1)(a)(I) was amended multiple times between January 1, 2010, and December 31, 2018, including in 2016; however, no changes were made to the applicable presumptive penalty range.

- The authors list the effective date of Florida's law as October 1, 2017. In fact, Florida's DIH law has existed since before October 1987. Before the 1987 amendments, the law applied only to covered deaths that result from “the unlawful distribution of opium or any synthetic or natural salt, compound, derivative, or preparation of opium.” The October 1, 1987, amendments added “any substance controlled under S.893.03(1)” and “cocaine as described in S.893.03(2)(A).” 1987 Fla. Sess. Law Serv. 87-243 (West). This law was indeed amended on October 1, 2017 to include fentanyl, carfentanil, sufentanil, and controlled substance analogs. 2017 Fla. Sess. Law Serv. Ch. 2017-107 (C.S.H.B. 477) (West). See 1987 Fla. Sess. Law Serv. 87-243. Contrary to the claims made by the authors, however, this amendment did not include specifications of minimum or maximum sentencing for DIH and, as described above, both natural and synthetic opioids were included in the law before 1987.
- The authors list the mandatory minimum penalty for violation of Florida's DIH law as “40+” and the maximum penalty as life. However, pursuant to Fla. Stat. § 782.04(1)(a), the DIH law is classified as “murder in the first degree and constitutes a capital felony.” Pursuant to Fla. Stat. § 775.082(1)(a), capital felonies are punished by life imprisonment without parole unless the sentence proceedings result in the determination that the person should be punished by death. Therefore, the authors' mandatory minimum and maximum numbers are incorrect.
- The authors list the effective date of Illinois’ law as January 1, 2018. In fact, Illinois has had a DIH law since January 1, 1989. 1988 Ill. Legis. Serv. P.A. 85-1259. The act was amended effective January 1, 2018, to allow for the prosecution of acts constituting DIH in violation of the law of other jurisdictions. See 2017 Ill. Legis. Serv. P.A. 100-404. Contrary to the claims made by the authors, this amendment did not mention opioids or include specifications of minimum or maximum sentencing.
- The authors list the mandatory minimum penalty for Illinois’ law as 20 years and the maximum as 59 years. In fact, pursuant to 720 Ill. Comp. Stat. 5/9-3.3, DIH is a Class X felony unless the circumstances warrant enhancements. Pursuant to 730 Ill. Comp. Stat. 5/5-4.5-25(a), a Class X felony is punishable by “not less than 6 years and not more than 30 years.”
- The authors list the effective date of the Kansas law as July 1, 2017. In fact, the Kansas DIH law, Kan. Stat. Ann. § 21-5430, was enacted on July 1, 2013. Contrary to the claims made by the authors, this law has not been amended since it was first enacted.

- The authors list the mandatory minimum penalty for Kansas's law as 19 years and the maximum as 22. Kansas's DIH law classifies the distribution of a controlled substance causing death as a nondrug, severity level I, person felony; therefore, the applicable presumptive sentencing grid is Kan. Stat. Ann. § 21-6804. (See Kan. Stat. Ann. § 21-5430.) Under the grid, the presumptive sentencing range for an individual with no prior record convicted of a severity level I is 147–165 months, which corresponds to approximately 12.25 to 13.75 years, contrary to the authors' claims. While the applicable sentencing grid located at Kan. Stat. Ann. 21-6804 has been modified multiple times, including a modification effective July 1, 2017, none of the modifications were related to the relevant presumptive range.
- The authors list the effective date of the Louisiana law as August 1, 2015. In fact, under La. Rev. Stat. Ann. § 14:30.1(A)(3), Louisiana has criminalized the unlawful distribution of a controlled substance that directly causes the death of another since September 1987. S.B. 191, 1987 La. Sess. Law Serv. 465 (West). Parts of Louisiana's homicide laws were modified in 2015; however, contrary to the claims made by the authors the relevant section of this law (pertaining to DIH) was not. Specifically, the statute was amended in 2015 to clarify terms related to rape. 2015 La. Sess. Law Serv. Act 184 (H.B. 139) (West).
- The authors list the effective date of North Carolina's law as December 1, 2017. In fact, North Carolina's homicide law (N.C. Gen. Stat. § 14-17(b)(2)) has defined death as "proximately caused by the unlawful distribution of opium or any synthetic or natural salt, compound, derivative, or preparation of opium" as second-degree murder since 1980. See 1979 North Carolina S.B. 1054 (1979). This law was amended on December 1, 2017 to specifically include certain fentanyl derivatives, synthetic cannabinoids, and other Schedule III, IV, and V substances; however, contrary to the claims made by the authors, this amendment did not include specifications of minimum or maximum sentencing for DIH and, as described above, opioids were included in the law as early as 1980. 2017 North Carolina H.B. 464 (West).
- The authors list the effective date of the Nevada law as July 1, 2013. In fact, Nevada has had a DIH law since July 1983. 1983 Nevada Laws Ch. 218 (A.B. 389). While this law only applied to minors, a more comprehensive DIH law was enacted in 1985. 1985 Nevada Laws Ch. 527 (A.B. 620). The statute containing penalties for murder (Nev. Rev. Stat. § 200.030) was modified effective July 1, 2013, solely to replace "mental retardation" with "an intellectual disability." 2013 Nevada Laws Ch. 186 (S.B. 338) (West). Contrary to the claims made by the authors, there were no relevant substantive changes on that date.
- The authors list the mandatory minimum penalty for Nevada's DIH law as 24 years and the maximum as life. In fact, pursuant to Nev. Rev. Stat. § 453.333 and Nev. Rev. Stat. § 200.030, Nevada's DIH law is punishable by death, life imprisonment, or 50 years if convicted of first-degree murder or, for second-degree murder, by life imprisonment or 25 years.
- The authors list the effective date of the New Jersey law as August 8, 2013. In fact, the law we presume they refer to, N.J. Stat. Ann. § 2C:35-9, has been in effect since July 1987. L.1987, c. 106, § 1 (1987). The definition of "controlled dangerous substance" was modified effective March 12, 2013, to include certain synthetic cannabinoids. (N.J. Stat. Ann. § 2C:35-2) 2013 NJ Sess. Law Serv. Ch. 35 (Senate 1783) (West). No references to opioids were added or modified on that date. The penalty statute (N.J. Stat. Ann. § 2C:43-6(a)(1)) was amended effective August 8, 2013 to make changes related to firearm enhancements that do not impact the DIH provisions. 2013 NJ Sess. Law Serv. Ch. 113 (Senate 2804) (West).
- The authors list the mandatory minimum penalty for New Jersey's law as nine years and the maximum as 19 years. Pursuant to N.J. Stat. Ann. § 2C:35-9, New Jersey's DIH law is

a "crime of the first degree," which, according to N.J. Stat. Ann. § 2C:43-6(a)(1), is punishable with a sentence between 10 and 20 years, contrary to the authors' claim.

- The authors list the effective date of the Oklahoma law as November 1, 2017. In fact, Okla. Stat. Ann. tit. 21, § 701.7(B) defined first-degree murder to include the taking of the life of another human being through the unlawful distribution or dispensing of a controlled substance or trafficking in illegal drugs since 1989. 1989 Okla. Sess. Law Serv. 259. In 2012, synthetic controlled substances were added to the list of included drugs. SB 987, 2012 Okla. Sess. Law Serv. Ch. 208. Contrary to the claims made by the authors, this law was not amended in 2017. The penalty statute, Okla. Stat. Ann. tit. 21, § 701.9(A), was amended effective November 1, 2017, to require "an overwhelming amount of mitigating evidence" to allow "the benefit of receiving imprisonment for life or deferment of the sentence," but this applies only when the victim is an on-duty law enforcement officer, correctional officer, or correctional employee. 2017 Okla. Sess. Law Serv. Ch. 169 (H.B. 1306) (West). No other changes were made to the sentencing statute on that date.
- The authors list the effective date of the Washington law as July 24, 2015. In fact, the relevant law, Wash. Rev. Code Ann. § 69.50.415, was first enacted in 1987. 1987 Wash. Legis. Serv. Ch. 458 § 2. Contrary to the claims made by the authors, this law was not amended in 2015. Washington's controlled substance definitions were amended in 2015 due to a change in cannabis laws. 2015 Wash. Legis. Serv. Ch. 70 (S.S.S.B. 5052) (West). No changes related to opioids were made on that date.
- The authors list the mandatory minimum penalty for Washington's law as nine years and the maximum also as nine years. However, Washington's DIH law is classified as a Class B felony. Wash. Rev. Code Ann. § 69.50.415. Pursuant to Wash. Rev. Code Ann. §§ 9A.20.021(1)(b), the maximum penalty for a Class B felony is 10 years or a $25,000 fine, or both. Further, pursuant to Wash. Rev. Code Ann. § 9.94A.518, Washington's DIH law is classified as a "seriousness level" III drug offense. Washington's sentencing grid, located at Wash. Rev. Code Ann. § 9.94A.517, provides that a seriousness level III conviction for a person with no prior record carries the standard sentencing range of 51–68 months equaling approximately 4.25–5.67 years, making the minimum sentence 4.25 years, contrary to the authors' claims.
- The authors list the effective date of the District of Columbia's DIH law as June 11, 2013. Rather, the District has had a DIH law since at least September 1992. See 1992 District of Columbia Laws 9-153 (Act 9–213). The penalty statute (D.C. Code § 22-2104) was amended effective June 11, 2013, to add subsection (e) related to limiting fines. Contrary to the claims made by the authors, no changes to sentencing amounts were made on that date. 2012 District of Columbia Laws 19-317 (Act 19-641) (West).
- The authors list the mandatory minimum penalty for the District of Columbia as 29 years. Pursuant to D.C. Code § 22-2101, the District of Columbia's DIH law is classified as murder in the first degree. In fact, pursuant to D.C. Code § 22-2104(a) murder in the first degree is punishable by "not less than 30 years nor more than life imprisonment without release."

As described above, DIH laws were effective in all 10 states and the District of Columbia before 2010, in contravention of the authors' own inclusion criteria; therefore, all 10 states and the District of Columbia should have been excluded from the study. *Even if every other aspect of the analysis was conducted correctly, the study's results are, therefore, entirely unreliable*.

Further, DIH laws can substantially vary in content in ways that impact the severity of punishment and the impact of the DIH law on behaviors, which Lee et al. do not consider. The DIH law in Colorado, for example—Colo. Rev. Stat. § 18-3-102(1)(e)—only applies to overdose fatalities (opioid-related or otherwise) in minors under the age of 18 where the person provided the drugs on school grounds. In the case of minors, the direct causal impact on overdose deaths should have been assessed within the relevant target population, yet complete population-based rates seem to have been calculated. Thus, in addition to inaccuracies in the "effective dates" attributed to DIH laws, the treatment condition itself is not consistent across the data set.

Finally, even if Lee et al. were to repeat their analysis with accurate effective dates, the use of effective dates as the main treatment variable introduces still more weaknesses in the analysis that would undermine any conclusions drawn from that data. According to Lee et al., "the main purpose of [DIH] laws is to deter sales or deliver of the [sic] opioids;" thus, their study "could be considered an empirical test of the deterrent effect of a criminal sanction on a targeted public health risk" (Lee et al., 2022a). This approach fails to account for more than a century of criminal–legal scholarship in the United States that calls attention to the difference between "law in the books and law in action" (Pound, 1910). Indeed, many states (including Colorado, Florida, Illinois, Louisiana, North Carolina, Nevada, New Jersey, Oklahoma, Washington, and the District of Columbia, as described above) have had DIH laws "in effect" for decades, during which time—until at least the 2010s—they remained largely unenforced (Beletsky, 2019). In addition to this failure to attend to the question of whether DIH laws on the books are enforced—and enforced equally—in their sample states, Lee et al. also decline to attend to drug suppliers' perceptions of DIH law implementation and to the degree to which the behavior of those suppliers may be susceptible to perceptions of criminal consequences and their enforcement—both of which are recognized in criminological literature as likely modifiers of the deterrent effects that legal enforcement may have (Tonry, 2008).

Operationalizing sentence length as a characteristic of the "treatment effect" does not resolve these concerns, as current evidence on the deterrence effect of more *severe* punishment (including capital punishment) is poor (Nagin, 2013a; Nagin & Pepper, 2012). However, there is significant empirical support for the deterrent effects of *certainty* of punishment; as criminologist Daniel Nagin has described, "the more precise statement is that certainty of apprehension [a policing matter], not the severity of the ensuing legal consequence [a matter of law] is the more effective deterrent" (Nagin, 2013b). Thus, while Lee et al. attempt to separate states with life and nonlife sentences (though, as described above, they have done so incorrectly), the enforcement of existing laws, regardless of the punishment they mandate, would have been a more salient measure. Such an approach would have avoided conflating "the rules that purport to govern the relations of man" with "those that in fact govern them" (Pound, 1910) and thereby produce whatever deterrent effect the original study sought to assess.

SAMPLING ERRORS CONTRIBUTING TO PROBLEMS OF EXTERNAL VALIDITY

In addition to the fatal flaws in measurement, described above, the sampling methods used by Lee et al. to select unique counties for inclusion in the model are problematic and seriously undermine the reliability of any subsequent findings. In addition to the District of Columbia, the 10 states that Lee et al. included in their sample represent a total of 656 unique counties. The final sample included only 92 counties—an 86% reduction in sample size. Lee et al. (2022a) describe their selection process as one based on the "availability of opioid overdose deaths reported at [CDC WONDER]." They subsequently note that the number of counties with available opioid mortality data is limited and that they sought to retain as many counties in the sample as possible. The details of their selection criteria are not sufficiently described in the article; we infer, however, that counties for which an age-adjusted rate of opioid overdose mortality was reported in CDC WONDER for all 6 years from 2013 to 2018 were selected and that any of the original 656 counties lacking an annual rate calculation in at least 1 year during the observation period was excluded.

Lee et al. (2022a) identified opioid mortality data in CDC WONDER by searching (by county) for deaths assigned at least one of several ICD-10 codes indicating fatal opioid overdose. They list the following ICD-10 codes in their text: T40.0, T40.1, T40.2, T40.3, T40.4, and T40.6. These "T-codes" define a particular opioid as a contributing cause of death (e.g., T40.1 indicates heroin as a contributing cause of death, and T40.3 indicates methadone); however, they do not indicate the underlying cause of death—accidental poisoning, intentional self-harm (suicide), assault (homicide), and poisoning of undetermined intent—which are designated by X- and Y-codes (SAMHSA's Center for the Application of Prevention Technologies, 2017). Lee et al. do not, therefore, specify what ICD-10 codes defining the manner of death (X- and Y-code) were used to query CDC WONDER. In their formal correction, the authors report that they include all deaths classified as "unintentional, suicide, homicide, or undetermined intent deaths (X40–44, X60–64, X85, Y10–14)" (Lee et al., 2022b).

The misclassification of overdose, thus affecting the selection of counties for analysis, appears probable in several specific ways. First, the exact set of ICD-10 codes specified by Lee et al. in their correction (the same definition offered by the National Center for Health Statistics (NCHS), which is cited by Lee et al.) includes overdoses from prescribed opioid analgesic medications that were obtained from a physician and pharmacy and may have been accidentally ingested in excess during the course of medical care (Hedegaard et al., 2017). While some clinicians have faced criminal charges for their role in "pill mill" conspiracy schemes (Finnegan, 2017), DIH laws have not, to the best of our knowledge, been used to prosecute physicians acting within the scope of medical practice where deaths were due to patient error. Second, the ICD-10 codes for overdose specified in the NCHS reference cited by Lee et al. exclude deaths where cocaine was the sole drug recorded on the death certificate, even though the statutes under review indicate criminal liability for cocaine-involved deaths. Further, the ICD-10 substance-specific T-codes specified in the referenced definition (Hedegaard et al., 2017) intentionally count polysubstance overdose deaths as multiple events (e.g., a death involving both fentanyl and oxycodone would count twice), which the authors neither acknowledge nor address.

Of still greater consequence for the county selection process that Lee et al. employ is the incompleteness of county-level opioid overdose within CDC WONDER. Most public health databases are limited by missing data, and CDC WONDER is no exception. However, in addition to missing data that is truly missing (i.e., unrecorded or unreported), the CDC WONDER database suppresses county-level mortality rates when the number of mortality incidents recorded is less than 10 per specified unit of time, as this triggers confidentiality concerns (US Centers for Disease Control and Prevention, 2021). In other words, some data not reported by CDC WONDER are not truly missing but have been systematically suppressed due to a low county-level opioid overdose death count. The selection criteria that Lee et al. use to make the implicit assumption that missing data are missing at random; however, counties with overdose data suppressed in CDC WONDER have a lower burden of the outcome (opioid overdose) by definition. This style of data censoring means that the data set constructed, and all subsequent analysis, is only representative of counties with particularly high overdose rates, constituting an extreme case of selection bias. This is not acknowledged by Lee et al. (2022a).

To replicate the authors' methodology, we conducted a query in CDC WONDER for crude county-level mortality rates associated with the underlying causes of death: ICD-10 codes X40–46 (accidental poisonings), X60–64 (intentional self-poisonings), X85 (assault by poisoning), and Y10–14 (poisonings of undetermined intent), as well as multiple causes of death (ICD-10 codes T40.0, T40.1, T40.2, T40.3, T40.4, and T40.6) in the 10 states sampled by Lee et al. from 2013 to 2018. This query returned results for 654 counties. Of those, 107 counties had overdose death data for all 6 years (2013–2018); the remaining 547 had data suppressed for at least one of those years (see Supporting Information: 1).

The results of this query (tabulated in Supporting Information: 1) show that 109 counties in the 10 states of interest meet the criteria for inclusion clarified by Lee et al. (2020b) in their correction letter. Lee et al. did not name the 92 counties they included in their analysis; therefore, the specific missing counties and the likely cause of their missingness cannot be determined at this time. Nevertheless, the table in Supporting Information: 1 also shows that the data used by Lee et al. (2022a), even with 19 counties unaccounted for, systematically underrepresent counties with smaller populations and overrepresent counties with larger populations (likely more urban areas) or higher opioid mortality rates. Along with the crude death count and total population (for the year 2013), the table in Supporting Information: 1 indicates whether CDC WONDER reported opioid mortality or suppressed that data for each county in each year from 2013 to 2018. Counties with complete opioid death data have much larger populations than average, as shown by the histograms in Figure 2. Thus, the "suppressed" designation provides a ready demonstration of systematic bias in the data set: the results are only representative of larger, more urban counties. Therefore, the findings cannot be generalized to the full population of counties, even within the 10 states included in the analysis. In addition to the universally incorrect dates for DIH law enactment applied to the study model, selection bias arising from excluding 86% of available counties, through a demonstrably differential mechanism, should have been grounds for rejecting the analysis presented by Lee et al. (2022a) before publication. Yet, the authors do not acknowledge this limitation.

Several solutions to these problems posed by the CDC WONDER database are available to the authors. First, complete county-level death data—including any data that would otherwise have been suppressed due to small numbers in CDC WONDER—is available through the CDC upon request (US Centers for Disease Control and Prevention, 2022a). Since the authors chose to use a data set with suppressed information instead of taking the steps necessary to acquire complete mortality data, they should offer justification for that choice. Alternatively, if they wish to estimate an impact representative of all counties, they should follow statistical methods that have been developed specifically to account for the forms of data suppression inherent to the CDC WONDER database

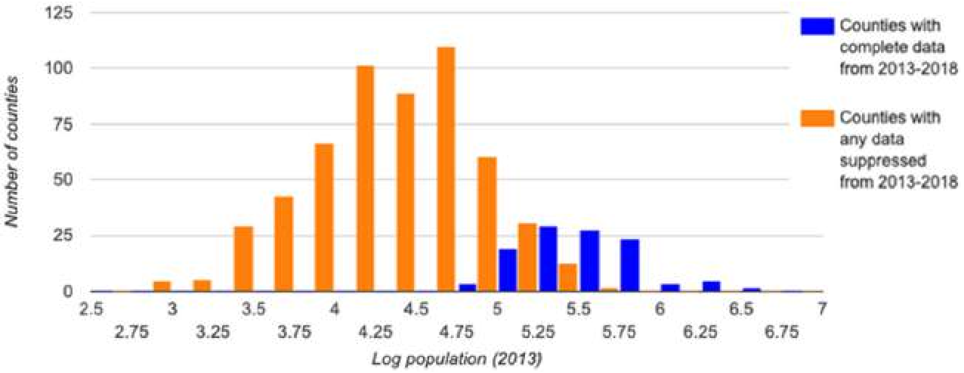

FIGURE 2 Log scale 2013 population distribution for counties with complete opioid mortality data versus counties with any suppressed data in US Centers for Disease Control and Prevention Wide-ranging ONline Data for Epidemiologic Research (CDC WONDER) from 2013 to 2018 in the 10 states sampled by Lee et al. A logarithmic scale is used due to skewness toward large values in the population data set.

(Quick, 2019; Tiwari et al., 2014). Both of these solutions are ignored by the authors (Lee et al., 2022a).

THE HYPOTHESIS THAT DIH LAWS REDUCE OPIOID OVERDOSE BY DETERRING DRUG DISTRIBUTION IS SUPPORTED NEITHER BY EXISTING EVIDENCE NOR BY THE MODELING STRATEGY USED

Finally, the modeling strategies employed by Lee et al. (2022a) are not equipped to evaluate the hypothesis that "DIH [law] implementation may have deterred drug dealers from supplying illicit opioids to populations at risk for opioid dependence and abuse". Recall that Lee et al. model county-level opioid mortality rate on two state-level predictors or "treatment" variables (DIH laws and an interaction between DIH laws and mandatory minimum life sentences), four other opioid-related state policies, and three variables capturing county-level socioeconomic conditions. They additionally control for year and county-fixed effects and 1-year lagged opioid mortality rates.[1] For this model to produce evidence that DIH laws negatively impact opioid mortality, it must be true that, conditional on the controls and fixed effects included in the model, the enactment of DIH laws is as good as randomly distributed.

This assumption that DIH laws are "conditionally exogenous" (i.e., as good as randomly distributed, conditional on controls) is almost sure to be wrong. Legislative responses to opioids emerge not out of thin air but in response to the successful activation of new conceptual frames that define opioids as a public health concern (often the result of pressure from advocacy groups) or through the successful reactivation of older conceptual frames that define opioids as a criminal concern (often the result of pressure from law enforcement groups) (El-Sabawi, 2018, 2019). For this reason, opioid legislation is likely to be proposed, ratified, and enacted after major public events related to opioid use or opioid overdose that allow these frames to reach new salience, such as a precipitous rise in overdose rates or a single high-profile case that brings the issue of opioid overdose to public attention in a new light. DIH laws, specifically, frequently emerge after focused activism on the part of families who have lost loved ones to overdose, resulting in numerous eponymous bills and laws that identify a particular decedent by name (Liu, 2019; Office of the Governor, 2018; Sandoval, 2021). Thus, the establishment of new DIH laws is likely not random. Rather, they may immediately follow a rising trend in overdose fatalities and/or signal a shifting of public attitudes around opioid policies, both of which could facilitate a downward trajectory in opioid overdose deaths. It is, therefore, possible for DIH laws to *appear* associated with reductions in overdose mortality due merely to the coincidence of when they were enacted.

While Lee et al. (2022a) do control for a single lag in opioid deaths, this lag cannot eliminate a potentially spurious relationship between mortality rates and DIH laws. This is because DIH laws are likely to respond to *time trends* in underlying opioid deaths over several years, not only to mortality values in the year immediately prior. To demonstrate this, we created a simulated data environment for three "counties" (see Figure 3) in which DIH laws were enacted in the year after mortality rates peaked (trend 1 in yellow), in the same year as that peak (trend 2 in blue), or in the year before that peak (trend 3 in green). Table 3 presents the same data numerically. In this simulated setting, a regression of 2013–2018 mortality rates on a binary indicator for DIH laws being "in effect," alongside "county" and "year" fixed effects, suggests that DIH laws reduce mortality (coefficient = −0.17), even though no effect of DIH laws was built into the data. The finding is purely based on a spurious relationship with mortality time trends. Interestingly, including the lagged mortality rate, as Lee et al. did in their analysis, makes the spurious "impact" of DIH laws appear *stronger*, not weaker (coefficient = −1.44). This simple simulation exercise illustrates two

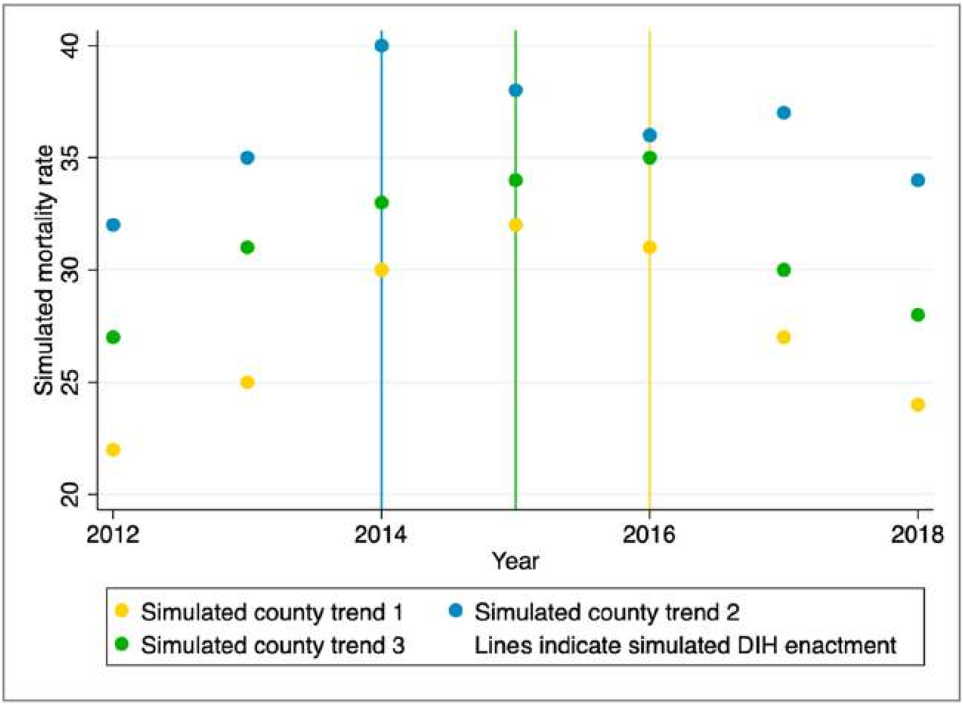

FIGURE 3 Graphic display of simulated data. DIH, drug-induced homicide.

points. First, if DIH laws are enacted as opioid mortality rates spike, this reverse causality can create a spurious, negative relationship between DIH laws and opioid mortality rates. Second, adding a lag in mortality rates to one's regression model, as Lee et al. (2022a) elected to do, will not eliminate this relationship, and could in some settings even exacerbate the spurious correlation.

There is still another characteristic of DIH law enactment that may further lead to spurious, negative correlation between DIH law enactment and mortality rates under the Lee et al. model. If DIH laws respond to shifting public attitudes about opioid policy, they are likely to be enacted—or amended—around the same time as other policy measures designed to reduce opioid mortality. If such measures are not controlled for, the apparent "effect" of DIH laws may in fact be picking up the effect of these other state- or county-level policy measures enacted, or resources created, around the same time. While Lee et al. (2022a) do control for four state-level policies aimed at reducing opioid mortality, there are numerous evidence-based overdose-prevention strategies they do not control for: the number of opioid treatment programs (which dispense methadone, a Food and Drug Administration [FDA]-approved medication for opioid use disorder) per county, the number of clinicians who prescribe buprenorphine (another FDA-approved medication for opioid use disorder) per county, access to medications for opioid use disorder in county jails, county-level access to syringe services programs, county-level naloxone access, and state-level Medicaid expansion, to name a few (Carroll et al., 2018; Kravitz-Wirtz et al., 2020). Importantly, access to opioid agonist medications for opioid use disorder—an evidence-based overdose prevention intervention known to reduce overdose mortality by as much as 50% (National Institutes of Health, 2018; Wakeman et al., 2020)—is typically higher in urban settings (Andrilla et al., 2019; Andrilla & Patterson, 2022), which are grossly over-represented in Lee et al.'s (2022a) final data set (discussed above).

TABLE 3 Tabular display of simulated data.

Year	County ID	Mortality rate	DIH enaction	Lagged mortality rate
2012	1	22	0	
2013	1	25	0	22
2014	1	30	0	25
2015	1	32	0	30
2016	1	31	1	32
2017	1	27	1	31
2018	1	24	1	27
2012	2	32	0	
2013	2	35	0	35
2014	2	40	1	45
2015	2	38	1	40
2016	2	36	1	36
2017	2	37	1	37
2018	2	34	1	34
2012	3	27	0	
2013	3	31	0	27
2014	3	33	0	32
2015	3	34	1	33
2016	3	35	1	34
2017	3	30	1	36
2018	3	28	1	30

Abbreviation: DIH, drug-induced homicide.

IMPLICATIONS FOR POLICYMAKERS

This review of fatal methodological flaws in a study, which was published in a peer-reviewed journal despite those flaws, should serve as a cautionary tale for policymakers. While stand-alone studies with noteworthy findings can reveal promising new avenues for overdose prevention, they should rarely serve as the sole basis for policy action. Rather, policymakers considering the potential impacts of DIH laws should follow a robust evidence base characterized by:

(1) multiple forms of quantitative investigation that test the causal links hypothetically connecting DIH laws and overdose, such as whether DIH laws are capable of deterring drug distribution and whether or not interruptions in drug distribution or drug supply reliably produce reductions in overdose—indeed, current evidence suggests neither supposition is wholly correct (Carroll et al., 2020; Dickinson, 2017);
(2) comprehensive qualitative studies that investigate the nuanced ways in which individuals, social networks, and the relationships that tie them together are affected and overdose risk subsequently altered by DIH laws and prosecutions; and

(3) similar findings produced by similar studies replicated across populations and contexts, each of which further reduces the likelihood that these common results are spurious or coincidental.

As this review has shown, researchers can make errors—sometimes very significant errors—in the conduct of a study. We believe this experience also highlights the importance of manuscripts being reviewed by experts in the subject matter of the paper. For example, we find it extremely unlikely that any attorney with experience in this type of research would have recommended that this paper be published and therefore find it unlikely that it was reviewed by one.

In addition, the causal hypothesis the authors put forward as a likely explanation for those findings—a hypothesis for which their analysis could not and did not test—should be considered with caution. Recall this statement from the conclusion of their article: “DIH [law] implementation may have deterred drug dealers from supplying illicit opioids to populations at risk for opioid dependence and abuse” (Lee et al., 2022a). Policymakers reading this statement must ask two key questions in response to this claim: (1) does the evidence support the hypothesis that enhanced criminalization deters individuals from drug distribution? And (2) does the evidence support the hypothesis that disruptions to drug markets and drug distribution networks reduce the overdose risks faced by persons who use drugs? As we have stated elsewhere in this article, the answers to these questions are not yet clear, though in both cases current research justifies doubt (Carroll et al., 2020; Dickinson, 2017). Thus, even if the findings produced by Lee et al. were reliable—which, as we have demonstrated here, they are not—those findings alone are not capable of informing health policy regarding DIH laws and overdose, as the mechanisms by which DIH laws might affect overdose rates complex and remain poorly understood.

Yet, we are not entirely in the dark about the possible impacts of DIH laws on individuals who use drugs. State-level Good Samaritan overdose laws were put into place to encourage seeking help when witnessing an overdose emergency. Most state-level Good Samaritan overdose laws are not as robust as they could be; many such laws deny meaningful and necessary protections to persons at the scene of the overdose other than the overdose victim and the person who called 911 (Legislative Analysis and Public Policy Association, 2021), and many overdose calls result in an arrest even when a Good Samaritan overdose law is in effect (Brad et al., 2022; Carroll et al., 2020). Nevertheless, even with these limitations, research conducted at the state ($n = 28$) and county ($n = 3109$) levels have found that they can be quite effective at encouraging 911 calls (Hamilton et al., 2021; Rees et al., 2019) by at least partially mitigating the primary concern that deters calling 911: fear of police involvement and arrest (Carroll et al., 2018). Qualitative research replicated in settings across the United States indicates that DIH laws undermine the public health impacts of Good Samaritan overdose laws by creating new risks for those who call for help during an overdose—risks of felony homicide charges, which the provisions of most Good Samaritan overdose law do not address (Carroll et al., 2021; Rouhani et al., 2019; Tesfaye Rogoza et al., 2020). Therefore, policymakers—especially in states with stricter DIH laws or in which DIH prosecutions have become more common—should consider expansions to their state's Good Samaritan overdose law to counteract these unintended consequences of DIH laws and the heightened overdose risks they may produce.

CONCLUSION

Our review and discussion of the analysis undertaken by Lee et al. (2022a) reveal this study to be fatally flawed. The treatment condition under investigation—the presence or absence of a DIH law in the 10 states and District of Columbia included in the sample according to author-identified "effective dates"—in no way resembles the legal reality in these states. Our independent legal analysis, a replication of the authors' efforts conducted by attorneys, reveals every single effective date relied on by the authors in the analysis to be incorrect. Where the "effective dates" do, in some cases, coincide with amendments to these laws, many of those amendments are minor or irrelevant. In some cases, we could find no reasonable example of legislation tied to the given "effective date" at all. This measurement error alone renders the entire study undertaken by Lee et al. meaningless.

Beyond this singular, fatal flaw, Lee et al. made use of an inferior data set (CDC WONDER) despite the availability of complete county-level data within their chosen states via a formal request to the CDC. The use of this inferior data set resulted in a massive selection bias, whereby 86% of the possible, county-level sample was excluded. As a result, Lee et al. conducted their analysis with a highly selected sample that is not even representative of the 10 states included in the study. Finally, the question Lee et al. ask is based on a specific, directional causal hypothesis: does the enactment of DIH laws negatively impact opioid overdose mortality? Yet, their analysis is not, even in theory, capable of evaluating whether DIH laws impacted opioid overdose in a causal manner because it assumes that the timing of DIH laws is randomly determined. Since the timing of DIH laws is highly unlikely to be random, and since Lee et al. offer no evidence to support the assumption that the laws are as good as random, their analysis is likely to estimate a spuriously negative association between DIH law enactment and deaths—as we have demonstrated herein—regardless of whether or not a causal relationship truly exists. We argue that these, too, constitute grounds for rejection before publication or postpublication retraction.

From 1999 to 2021, more than one million people died of a drug overdose in the United States (Hedegaard et al., 2021)—a death toll that staggers not only for its magnitude but for the sheer fact that it continues to climb despite the numerous, scientifically proven overdose-prevention strategies available to us. In the context of these staggering numbers, policy-relevant scholarship pertaining to substance use and overdose is of critical importance to American society. The implementation of well-evaluated, evidence-based policies to prevent overdose fatalities could save lives, while policies that are misinformed or erroneous in their approach could inflict real harm on real people in equal measure. For this reason, scholarship evaluating policy-level interventions to prevent overdose demands heightened scrutiny, especially when the real-world application of scholarly findings would increase contact with the criminal justice system. As we wait for reliable and informative empirical research on the true impacts of DIH laws to emerge, policymakers who hope to turn the tide of this epidemic can support one of the many strategies that are already supported by robust scientific evidence, yet remain widely under-implemented: naloxone access, medications for opioid use disorder, and peer-led harm reduction and syringe services programs (Carroll et al., 2018).

ETHICS STATEMENT

This work did not constitute research on human subjects and was therefore not subject to ethical review.

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ENDNOTE

[1] Following Arellano and Bover (1995) and Lee et al. (2022a) instrument for this lag, as well as for the socioeconomic conditions. This instrumentation has little (and no direct) bearing on the estimated coefficients of DIH laws. In fact, this choice of analysis technique is odd, because it is meant for time-series analysis focused on

temporal correlation, and this paper is not using classic time-series data nor is it focused on gauging temporal correlation (the correlation between today's opioid mortality rate and the lagged opioid mortality rate).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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Emerging themes and factors influencing the prices of biotherapeutics

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Abstract

The high prices of biotherapeutics remain an area of concern for various national and international agencies working toward developing strategies for monitoring, evaluating, and managing the prices of medicines to promote equitable access. This paper deploys a unique study design to identify emerging themes and determine the elements influencing the price of biotherapeutics specifically biosimilars. This review is based on a bibliometric and qualitative synthesis approach to generate a new line of thinking for future studies. The findings enable knowledge assimilation for policy decisions. The results indicate that while the factors like market share, market competition, and pricing policies are extensively explored by researchers, the factors such as innovation capability, product development costs, and local factors like regulatory ecosystem can be further examined as potential influencers of prices. Further, pricing frameworks and regulations designed for generic drugs cannot be replicated to estimate the prices of biotherapeutics. As a result, policymakers must take the necessary actions to construct innovative pricing frameworks for this class of products that are in conformity with national policies, regulations, market dynamics, and economics. Moreover, studies on incentives and profit margins associated with the last-mile delivery and accessibility of high-cost biotherapeutics are essential for their efficient adoption.

KEYWORDS

bibliometric, biosimilar, biotherapeutics, prices

Key points

- The high expense associated with the use of biotherapeutics, and the biosimilars that are used to treat cancer in particular, is a concern for many healthcare organizations.

- To strategize the relevant healthcare interventions, it is important to understand and synthesize the outcome of prior research on the price determinants of biotherapeutics, so as to facilitate future policy development.
- The national and international regulatory and health bodies can use the pricing factors and recommendations made via this research to create effective mechanisms for assessing and regulating the costs of expensive medicines like biosimilars.
- This article demonstrates how a combination of quantitative and qualitative methods can be used to review the corpus of research, resulting in the identification of important themes and variables affecting the cost of biotherapeutics.
- To comprehend the significant primary and secondary factors influencing the cost of biosimilars, the authors proposed a conceptual framework as a precursor for conducting evidence-based investigations.

INTRODUCTION

The argument related to the high prices of biotherapeutics including similar biotherapeutics or biosimilars is not new. Many researchers have highlighted the increasing trend in prices of biotherapeutic products and the various ways through which pharmaceutical companies profiteer from even outdated therapies (Blackstone & Joseph, 2013; Rathore & Shereef, 2019a; San-Juan-Rodriguez et al., 2019). Similar biotherapeutics in general dominate the market for oncology drugs, however, due to their high manufacturing and development costs, many end users are unable to afford these expensive prescription biologic drugs (Bachu et al., 2022). Biotherapeutics are a diverse class of complex molecules produced by living organisms and their active ingredients mainly include cytokine, hormones, monoclonal antibodies, and insulin, which are mostly used for the treatment of various types of cancers (Similar Biotherapeutic Products, IFPMA). Due to different regulations, clinical norms, and distribution constraints, the price of these medications varies greatly between nations (Niazi, 2022). The various surveys also indicate that the public perceives drug prices to be unfair (Patricia & Andrew Mulcahy, 2015; Trujillo et al., 2020). Organizations including the World Health Organisation (WHO), Canadian Agency for Drugs and Technologies in Health (CADTH), and Organisation for Economic Co-operation and Development (OECD) have established standards and guidelines for this class of medications in response to the disputes sparked by the price variations (Knezevic & Griffiths, 2017; OCDE, 2019; Rannanheimo et al., 2018) However, biopharmaceutical companies frequently blame expensive research and development (R&D) and innovation costs linked to the molecule's discovery and development for the high price (Prasad et al., 2017). The burden of these expensive medicines eventually restricts their accessibility to patients.

Biosimilars—An opportunity for cost reduction

As per a 2017 report by RAND Corporation, it is anticipated that biosimilars or similar biotherapeutics have the potential of saving healthcare costs, which may lead to the reduction of $54 billion in direct spending on drugs from 2017 to 2026 (Mulcahy et al., 2018).

As can be seen, biosimilars can be a game changer in reducing healthcare costs but the pricing mechanism for biosimilars is complex and involves various stakeholders including physicians, manufacturers, distributors, payers, and policymakers (World Health Organization, 2018). Biosimilars, a class within the larger group of biotherapeutics, are not the same as generic drugs. Generic drugs or generic medicines are manufactured synthetically or naturally, and can be identically described or recreated using standard chemistry and pharmaceutical manufacturing techniques. Biosimilar or similar biotherapeutics (or follow-on biologics or similar biologics) are different terms used for biosimilars by regulatory agencies of different countries and cannot be duplicated to the same extent as generic drugs because they are produced using living cells. These proteins are more susceptible to structural variability and post-translational modification changes (Harvey, 2017; IFPMA, 2013). Globally, it has been demonstrated that generic drugs decrease healthcare costs, but there is currently insufficient data to determine how biosimilars will affect the rising cost of biologics. Additionally, it is difficult to extrapolate from one country's experience to other country's due to differences in how biotherapeutics are regulated, approved, bought, priced, and distributed (Mehr & Brook, 2017; Rugo et al., 2019). Hence, to employ this cost-saving potential of biosimilars, it is important to understand the various factors influencing the prices of these similar biotherapeutics. This review identifies many elements that affect the cost of biotherapeutics specifically biosimilars. The study began with a larger range of search terms, such as biotherapeutics, biologics, generics, and biosimilars. However, after bibliometric investigations revealed that biosimilars were an active topic of discussion, a specific study on biosimilars was conducted. As highlighted earlier, a biosimilar is a class of products under the larger group of biotherapeutics. The keyword “generics” is also a crucial component of this review because biosimilars are frequently compared to generics, making it challenging to distinguish both. Moreover, a few policies and regulations about generics apply to biosimilars as well. The addition of generics in the first keyword search strategy has helped in identifying many research articles which are relevant for biotherapeutics and particularly biosimilars.

An overview of price control measures

To support equitable access, numerous international organizations (e.g. WHO, UNICEF, and Medicines Sans Frontiers, or MSF), have consistently emphasized the importance of creating mechanisms for reviewing, measuring, and controlling the pricing of vital medications including high-cost biosimilars (Afzali et al., 2019; Kanavos & Vandoros, 2011; World Health Organization, 2007). Their combined efforts, particularly in developing nations including low- middle-income countries (LMICs), have led to the creation of guidance and policy documents to aid policymakers and other stakeholders (Abdel et al., 2017; OMS, 2020). Studies show that different countries control their pharmaceutical economies in different ways, but affordability is improved in countries where prices are regulated (Abdel et al., 2017; Babar, 2022). Many countries regulate medicine prices either directly by setting prices through price control policies at the government level or indirectly through pharmacoeconomics Malaysia, for example, prefers little interference, balancing economic interactions between patients, suppliers, and the healthcare industry (Anggriani et al., 2013). In developed countries such as New Zealand and the United Kingdom, governments subsidize medicines in both public and private sector hospitals and pharmacies, leading to low out-of-pocket expenditures for patients. Further, medicine prices are negotiated by drug procurement agencies that are separate from regulatory authorities. In Canada, setting policies and regulating drug costs is a responsibility shared by the federal government, jurisdictional governments, and their agencies. For its member jurisdictions, the pan-Canadian Pharmaceutical Alliance (pCPA) bargains lower prices for patented, generic, and biosimilar medications. The pCPA requires biosimilars to be priced transparently, often with a reduction of 25%–50% (GaBI, 2022). While in countries like India and Pakistan, the prices of medicines are controlled at the selling point through the maximum retail price that is, market-based pricing mechanism. The government-sponsored health insurance scheme is available only for the most vulnerable section of the population and a large portion of the population relies on private insurance or out-of-pocket expenses (Renganathan et al., 2016). Few countries (e.g. the United States and Malaysia) do not directly control medicine prices (Babar, 2022). In the United States, Medicare policy for cost-saving similar biotherapeutics is evolving and is based on average sales prices, discounts, and rebates that are approved by the government. Because the markup on a cheaper price is smaller in monetary terms, providers would typically be punished for selecting a less expensive medicine. After the intervention by the biologics price competition and innovation act (BPCIA); which defines a pathway for the approval of interchangeable biologics and biosimilars while retaining the incentives for the development of the product; medicare's current payment policy for biosimilars provides an average sales price for all biosimilars with the common reference biologic; in addition, a fixed percentage of the originator is mandated (Mehr & Brook, 2017; Mulcahy et al., 2018). The impact of the BPCIA is not yet established and it is not clear that the private insurers are incentivizing biosimilars. Currently, the major pricing mechanisms used by different nations are health technology assessment; using legislation to establish default rules that strengthen the insurer's negotiating position; capping prices close to those in other European nations (external reference pricing); setting a maximum retail price for comparable drugs (reference group pricing); restricting price increases; purchasing drugs through competitive bids; contracting to obtain discounts as sales volume rise; and mandating manufacturers to provide refund payments when spending goes over a predetermined limit. It should be noted that despite different countries adopting different price strategies, there are still a lot of controversies regarding the appropriate pricing structure for expensive therapeutics.

This study systematically analyzes and synthesizes the existing literature on biotherapeutic prices to (1) identify the basic, active, and emerging themes related to biotherapeutic prices, (2) distinguish the factors influencing the prices of biotherapeutic products especially biosimilars, and (3) advance the knowledge toward the development of a new line of thinking for future studies. To the best of our knowledge, no published research addresses this gap. The closest study (Borges Dos Santos et al., 2019) involves the categorization of the price factors into supply, demand, product, regulatory, and trading strategies. Yet another study in a similar domain describes the framework of four drivers of biotherapeutic prices; safety and efficacy, payment models, acceptability by physicians, and competition by biosimilars; which together establish the extent of cost savings (Mulcahy et al., 2014). No available papers performed a systematic review of the published literature over the five decades for the identification of the factors influencing the prices of biotherapeutics, especially biosimilars. While the series of quantitative bibliometric analysis helped in identifying the major themes around generic medicine and biotherapeutic prices, the qualitative manual review of the literature helped in the identification of pricing factors and understanding of the relationship of these factors on the prices of this class of products.

METHODS

Both quantitative, as well as qualitative methods, were adopted. While bibliometric methodology quantitatively assesses the performance of academic literature, the qualitative synthesis was performed manually for a subjective review of publications. The various approaches available for domain-based review comprising structured, framework, bibliometric, hybrid, and theory-based methodologies were considered before finalizing the combination of bibliometric analysis and qualitative synthesis for this study (Paul & Criado, 2020). Various bibliographic tools were utilized to quantify the available information for generating the themes around prior research, understanding the progression of the themes and identifying the gaps; the results of the bibliometric analysis were used to develop the qualitative synthesis leading to the identification of factors influencing the prices of biotherapeutics (Linnenluecke et al., 2020). Further, the identified themes and price factors facilitated the generation of recommendations for future research. To remove bias associated with the manual review, the outcomes and recommendations were vetted by the subject expert.

As illustrated in Figure 1, the methodology involves defining the search strategy, inclusion and exclusion criteria, data extraction, analysis, investigation, and result interpretation. The methodology section can be described in four different phases (i) database and searching keywords selection, (ii) study design, (iii) data extraction and analysis, and (iv) network visualization mapping.

Database and searching keywords selection

Web of Science and Scopus databases are used to collect the published literature with keywords “Biologic” OR “Biosimilar” OR “Biotherapeutic” OR “Medicine” OR “Generic” AND “Price” OR “Affordable.” The selection strategy is developed carefully and is kept broad; by using the combination of relevant scientific keywords used for biosimilars in different geographies and keywords related to price and affordability; primarily to capture all the published literature in the said group, second to study the impact or relation of biosimilars within this larger interrelated group of terminologies, and third it helped assess the evolution of various themes in the available literature. In addition, the medicine and generic words are included as search keywords as many research papers are common for generic drugs and biotherapeutics including biosimilars.

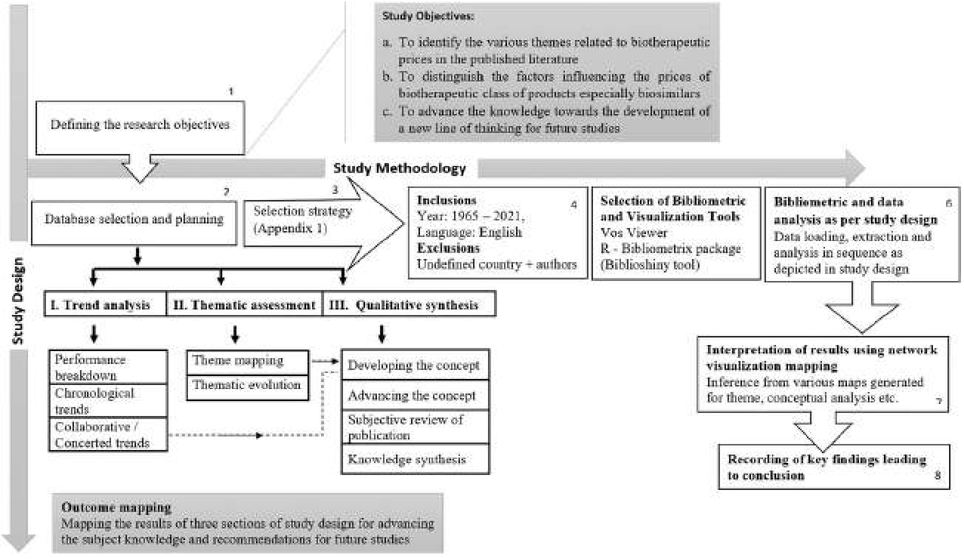

FIGURE 1 Methodology and study design followed in this research paper.

In addition, gray literature available on the websites of various organizations such as WHO, OECD, MSF, and UNICEF was retrieved. Wherever possible, research articles, book chapters, conference papers, review papers, commentaries, perspectives, and editorials are included. To efficiently organize a large number of documents, they are primarily reviewed for the title of the documents. Further, the inclusion and exclusion criteria as described in Appendix 1 are applied. The time regime for the trend analysis is selected as January 01, 1965 to August 17, 2021; over five decades because it helped in collecting the maximum available information in the Web of Science and Scopus databases that are used for this study (the maximum period possible in the selected database).

Study design

The proposed study design is a unique approach developed by the authors for analyzing the trends of the prior literature and identifying gaps for future studies. Further, the same can be adopted by research scholars in the early phase of their research, irrespective of the subject domain. The study design comprises three major sections with a series of sub-sections. The result of one section feeds into the other section leading to the qualitative synthesis of the concept. The study design and interlinkages between its sections are depicted in Figure 1.

Section 1

Trend analysis provides the performance quality of the available literature. Performance breakdown of the various research components is analyzed using various bibliometric tools. This section uses bibliometrix package of R Studio to provide a pragmatic way of mapping the year-wise trends of authors, sources, affiliations, countries, and keywords. A graphical bibliometric review is generated for concerted and historical trends. The collaborative tool generates the cooccurrence of keywords, coauthorship, and cocitation. The co-occurrence methodology calculates the incidence frequency and helps in exploring the present and future relationships between the topics while the cocitation trends are used to understand the research area and to provide similarity measures that help in the development of the basic themes. The results, while providing quantitative information, facilitate the qualitative synthesis.

Section 2

The thematic assessment helps in the identification of the themes and their evolution in the larger group of publications on the prices of generic medicine and biotherapeutics. The thematic assessment is the process of developing the themes around the given concept for enhanced interpretation of research in the experimental domain. Toward this end, the section creates thematic maps based on coword analysis and clustering methodology. The section utilizes the cooccurrence tool to generate basic, active, and emerging themes around the available literature. Further, the chronological tool is used to show the evolution of the themes across the three slices of time zone.

Section 3

The qualitative synthesis is a subjective analysis supplemented by results of bibliometric studies to reduce the author-associated biasedness. To observe the dual approach of this research paper, which involves bibliometric as well as qualitative analysis, the selected data set succumbs to manual subjective analysis. A recent study by Post et al. (2020) indicates that generating theoretical contributions to any field requires a combination of integrative and generative approaches. While the integrative approach synthesizes the prior published research; the generative approach helps in creating novel ideas to provide a strategic platform for future researchers. To this end, a pragmatic, four-step block generation approach is adopted to generate subjective knowledge and recommendations for future research. (a) *Concept development* that involves co-occurrence methodology and subjective knowledge of the authors to generate clusters along with their percent contribution to the topic, (b) *Advancing the concept* expands the understanding of the selected cluster by an extended study with refined data set and inclusion period, (c) *Subjective review* on the refined data set involves focussed analysis of existing literature by identifying, collating, and recognizing the patterns and relationships, intending to generate the information around the concept, (d) *Knowledge synthesis* entails the formation of logical arguments by critically analyzing the key finding of the previous sections to summarize the various dimensions of the research. Through this analysis, the authors try to map important areas of agreement, disagreement, and new knowledge requirements (Torraco, 2016).

Data extraction and analysis

Data extraction was conducted via searching keywords and the combination strategy described in Appendix 1. The inclusion and exclusion criteria were defined to capture the maximum relevant publications from the Web of Science and Scopus database. The data extraction led to the shortlisting of 431 articles, 53 reviews, 81 letters, 20 books/chapters, 11 conference papers, and 163 miscellaneous documents. After removing the duplicates, the final data set for the bibliometric study comprised 598 documents. 84 documents selected from the gray literature are reviewed manually.

Network visualization mapping

This study is conducted through the open-source bibliometrix package of R Studio (Aria & Cuccurullo, 2017) and VoSviewer (Visualization of Similarities) software. The tutorial on network visualization mapping for R is available at https://kateto.net/network-visualization.

RESULTS AND DISCUSSION

A total of 1139 documents, wherein 774 documents were retrieved from Scopus, 253 from Web of Science, and 112 from gray literature (collection from websites of various organizations, Google Scholar, and the standard Google search engine) are considered in this investigation. After applying inclusion and exclusion criteria, the final data set included 598 bibliometric and 84 gray literature documents. The results from the bibliometric analysis and qualitative synthesis are described in three sections, aligning with the three sections of the study design.

Inferences from trend analysis on the performance of literature

Performance breakdown generates an overview of the performance of the selected topic. The results in Figure 2 indicate that Sabine Vogler of the World Health Organization

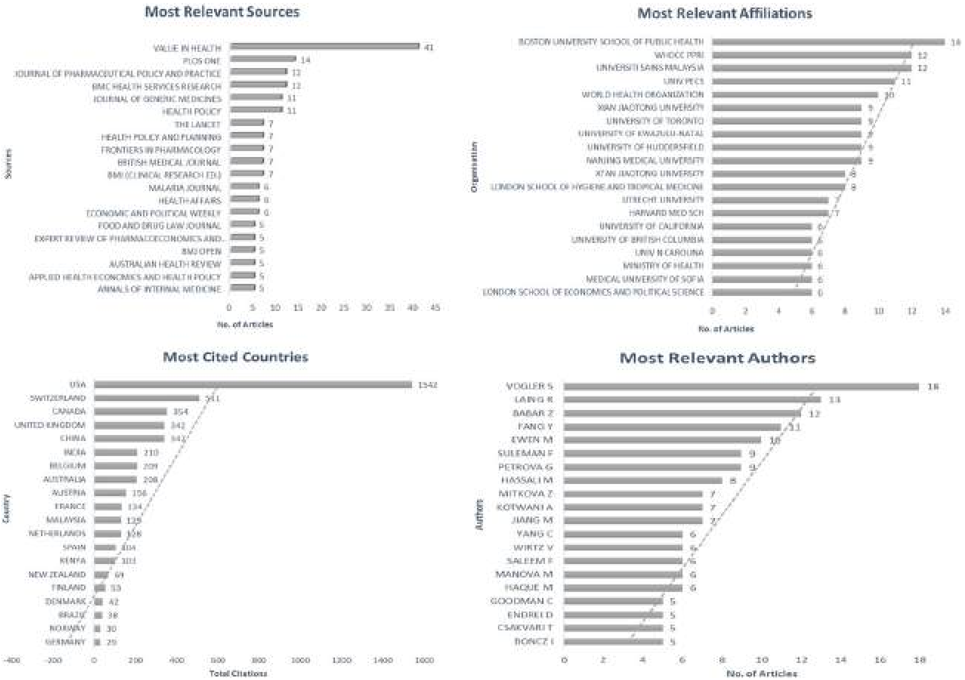

FIGURE 2 Performance breakdown: leading sources, affiliations, countries, and authors.

Collaborating Centre for Pharmaceutical Pricing and Reimbursement Policies (WHOCC PPRI) has made a significant contribution to the domain of pharmaceutical pricing mechanisms and policies. The same is also evident from the most relevant affiliations section, wherein the WHO and its collaborating center have published a significant number of articles. Similarly, Laing R from Essential Medicines and Pharmaceutical Policies, World Health Organization, Geneva, Switzerland has worked extensively in the essential medicine domain. Country analysis indicates that a maximum number of cited papers are from USA and Switzerland. In terms of the most relevant sources, maximum articles are published in "Value in Health," "PLOS ONE," and "Journal of Pharmaceutical Policy and Practice."

Chronological trends on the year-wise performance of the leading 20 authors reflect that most of the articles are published between 2011 and 2020. Additionally, the maximum number of papers are published in the year 2019. While the maximum articles are published by Vogler S but Ewen M and Laing R remained the most consistent authors of this domain. Likewise, analysis of leading sources reflects the exponential increase in the number of publications from 2007 onwards. Journals like PLOS ONE, Lancet, BMC Health Services Research, Frontiers in Pharmacology, and BMJ are publishing consistently in this domain, but "Value in Health" emerged as the leader in the domain after 2005 (Supporting Information: Figure 1S and 2S).

Collaborative/concerted trend

Figure 3a presents a keyword co-occurrence map and depicts the relation between the keywords based on their co-occurrence within the data set. It further highlights the nine clusters generated from 759 eligible items with a threshold limit of three. In-depth analysis indicates drug economics/cost control ($N = 649$), human ($N = 508$), article/journal ($N = 339$),

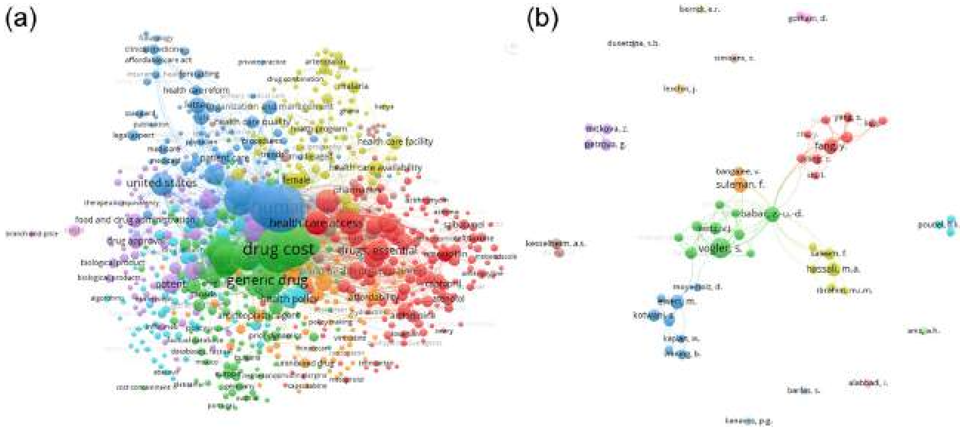

FIGURE 3 (a) Co-occurrence map of keywords (with a threshold level of 3). (b) Coauthorship map representing relationships between the authors.

generic drug industry ($N = 333$), health services accessibility/healthcare delivery ($N = 201$), healthcare policy ($N = 132$), and essential drug ($N = 114$) have high occurrence scores.

The coauthorship analysis reflects the strength of relationships among the authors that is, it helps in studying the developments of the research themes due to social interactions and their affiliations. Figure 3b reflects the interlinkages among the authors. It highlights four prominent group of authors working in a similar domain and the interlinking lines represents the strength of the relationship. Sabine Vogler from WHOCC PPRI, Yu Fang from Xi'an Jiaotong University, and Zaheer-Ud-Din Babar from the University of Huddersfield share high social interaction scores with link strengths of 27, 24, and 20, respectively (Supporting Information: Table 1S).

The cocitation network (Supporting Information: Figure 3S) reflects three prominent groups with similar intellectual structures and high association index. Further deep diving indicates the first group of (Cameron et al., 2009) with significant work on the "WHO-HAI methodology." The study with a sample of 36 developing and middle-income countries has been cited 486 times. The second group "Prices of generic medicine and branded prescription drugs" highlights the effects of generic competition. A study by Lexchin (2004) has been cited 67 times while a study describing price response to generic entry in the market for originator by Frank and Salkever (1997) has been cited 64 times. The third group indicates the "Pricing and Reimbursement policies" like external reference pricing, differential pricing, and comparison of international prices. The study by Simoens (2007) on generic price-regulation systems in nine European countries has been cited 47 times. Further, the study by Danzon and Furukawa (2008) highlighting the pharmaceutical spending, usage, availability, and prices in 12 countries including the United States has received the citation in about 100 papers.

Inferences from the thematic assessment section for identification of the themes

The thematic assessment section divides the selected topic into four regions of basic, motor, emerging, and niche themes. Figure 4 indicates the 18 clusters based on "Development Degree" on y-axis and "Relevance Degree" on x-axis. They are further arranged into four regions based on centrality (Relevance) and density (Development) scores provided in

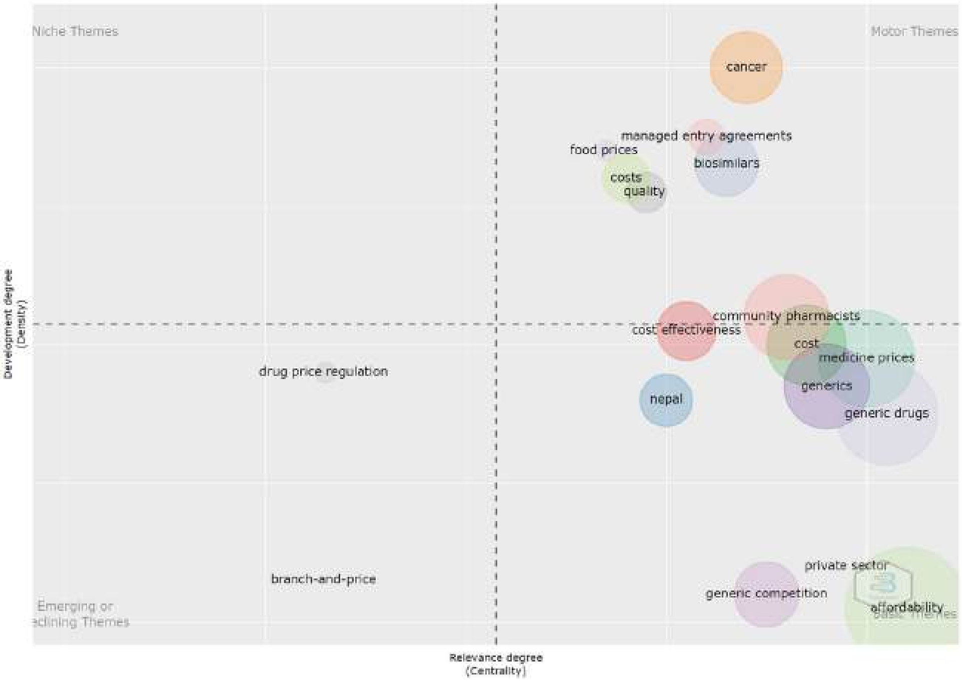

FIGURE 4 Thematic clusters developed through 500 author's keywords with a minimum of five documents per thousand frequency.

Table 1. The map reflects that theme like generic drugs, affordability, medicine prices, generic competition, and community pharmacy are basic themes with high relevance. On the other hand, themes like biosimilars, managed entry agreements, cancer medicine, quality, and cost-effectiveness are active themes with high development potential. These are the themes that have gained high traction from researchers. Further, the emerging themes which invite future research are drug price regulations and price determinants. These themes are relatively less explored and further investigations are warranted.

To explore the evolution of themes, the full study period is sliced into three zones based on the chronological trends discussed in the earlier section and the subjective knowledge of the authors. To recall, the study on chronological trends revealed that most of the research papers are published in the time interval 2011 to 2020. Accordingly, time breaks are introduced in 2010, 2015, and 2020. Thematic progression map (Supporting Information: Figure 4S) indicates that the research themes like essential medicines, generic drugs, prices, affordability, and price competition are being researched from the period before 1965. The prices cluster has not witnessed significant changes between 2011 and 2015 and areas like generic medicines, affordability, and prices remained the top researched themes. However, the research related to cardiovascular medicine and hospital-based studies gained significant attention in this era. It is worthwhile to note that the period between 2016 and 2020 has witnessed the initiation of discussions on oncology including the quality of cancer medicines. Events like BPCI Act and Interchangeability have triggered the attention of researchers and policymakers toward high-cost biosimilars, specifically for cancer medicines. But as concluded for the previous era, the research is dominated by generic themes of affordability and medicine prices. The 2021-time slice is introduced to analyze the latest developments in the domain. As expected, it reflects that the research interests are getting shifted toward themes like biosimilars and medicine prices.

TABLE 1 Centrality and density measurements of thematic clusters.

Theme category	Cluster	Centrality	Density
Basic	Affordability	17.34	169.37
	Generic competition	3.47	169.74
	Private sector	6.83	193.20
	Generic drugs	10.35	200.09
	Medicine prices	9.48	235.68
	Community pharmacists	5.26	262.50
	Cost effectiveness	1.59	250.00
Emerging	Drug price regulation	0	216.67
	Branch-and-price	0	183.33
Motor	Quality	1.44	313.33
	Costs	1.18	313.64
	Biosimilars	2.04	374.72
	Food prices	0.75	375.00
	Managed entry agreements	1.62	393.75
	Cancer	2.77	442.16

Inferences from the third section on the qualitative synthesis

The qualitative synthesis section comprises four sequential steps: (i) concept development, (ii) advancing the concept, (iii) subjective review, and (iv) knowledge synthesis. Although the inferences from one step feed into the other for developing key recommendations; the inferences from individual steps are equally meaningful and worthwhile for consideration. The authors intend to map significant areas of agreement, disagreement, and knowledge gaps through this systematic approach.

Concept development is based on the co-occurrence methodology and subjective knowledge of the authors. The degree of relevance of the articles to the cluster and the overall contribution to the topic is generated as per the understanding of the subject. While developing the concepts around each cluster, weightage is also given to the themes formulated through co-occurrence and co-citation analysis observed in Figure 3A and Supporting Information: 3S.

To achieve the first objective of this study, that is, to identify the various themes in the published literature, the results obtained in earlier sections were further analyzed. The manual review assisted with themes identified through co-occurrence analysis divides the complete data set into five major clusters. As anticipated, most of the research is concentrated around the foundation themes like generic medicines and essential drugs. The WHO-HAI project and pricing mechanisms/policies raised significant interest among the researchers. Both clusters I and II on "Generic Essential Medicine" and "Pricing Mechanisms/Policies" collectively account for more than half of the research that is, 54%. The accessibility of medicines and healthcare economics including out-of-pocket expenditure form cluster III with a 19% contribution. Closely following with a 16% contribution is the research on high-burden diseases like Malaria, HIV, and cardiovascular disorders as cluster

IV. The least percentage of around 11% is toward cluster V on biosimilar prices highlighting the research areas like the affordability of cancer medicines and comparative studies with the originator. Subsequently, major themes are identified within each cluster which are described in Supporting Information: Table 2S).

The results from Figure 4 and Table 1, based on the centrality and density measurements highlighted that cancer, biosimilar, associated cost, quality, and accessibility through managed entry agreements are the motor or active areas of research. In addition, the results of theme evolution studies, as presented in Supporting Information: Figure 4S, highlight that the research between 2016 and 2020 has witnessed the initiation of discussions on oncology including the quality of cancer medicines. Further, the 2021-time slice reflected the shift of research toward themes like biosimilars and medicine prices. Based on all these inferences, more research is expected on biosimilar prices in near future and hence this cluster is selected for further examination. The findings also suggest that healthcare economics with healthcare spending as a theme has high development potential in future.

Advancing the concept section attempts to expand the understanding of the "biosimilar prices" cluster. As the results of the previous section suggested the need for an extended study in this domain, the data set was refined by omitting the words "medicine" OR "generic" and restricted to the period 2010–2021 (The period with maximum publications). Figure 5 reflects research trends for biosimilar prices by mapping the various topics with the year of publication. As per the trends, 2012 marked significant development of biosimilars. India made a significant contribution by approving a few biosimilars even before they were approved in Europe. Moving forward, the US Medicaid system and the adoption of biosimilars generated significant publications in 2014. The trends further indicate that the amendments in the BPCI Act ignited the debate on the high prices and accessibility of biosimilars. Not to mention, the debate started with Insulin prices because of high demand and the high burden of diabetes but the patent expiry of originator molecules and accessibility remained at the center stage. 2017 and 2018 emerged as the years with significant expansion of the research into themes like interchangeability, cost-effectiveness, and health economics. 2019 witnessed the shift toward the oncology and inflammatory

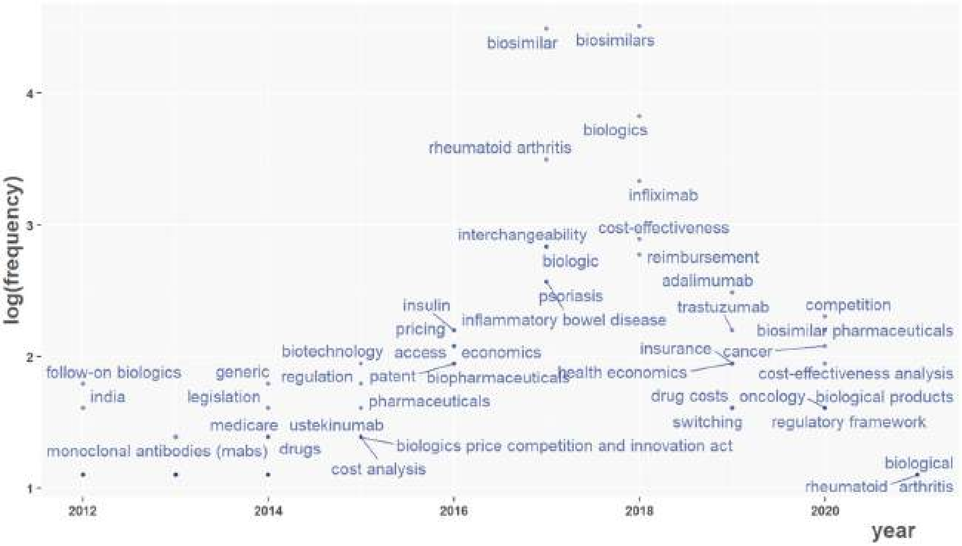

FIGURE 5 Chronological trend of topics in biosimilar price cluster with a threshold frequency of three.

segments like cancer, trastuzumab, adalimumab, infliximab, and rheumatoid arthritis which are high-cost biologics. Further, the trend highlights that the topics like regulatory frameworks, cost-effective analysis, insurance, competition, and health economics are emerging within the biosimilar price cluster and have a high potential for future development.

The earlier sections, specifically Figure 4, also highlighted price regulation and related pricing mechanisms as emerging areas which need efforts for further development. The cost-effective studies in the form of health technology assessment and health insurance as universal health coverage (UHC) are ranked high among the most contested topics in health policy. The effective and efficient pricing structure supported by the right regulatory framework is particularly critical for LMICs, where medicine prices form a significant portion of health spending and can impact the implementation of UHC (Chalkidou et al., 2020). Hence, regulators should make the price regulations and mechanisms easier and more efficient for ensuring the affordability and accessibility of high-cost medicines particularly cancer biotherapeutics.

Subjective review of publications is based on the subject knowledge of the authors assisted by bibliometrics. To achieve the second objective of this study; to distinguish the factors influencing the prices of biotherapeutics; major factors, their categorization, and implications to the biotherapeutic pricing ecosystem are discussed. The review helped in classifying the price factors into nine categories as mentioned in Table 2.

Factors like market share, market competition, and pricing policies are extensively explored by researchers and can be considered major influencers of prices. Market-based costing strategies as explained in the introduction are currently in practice in many nations including India and Pakistan. In this scenario, the price changes according to the market share of biosimilars; an increase in competition by the addition of new biosimilar in the market usually causes a decrease in prices. A decline in pricing is directly correlated with the market share of generic products (Dylst & Simoens, 2011; Meiners et al., 2011). The fact that originator suppliers strategically set prices to lessen the prospect of compulsory licencing and generic competition is also well recognized. Therefore, it is essential to stop such malpractices to increase the affordability of medications with few manufacturers.

The potential influencers of biotherapeutic pricing include determinants like innovation capability (R&D), product development cost and local regulatory framework. Domestic manufacturing capability is considered one of the major factors of affordability (Rathore & Shereef, 2019b). As mentioned in the introduction, the manufacturing of biosimilars is significantly different from generic drugs and is a complex process (Ratih et al., 2021). Information on costs associated with product development can aid in cost-effectiveness analysis and strengthen government price negotiations through appropriate regulations (Hill et al., 2018). Hence, variables such as technological innovation, R&D costs, production yield, regulatory ecosystem, and patent protection could be further explored as potential factors impacting the prices of biotherapeutics. The authors recommend evidence-based studies to understand the important primary and secondary factors affecting the prices of biosimilars.

The acceptance of biosimilars is significantly influenced by incentive policies and profit margins (Rémuzat et al., 2017). Prescription targets, primary substitution, reference price systems, clinical guidelines, fixed payments, and public tendering are some potential incentives and barriers to their effective adoption (Swartenbroekx et al., 2014). Depending on the adoption rate of biosimilars, the discounts vary greatly from product to product and nation to nation (Mullard, 2017). Even though different countries have different incentives for biosimilars; prescription quotas or budgets are frequent. Financial incentives or penalties were also noted in a few countries (Belgium and Germany) but the enforcement of such measures calls for creative monitoring techniques (Rémuzat et al., 2017). Therefore,

TABLE 2 Key factors influencing the prices of biotherapeutics.

S. no.	Factor(s)	Key findings/Impact on price	Reference
I. Market dynamics			
1.	Market share	The price varies as per the market share of generic medicines. Competition from generic medicines leads to price reductions. Generic market share is directly proportional to a decrease in prices.	Dylst and Simoens (2011)
2.	Market competition and demand	The chances of generic suppliers responding to factors influencing demand size and market competition are high. Originator suppliers set prices strategically to reduce compulsory licensing and generic competition threats.	Meiners et al. (2011)
3.	Entry of new biosimilar	The introduction of the new biosimilar Pegfilgrastim over GCSF resulted in substantial cost savings for French healthcare.	Yang et al. (2021)
II. Product-specific factors			
4.	Efficacy and safety	A biosimilar's price is only one aspect of its full value. In addition to taking into account development and manufacturing expenses, the outcomes of efficacy and safety in comparison to the reference biologic medicine are also taken into account.	Henry and Taylor (2014)
5.	Package inserts	Price are a reflection of the quantity of information provided in inserts. Information provided with generic drugs is lesser than for brand drugs. The difference in the quantity of information is based on differences in manufacturer policy on the information.	Shiragami, 2015
III. Economic drivers			
6.	Per capita income	Per capita GDP is positively correlated with the unit price of insulin. The price of insulin drugs originating from OECD countries is higher than that imported from developing countries.	Helble and Aizawa (2017)
7.	Domestic manufacturing capabilities, and paying capacity of the economy	Developing domestic manufacturing capacity is important, but due to complexities, it is not a recommended option for emerging economies. It is recommended to expand the market and facilitate the import of biologics.	Rathore and Shereef (2019b)
IV. Price discounts and incentives			
8.	List prices, net prices, discounts	The price drop is observed for originators after the entry of biosimilars or other substitutes in the market. The entry of biosimilars stopped the increase in list prices but net prices commence to decrease due to discounts offered by companies.	San-Juan-Rodriguez et al. (2019)
9.	Reimbursement criteria	No specific difference was observed between the reimbursement criteria for biosimilars and other generic products in the selected CEE countries. The price of biosimilars is usually reduced in comparison to original drugs and huge price discounts are offered.	Kawalec et al. (2017)

TABLE 2 (Continued)

S. no.	Factor(s)	Key findings/Impact on price	Reference
V. Process innovation and M&A			
10.	Innovation and M&A	Price does not correlate with market power based on industry concentration (HHI Index). M&A induced market concentration may weaken competition. The potential danger of market concentration is at the stage of regulatory approval.	Richman et al. (2017)
11.	API, formulation (Raw material availability)	Competitive large-scale generic manufacturers can supply 5–10 times more MDR-TB treatment within current procurement budgets without major impact on profit margins.	Gotham et al. (2017)
VI. Psychological factors			
12.	Consumer behavior	Generic price terms like cheap and not expensive. The cheap word is associated with lower prices than the not-expensive word. It is not related to higher preferences for cheap drugs as it may evoke negative quality perceptions.	Weijters et al. (2018)
13.	Trust and confidence of the physician	To increase the market acceptance of biosimilars, clinicians' and users' trust and confidence are essential. This may increase the demand and impact the price.	Camacho (2017)
VII. Selection strategy			
14.	Originator versus generics	Switching originator drugs to generics results in savings of 65% for patients.	Zeng (2013)
15.	Selection strategy	The price of the originator varies with the selection strategy between branded and generic drugs in out-of-hospital pharmacies, but not in in-house pharmacies of medical facilities.	Takizawa et al. (2015)
VIII. Pricing policy			
16.	Differential pricing policies	Differential pricing policies are feasible mostly for “global” diseases, where drugs through worldwide sales recoup their R&D costs. The differential prices vary with the pharmaceutical industry and do not encourage sustainability or autonomy in developing countries.	Babar and Atif (2014)
17.	New public medicine procurement policy	The introduction of the NPMPP led to an increase in the prices of emergency medicines and gynecological medicines but a decrease in the prices of pediatric medicines.	Hu et al. (2019)
18.	Pricing policies	Despite many efforts toward the implementation of policies like internal reference, tendering and generic substitution to increase biosimilar adoption, a large difference remains in the price and uptake of medicines between countries.	Ferrario et al. (2020)

(Continues)

TABLE 2 (Continued)

S. no.	Factor(s)	Key findings/Impact on price	Reference
IX.	Regulations		
19.	Price cap regulations	A continuous decline in the ceiling prices is associated with a high incidence of exit of generic firms from markets.	Zhang et al. (2016)

Abbreviations: API, active pharmaceutical ingredient; ARV, antiretrovirals; CEE, central and eastern European countries; GCSF, granulocyte colony stimulating factor; GDP, gross domestic product; HHI, Herfindahl-Hirschman index; M&A, mergers and acquisitions; MDR-TB, Multidrug resistant tuberculosis; NPMPP, new public medicine procurement policy; OECD, organisation for economic co-operation and development; WHO, World Health Organisation.

interlinkages between the factors leading to complexities of the pricing mechanism are an interesting research area for further consideration.

It is also important to point out the studies on consumer behavior, pharmacy type, and package inserts which are often overlooked (Innovation & Shiragami, 2015; Weijters et al., 2018). These can be considered micro-influencers that impact biotherapeutic prices. One example could be market concentration brought on by M&A, creating a monopoly. At the time of regulatory approval, market concentration could be dangerous, demanding detailed analysis (Richman et al., 2017).

Knowledge synthesis section combines the findings from various dimensions of this research. The results from the bibliometric as well as qualitative synthesis sections are summarized, and interlinkages are developed to generate a new line of thinking for future studies. Table 3 provides a summary of the findings of the many investigations conducted for this article and helps in accomplishing the third objective of this article i.e. to advance the knowledge toward the development of a new line of thinking for future studies.

The results reflect that the concept of generic competition with originator medicine and related price impact is not a recent one; indeed, it appeared in publications even before the 1960s. Only after 2010 did the topic gain traction, resulting in considerable research papers. Fundamental themes like "drug costs," "generic competition," and "critical medicines" have remained constant throughout the evolutionary process, but a few themes, such as “biosimilar prices and quality,” have emerged over time. It has been found that most price debates are limited to essential medicines, with sectors such as neglected diseases and orphan treatments being overlooked. Although research on biosimilar costs is growing rapidly, it still accounts for a very small portion of research publications—11%—in the entire field of generic medications and critical pharmaceuticals. Numerous researchers have focused on the cost and accessibility of cancer biosimilars, and this focus has accelerated since 2016. It should be highlighted that although specific pricing approaches are adopted by various nations, there is still significant disagreement in finding the best pricing mechanism for expensive therapeutics. Additionally, the majority of pricing strategies for essential medications include biosimilars in the same category as generic medications without considering many scientific elements associated with biosimilars. It is important to develop regulations/policies for biosimilars to justify the associated high innovation component as compared to generic drugs (Blackstone & Joseph, 2013; Food and Drug Administration FDA, 2018). Further, scant literature on the pricing mechanisms of biotherapeutics makes the study challenging (Rao, 2011).

The bibliometric analysis reveals that a significant number of articles are published through sponsored research. “National Institute of Health” and “The U.S. Department of Health and Human Services” funded considerable research in this domain. Another key point deciphered from this review is that most of the studies are descriptive and only a

TABLE 3 Summary of findings of various studies conducted in this article.

Study vertical	Study parameter	Key findings
Trend analysis		
Performance breakdown	Time	Most of the articles relating to price determinants are published between 2011 to 2020
	Country	Articles from the United States, Switzerland, and Canada are cited a maximum number of times
	Journals	Value in Health, PLOS ONE, and Journal of Pharmaceutical Policy and Practice are publishing significant research papers in this domain
	Authors	Sabine Vogler, Laing R and Babar Z.U.D have contributed significantly to the development of the area
Collaborative trends	Co-occurrence trends	Drug cost control, generic drug industry, essential drug, health services accessibility, and healthcare policy have high co-occurrence scores
	Coauthorship trends	Sabine Vogler, Yu Fang, and Babar Z.U.D share high social interaction scores with link strength of 27, 24, and 20 respectively
	Cocitation trends	WHO-HAI methodology, Prices of generic medicine/branded prescription drugs, and Pricing cum reimbursement policies are three prominent groups
Thematic assessment		
Theme maps	Emerging themes	Drug price regulations and price determinants
	Active themes	Biosimilars, managed entry agreements, cancer medicine, quality and cost-effectiveness
	Basic themes	Generic drugs, affordability, medicine prices, generic competition, and community pharmacy
Qualitative synthesis		
Conceptualization	Clusters (% contribution)	Generic drugs including essential medicines (28%), pricing mechanism (26%), healthcare market dynamics (19%), high-burden medicine (16%) and biosimilars price (11%)
	Biosimilar price study	Significant expansion of research from 2017 onwards. Managed entry agreements, interchangeability, and affordability of cancer medicines for targeted therapies are active interest areas
	Factors impacting prices	*Major-influencers*: Market dynamics, economic drivers, pricing policies, and mechanism *Potential influencers*: Product-specific factors, process innovation, and regulations *Essential for adoption*: Incentive policies and profit margins *Micro-influencers*: Selection strategy, psychological factors, and M&A

(Continues)

TABLE 3 (Continued)

Study vertical	Study parameter	Key findings
	Knowledge synthesis	• Need for evidence-based studies to understand the important primary and secondary factors affecting the prices of biosimilars • Inter-linkages between the factors leading to complexities of the pricing mechanism is an interesting research area for further consideration • Studies on incentives and profit margins are essential for the efficient adoption of biosimilars • Country-specific costing and pricing strategies are required to align with the local policies, regulatory, and economic factors of the country • The pricing mechanisms, regulations, and policies developed for the generic drugs; synthesized by chemical route; cannot be replicated for biosimilars

Abbreviations: HER 2, human epidermal growth factor receptor 2; TNF, tumor necrosis factor; VEGF, vascular endothelial growth factor; WHO-HAI, World Health Organization-Health Action International.

limited number of empirical studies are performed. As can be seen from Table 2, pricing mechanisms, and policies like internal, differential referencing, tendering and switching policies have been extensively researched to untangle the complexities of biosimilar pricing. Moreover, studies on incentives and profit margins associated with the last mile delivery and accessibility of high-cost cancer biosimilars are essential for the efficient adoption of biosimilars. It is worthwhile to note that there cannot be a “one size fits all” rule that can be applied to all countries (Ferrario et al., 2020). Hence, there is a need to develop country-specific costing and pricing strategies that align with the policies, regulations, market dynamics, and economic ecosystem of that country. Further, most of the efforts in this direction are concerted toward the generic drugs for high-burden diseases like HIV, Malaria and TB while biotherapeutics have received scant attention on account of the different value chains including R&D, production, procurement, distribution, and usage network. Creating an optimal solution would demand a deep understanding of the pricing mechanisms and costing models for this class of products.

It is evident from the findings that most of the research is concentrated on market dynamics; leading to the impression that the prices of medicines are mainly driven by market forces; with manufacturing cost and product parameters playing a limited role. Accordingly, it is noteworthy that many countries prefer a market-based pricing mechanism for determining the ceiling prices of biotherapeutics over a cost-based one. However, the review also raises an important question in the absence of significant research on other factors and the availability of pharmacoeconomic data for many molecules, is it justified to continue with market-based costing policies? or the decision-makers should start exploring other efficient alternatives.

Researchers can use the multiple factors found through this study to further create models and conduct evidence-based investigations. The conceptual framework of possible antecedents and moderating variables impacting the price of biotherapeutics is shown in Figure 6. The role of BPCIA in moderating pricing was underlined in an empirical study on the effect of market competition on biosimilar prices (Frank et al., 2022). While a study by Scott Morton et al. (2018) assesses the influence of variables like market features and public policies on the entry, price, and penetration of biosimilars.

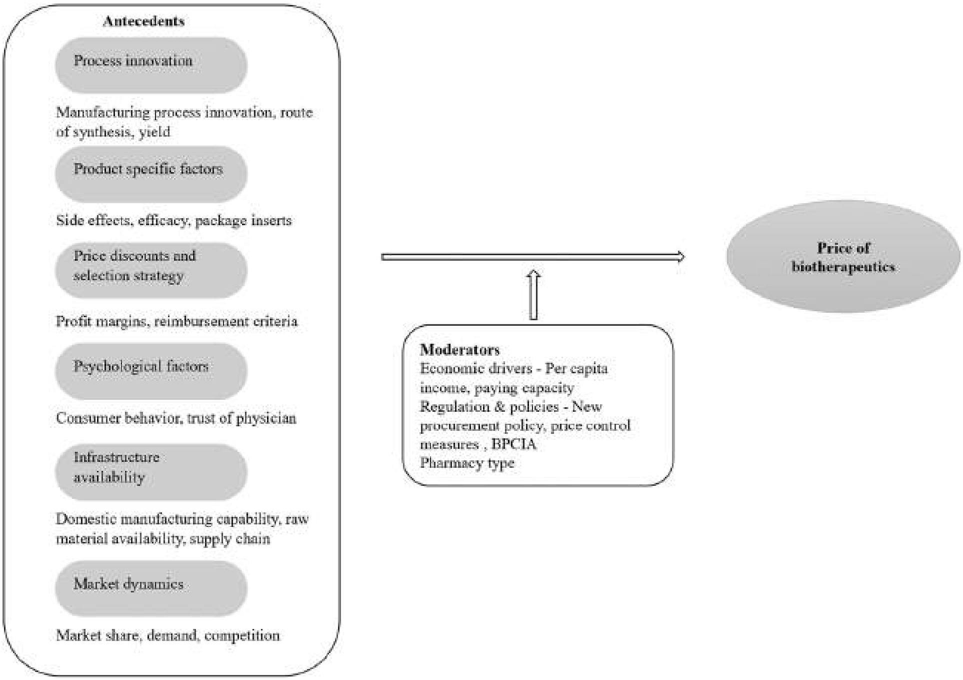

FIGURE 6 Conceptual framework of factors influencing the prices of biotherapeutics as developed from literature review and expert consultation.

The review of gray literature uncovered substantial initiatives from WHO and its collaborating partners toward this direction. At the 54th World Health Assembly, WHO member states passed a resolution that demanded a mechanism for voluntary monitoring of the prices of medicines and a global system for drug price reporting. In response to the resolution, WHO/Health Action International (HAI) project on medicine prices and availability was launched in 2001. Under the project, HAI has conducted surveys in more than 50 countries. Extensive literature including technical reports, white papers, guideline documents, medicine price books, and data generated from the surveys are available on the WHO website.

LIMITATIONS

As previously mentioned, the systematic study design, which consists of a series of bibliometric and qualitative steps to identify the gaps in the subject area, is the strength of this study. Researchers can utilize this tool to advance their research or improve their understanding of the topic. It is important to emphasize that the review study has several shortcomings. First, while the authors made every effort to adhere to the PRISMA guidelines, some of the items on the checklist may have remained unchecked. Even though there are numerous measures employed to prevent author-specific bias, the qualitative synthesis and conceptual framework section may still be subject to individual prejudice. Some findings are based solely on title reviews because complete readings of all the articles in the chosen data set were not possible. Additionally, while the review is concentrated on the elements that affect prices, other elements like costing models and pricing mechanisms have not been examined. Further, we may have missed some crucial material because we did not extend our search via the reference lists of the papers and instead conducted a very concentrated manual search for the gray literature publications from international agencies. Additionally, inconsistent reporting and a lack of published studies on this subject might hamper the generalization of the findings.

Also, it is to be noted that although bibliometric analysis like co-citation is a good approach for developing the themes, it does suffer from certain limitations. The threshold limit excludes the recent publications which have not received the minimum number of citations. This could be a reason for the exclusion of the biosimilar prices theme which is an active area as per the results of other sections of this paper. One of the probable solutions to avoid this bias for old papers is the manual examination of recent papers. The same is performed by the authors in the qualitative synthesis section of this manuscript.

CONCLUSION

The various facets of biotherapeutics pricing discussed in this article indicate that multiple factors influence the prices of high-cost biotherapeutics, especially the biosimilar class of products. Biosimilar costing is a complex web that includes various stakeholders such as innovators, manufacturers, suppliers, distributors, pharmacies, and in-hospital pharmacies. The intensity of the problem magnifies as the majority of end users do not understand the distinction between originator products and biosimilars, which results in high out-of-pocket costs. As a result, academics and decision-makers from all around the world have been interested in the discussions surrounding the high price of biotherapeutics and associated strategies.

This study's conclusions underscore the importance of doing evidence-based research to understand the important primary and secondary factors impacting the costs of biotherapeutics. The interrelationships between the factors can be explored using econometric studies, which may help identify potential solutions for sorting out the intricate details of the pricing system. It is important to stress that the pricing mechanisms, regulations, and policies created for chemically synthesized generic medications cannot be replicated in biotherapeutics, at neither the product nor country level. Decision-makers must therefore consider this necessity, and pricing strategies must be aligned with the local policies, regulatory, and economic factors of the country. In addition, for efficient adoption at every level of healthcare, studies on incentives and profit margins are essential.

Although the review of gray literature describes the efforts by various international health agencies toward monitoring and control of medicines pricing as a whole; the uncertainties surrounding the affordability and effective uptake of high-priced health therapies like biosimilars require more collaborative efforts at every level of the healthcare system to untangle the complex web of pricing for this class of products. In future, it is important to extend this research to cover other aspects of pricing like costing models and pricing mechanisms used by firms that may help reveal unidentified factors that drive pricing decisions. Additionally, the emerging themes which invite future research are healthcare insurance for equitable access, and associated pricing regulations. These areas are relatively less explored and demand greater efforts to develop the knowledge of the subject.

AUTHOR CONTRIBUTIONS

Smita Kashiramka and Sonia Gandhi conceptualized the idea of the bibliometric study. Sonia Gandhi performed the literature search, data analysis and wrote the manuscript with inputs from Smita Kashiramka and Anurag S. Rathore. All authors approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

All the data used in the study is available at the public domain and can be retrieved from Scopus and Web of Science database using the inclusion exclusion criteria mentioned in manuscript.

ETHICS STATEMENT

There are no human subjects or animals involved in the article and informed consent are not applicable.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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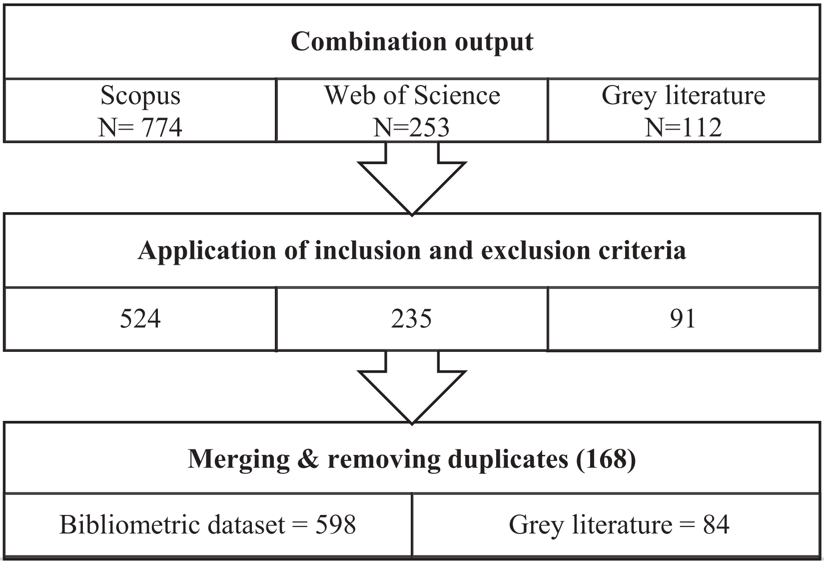
APPENDIX 1: Selection strategy

see: Table A1

TABLE A1 Web of Science and Scopus data search builder (Date of extraction: August 17, 2021).

Combinations	Booleans	Field	Keywords
#1		Title	Biologic
	OR	Title	Biosimilar
	OR	Title	Biotherapeutics
	OR	Title	Medicine
	OR	Title	Generic
#2	AND	Title	Price
	OR	Title	Affordable

Inclusions	Exclusions
Publication Year: 1965 – 2021	Author Name: Undefined
Language: English	Country/territory: Undefined



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RESEARCH ARTICLE

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Feeding the future in Ghana: Gender inequality, poverty, and food insecurity

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Abstract

As women's empowerment is critical for the adoption of agricultural technologies by farmers, some governments have over the last three decades adopted a gender equality approach to food security. In Ghana, women play a vital role as farmers and food processors, which means they impact household nutrition in important ways. In this article, we explore women's empowerment in maize-producing sites in Ghana by drawing on original data collected from over 400 farmers and service providers as part of a United States Agency for International Development-funded Feed the Future project. We employ a quasi-“women's empowerment in agriculture index” to measure the extent to which men and women maize producers are either empowered or disempowered in the domains of production, access to resources, control over income, leadership, and time allocation. Our study reveals that cost and time poverty are the main factors that influence the adoption of technologies to reduce postharvest losses. We also find that women are disproportionately disempowered in the areas of control over the use of income and time poverty. Importantly, we further find that researchers need to account for perceived versus actual empowerment when examining gender inequality in agriculture. Our study findings and policy recommendations will be of interest to policymakers, scholars, and development practitioners.

KEYWORDS
food security, gender, Ghana, women's empowerment

Key points

- Cost and time poverty are the main factors that influence the adoption of technologies to reduce postharvest food losses in Ghana.
- Ghanaian women are critically disempowered in the areas of control over the use of income and time poverty.
- Researchers need to account for perceived versus actual empowerment when examining gender inequality in agriculture.

INTRODUCTION

Postharvest losses and contamination impact food security, nutrition, and health, particularly in developing nations, and they pose serious challenges to smallholder farmers by causing food insecurity and reducing income. Tefera et al. (2011, p. 240) state, “Traditional storage practices in developing countries cannot guarantee protection against major storage pests of staple food crops like maize, leading to 20–30% grain losses, particularly due to post-harvest insect pests and grain pathogens. As a result, smallholder farmers end up selling their grain soon after harvest, only to buy it back at an expensive price just a few months after harvest, falling in a poverty trap.” Further, “pests in stored grain are also linked to aflatoxin contamination and poisoning” (Tefera et al., 2011). A key cause of postharvest losses is fungal contamination of grains (especially from mycotoxin-producing fungi in maize) that affects nutrition and health. Reducing this contamination could significantly help improve nutrition in many countries.

Women farmers are key actors to help address this public health issue in sub-Saharan Africa (SSA), where most postharvest activities are performed by women. Notably, in the literature on postharvest losses in SSA, Affognon et al. (2015, p. 60) find that “out of the 213 documents reviewed, only three (or less than 1.5%) explored gender issues,” and add: “In many SSA countries, postharvest systems underperform because women lack the resources and opportunities they need to access technologies and services to help transform agricultural produce” (Okorley et al., 2001). Our study answers a call to increase gender research and analysis to improve food security and decrease postharvest losses (Domingo et al., 2015, p. 61; Doss, 2011). Not only is gender analysis needed to fill a gap in the literature, but women's empowerment is imperative to improve postharvest systems and our study examines women's empowerment in agriculture.

Studies show that women's empowerment improves food security, nutrition, and health, while gender inequalities exacerbate food security gaps (Food and Agriculture Organisation [FAO], 2011; O'Brien et al., 2016). Reducing gender disparities by increasing women's physical and human capital promotes agricultural growth, greater income for women, and better food and nutrition security in households (Quisumbing, 1995).

> “The research also highlights the complex nature of empowerment and illustrates that different dimensions of empowerment support different outcomes. For instance, women's greater autonomy in agricultural production and control over their own workload are key determinants of their own dietary diversity and their children's nutrition (Malapit et al., 2013). Evidence from a nationally representative survey data from Bangladesh also finds that the overall women's empowerment score, the number of groups in which women actively participate,

> women's control of assets, and a narrowing gap in empowerment between men and women within households are positively associated with calorie availability and dietary diversity (Sraboni et al., 2013) … [T]here is an established body of evidence that demonstrates that women's increased control over income and greater-decision making in the household improves their own and their children's health and well-being…" (Domingo et al., 2015, pp. 76, 88).

Our study adds to this literature by analyzing women's empowerment in maize-producing communities in Ghana, a nation where agriculture employs approximately 45% of the workforce and maize "is the largest staple crop," contributing significantly to consumer diets, and "is the number one crop in terms of area planted and accounts for 50–60% of total cereal production" (Norman et al., 2016, p. 13; see also Okudzeto et al., 2015). Baoua et al. (2014, p. 20) write, "Maize is a key food crop in West Africa, where Benin, Ghana, Burkina Faso and Nigeria account for most of the regional production. Storage pests are major constraints in the maize value chain, with [postharvest] losses reaching 30%." In Ghana, "70% of food crop growers, 95% of actors in agro-processing and 85% in food distribution are women" (Pepper, 2016, p. 22; see also Hagan & Opare, 2011). Given the postharvest losses of maize and the high percentage of female labor in the agricultural sector, Ghana offers fertile ground to analyze gender and food security.

We present the first stage of gender analysis in an agricultural technology project that seeks to reduce postharvest losses in the maize value chain in Ghana. In Africa, where postharvest grain losses most often occur due to insect infestation during storage and poor drying after harvest, causing mold contamination, Ghana offers an opportunity to better understand both women's empowerment in agriculture and postharvest losses in SSA. Our study is a part of the Feed the Future Innovation Lab for the Reduction of Postharvest Loss (PHLIL). PHLIL is a strategic, applied, research and education program aimed at improving global food security by reducing postharvest losses in long-term storage crops, such as grains, oilseeds, legumes, root crops, and seeds. The Lab's efforts focus on four Feed the Future countries, including Ghana, and are funded by United States Agency for International Development. Through collaborations between US universities and local universities, research institutions, and other partner organizations, PHLIL conducts research, testing, and outreach related to drying, storage, and mycotoxin detection for key crops. PHLIL seeks to increase understanding of current postharvest loss factors and task division—including gender division of labor—in rural communities and households, and works toward the development of technologies usable by all household members. Informed by the aforementioned literature on women's empowerment as important for improved food security and nutrition across households, PHLIL is exploring women's empowerment in agriculture.

Addressing women's empowerment in an agricultural technology project, such as PHLIL, requires gender-sensitive data collection and analysis. Doss (2011, p. 11) writes:

To support gender analyses in agriculture, data collection efforts need to do two things. First, they need to ensure that women farmers are interviewed and that their voices are counted. Second, the information should identify which people are involved in various activities, as owners, managers, workers, and decisionmakers.

Our study heeds this call by collecting data from women and men farmers, owners, managers, and others along the maize value chain in four regions of Ghana through focus group discussions (FGDs), surveys, and interviews. In addition to collecting data on women's empowerment in agriculture, we examine study participants' perceptions of and experiences with postharvest technologies and institutions (e.g., credit) related to gender-based constraints and opportunities that could impact technology adoption in the PHLIL project. Women's empowerment is a distinct concept that this study explores in support of the development goal of gender equality. (For more on the difference between gender equality and women's empowerment, see, e.g., O'Brien et al., 2022.)

In the next section, we present the methodology of the data collection for gender analysis in the PHLIL Ghana project. Following the Methodology section, we present this study's results and discuss our findings. Our study confirms that postharvest technologies improve household food security. We find that cost and demand on time are important factors that impact technology adoption. While women's disempowerment may create a barrier to technology uptake, we stress that the relationship between the empowerment results and the technology uptake is suggestive, not conclusive. Further, we find that women are more disempowered than men in the maize value chain, but data from this study also reveal a few areas in which women's empowerment may surpass men's in the PHLIL project sites. We explain these findings and discuss how disempowerment related to gender, especially the division of labor, can impact the adoption and effective utilization of technologies that can improve food and nutrition security. We conclude with specific policy recommendations and strategies for governments and implementing partners to improve women's empowerment in agriculture.

METHODOLOGY

Overview and conceptual and analytical tools

To enhance food security in developing nations, the adoption and proper use of postharvest loss reduction technologies by smallholder farmers is important to decrease postharvest losses from pests in stored grain and grain pathogens. Such technologies target interventions in storage by using silos, bags, traps, and moisture meters, among others. Increasing the ability of smallholder farmers, many of whom are women, to effectively dry and store crops long-term will increase their household food security. For households with a surplus to market, it will also increase their incomes by enabling them to store until the lean season when crop prices are much higher.

In the PHLIL Ghana project, a combination of 10 ISCTs was identified in maize-producing communities in the 10 regions of Ghana. The technologies include tools for testing moisture content, presence of fungus, management of insects and mycotoxins, and storage containers (plastic and metal silos; hermetic grain bags—GrainPro Super Grain bags and Purdue Improved Crop Storage [PICS] bags). These technologies were introduced by different state and nonstate agencies in the last two decades or more. Awareness of ICSTs and their benefits is necessary for and can encourage technology adoption to improve the drying and storage of cereal grains and grain legumes.

According to the aforementioned studies on gender equality and women's empowerment in agriculture, technology interventions for food security and development projects need to consider gender's role in technology adoption by smallholder farmers. Informed by the literature on gender issues in agriculture and food security, we expect that gender inequalities create barriers to technology adoption. Therefore, we assess gender relationships among maize value chain actors, primarily farmers, in this study.

In this first gender analysis in the multiple-year PHLIL Ghana project, our study uses FGDs, interviews, and surveys as well as a quantified scoring of men's and women's empowerment to assess gender differences in ICST awareness and adoption factors, women's empowerment in agriculture, and gender roles in farming and nonfarming activities, namely, gender division of labor. Gender inequalities may limit the adoption, transfer, and scale-up of ICSTs, and the ultimate impact of ICSTs on food security for smallholder farm families.

The analytical tool from which we draw to develop questions for the FGDs, interviews, and surveys as well as to quantify data on men's and women's empowerment is the women's empowerment in agriculture index (WEAI). The WEAI was developed by the International Food Policy Research Institute to aid the monitoring of gender results in agricultural development projects (Alkire et al., 2013). As Table 1 shows, the WEAI measures the roles and extent of women's engagement in agriculture in five domains: decisions about agricultural production, access to and decision-making power over productive resources, control over the use of income, leadership in the community, and time use (Alkire et al., 2013).

The index also measures women's empowerment relative to men within their households.

In this study, we adapted the WEAI in two ways due to time and financial limitations. First, the WEAI involves a household survey to obtain data from farm families' heads of households and their spouses. Due to the survey's length and implementation cost, we collected data from men and women from different households within the same farm communities through FGDs and as individuals through a shorter survey than the WEAI to compare women's and men's empowerment in agriculture in our study sites. (Since our study began, an Abbreviated WEAI, a shorter, streamlined version of the original WEAI was released.) We also conducted interviews. Since we drew from the WEAI to develop questions for our FGDs, survey, and interviews, we refer to our study as a quasi-WEAI (Q-WEAI) study. Second, while we ask questions based on the WEAI through multiple methods to assess women's empowerment in agriculture generally, we also incorporate questions that focus on the adoption of postharvest technologies in our project sites. The WEAI's focus is production-heavy, and our Q-WEAI study includes questions to better understand what factors influence the adoption of ISCTs by men and women in the maize value chain.

Our research questions are: (1) what barriers and motivations impact the adoption of ISCTs in our project sites, and (2) what is the status of women's empowerment in comparison to men in our project's farming communities? Combined, these questions allow us to ascertain if gender may impact the adoption of ICSTs by key stakeholders in the maize value chain and women's empowerment in agriculture in the PHLIL study.

TABLE 1 The domains, indicators, and weights in the WEAI.

Domain	Indicator	Weight
Production	Input in productive decisions	1/10
	Autonomy in production	1/10
Resources	Ownership of assets	1/15
	Purchase, sale, or transfer of assets	1/15
	Access to and decisions about credit	1/15
Income	Control over the use of income	1/5
Leadership (in the community)	Group member	1/10
	Speaking in public	1/10
Time	Workload	1/10
	Leisure	1/10

Abbreviation: WEAI, women's empowerment in agriculture index.

Study participants and methods of data collection

In this study, we target maize value chain actors for FGDs, surveys, and key informant interviews in maize-producing communities in four regions of Ghana (Table 2).

The regions of Ashanti and Brong-Ahafo are in the more humid forest–savannah transition zone, and the Northern and Upper West are in the more arid–savannah zone. In the first two regions, ethnic Akan groups who engage in a matrilineal inheritance system that passes property through mothers to children dominate; in the last two regions, Dagbani-Dagaaba ethnic groups who engage in a patrilineal inheritance system (i.e., the property passes from fathers to children) dominate. Matrilineal and patrilineal descent has determined social and political relationships and structures (Fortes, 1984), and one may expect women to be more empowered in the matrilineal regions than in the patrilineal regions.

In 2015, FGDs were held with same- and mixed-sex groups (10 people per group) in maize-producing communities in the four regions. Each group included farmers, traders, and community leaders, as it was important to include farmers, traders, and community leaders to learn from different stakeholders with local knowledge to contribute to our research of the study sites. Traders include a significant number of women in our study sites, and so the traders were important to invite to the FGDs alongside farmers and local community leaders to better assess women's empowerment in different locations. During the FGDs, the differences between men and women with respect to awareness of the maize ICSTs were

TABLE 2 Sources of data and sample size.

Source	Region				Total
	Ashanti	Brong-Ahafo	Northern	Upper West	
Focus group discussions (FGDs)					(100)
Men's group	10	10			20
Women's group	10	10	10		30
Mixed group[a]		20 [10; 10]	10	20 [10; 10]	50
Individual surveys					(281)
Maize farmers	35	35	40	35	145
Warehouse operators	5	5	5	5	20
Input dealers	5	5	5	5	20
Maize traders	15	15	10	16	56
Maize aggregators	10	10	15	5	40
Key informant interviews					(36)
District Director of Agriculture	1	2	2	1	6
Cooperative/Community Development Officer	1	2	2	2	6
NGO Director/Project Leader	2	2	2	2	8
Agriculture Project Officers	2	2	2	2	8
Community leaders (Chiefs and Chief farmers)	2	2	2	2	8
Total	98	120	105	95	418

[a] Mixed groups were 50% men and 50% women (25 men + 25 women = 50 total participants).

sought. The guided interview script included questions on gender dynamics at home and in the community with attention to the five domains of the WEAI along the maize value chain. The closed-ended survey questions of the original WEAI (IFPRI, 2012) were rephrased and posed as open-ended or dichotomous questions.

In addition, a semistructured survey was designed to ascertain men's and women's awareness and use of the 10 aforementioned ICSTs as well as motivating factors for and benefits of technology adoption. In 2016, a total of 281 key actors in the maize value chain were surveyed: 145 maize farmers (61% men; 39% women) and 136 service providers. The service providers included: 56 maize traders (23% men; 77% women); 40 maize aggregators (60% men; 40% women); 20 input dealers (19 men; 1 woman); and 20 warehouse operators (18 men; 2 women). (Aggregators are wholesalers who travel to the cottages and hamlets to assemble grains for bulk distribution.) Since no database was available on any of the actor groups at the time of selection, surveyed farmers were selected in communities where the PICS bag had been introduced and distributed in the last decade by Adventist Development and Relief Agency, a nongovernmental organization. Service providers were selected based on a snowball and nonprobability sampling in towns and markets close to the farming communities.

To better understand the adoption of postharvest technologies, survey responses on the following factors of ICST adoption were analyzed: awareness and use of ICSTs, motivation to adopt ICSTs, (perceived) constraints, and (perceived) gains. The awareness and use levels of ICSTs were determined through relative frequency analysis for the five maize value chain actors: farmers, input dealers, warehouse operators, aggregators, and traders. Awareness is defined as knowledge of the technology and its usefulness. Adopters of ICST (s) are those actors who have used the specific input or practice for more than 1 year. Eight motivating factors to adopt ICSTs were identified and ranked by survey participants: (1) interest is shown by other actors, (2) capital to invest is available at a low-interest rate, (3) low level of capital investment is required, (4) there are no negative environmental consequences, (5) there is minimal demand on time (to use the technology), (6) technology is readily available in the community, (7) my peers are using it or doing business in it, and (8) my spouse agrees to the suggestion to use it. Kendall's coefficient of concordance was used to test agreement among the rankers of the eight factors. The null hypothesis is that there is no agreement among the rankers of the rankings. The alternate hypothesis is that there is agreement among the rankers of the rankings. The differences in the rankings of men and women value chain actors were analyzed.

The perceived constraints to ICST adoption listed by researchers and selected by individual survey respondents were ranked using relative frequency analysis. The differences between women's and men's responses were compared. We expected that more women would register higher levels of constraints to using ICSTs than men. The perceived gains of ICST adoption were similarly measured using survey responses on experiences or perceptions of: (1) changes in the number of months that maize is stored after using a technology, (2) whether technology better protected maize from pest attack, (3) whether higher prices were obtained for the commodity stored with a technology, and (4) whether food security status changed from poor to improved after using a technology.

In 2016, interviews on the role of the private sector, NGOs, and civil society in providing support for farmers were obtained from 36 key informants, including community leaders (e.g., Chiefs and Chief farmers), coordinators of food security projects, and monitoring officers at the local government departments (Table 2). Purposively including key informants who are leaders and technical experts was to validate the information and fill any gaps in information. Researchers also made observations at agribusiness service centers and socioeconomic facilities to gather data on institutional support for farmers.

We note that the survey participants differ from the FGD participants. Including different participants across the survey and the FGDs increased the diversity and number of study participants who could inform the project. In addition, it was not possible for all participants, especially farmers, to attend to both the survey and the FGD due to their time constraints and study logistics in Ghana. Requiring participants to do both the survey and the FGD to share their perceptions and experiences and respond to questions of importance for the project would have gone against the ethics of our study. We also did not want to risk influencing individual survey answers if someone had participated in an FGD, which was held before the survey. Finally, as explained in the next section, quantified WEAI-related FGD questions and WEAI-related survey questions' responses were combined to calculate our study's Q-WEAI scores. Having different participant samples for the FGDs and the survey ensured that we did not double-count participants' responses for our Q-WEAI analysis.

Method of Q-WEAI data analysis

Responses to WEAI-related FGD questions were transformed into numerical scores toward their relevant WEAI domains (Table 1). During the FGDs, men and women provided scores on both men's and women's empowerment in each domain. Additionally, WEAI-related survey questions' responses were converted (using relative frequency calculation) into numerical scores toward their relevant WEAI domains. These quantified FGD and survey responses were combined to calculate our study's Q-WEAI scores. The mean scores for each domain indicator are compared for men and women. Disempowerment for a gender group is reflected in an overall Q-WEAI score (for men or women) of less than 80%, and this is based on the WEAI's weight allocation for the domain indicators (Table 1). Alkire et al. (2013, pp. 75, 77) explain WEAI's 80% rationale:

> “[A] woman or man is defined as empowered in 5DE [five domains] if she or he has adequate achievements in four of the five domains or is empowered in some combination of the weighted indicators that reflect 80% total adequacy or more … An individual is disempowered if his or her inadequacy score is greater than 20%. This is the same as saying that an individual is identified as empowered in 5DE if he or she has adequate achievements in four of the five domains, enjoys adequacy in some combination of the weighted indicators that sum to 80% or more, or has an adequacy score of 80 or greater.”

Similar to the WEAI, through our Q-WEAI, we analyze disempowerment to “identify the critical indicators that must be addressed to increase empowerment” (Alkire et al., 2013). The lower the score, the more disempowerment is indicated.

RESULTS

Adoption of technology

Our survey findings confirm that ICSTs help decrease postharvest losses and improve food security, and food security (for home consumption and sale) is the motive for crop cultivation for the majority (85%) surveyed. Before using any ICST, only 1% of farmers surveyed stored grains beyond 12 months due to pest attack and about 60% could afford three meals a day. Notably, after technology use, 36% of farmers stored grains beyond 12 months and 66%

TABLE 3 Use of ICSTs by gender.

ICSTs	Farmers % Use		Warehouse managers % Use		Input dealers % Use		Traders % Use		Aggregators % Use	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Simple tools to detect fungus	31	14	22	100	21	0	0	23	17	69
ZeroFly® bag	6	0	0	50	11	0	0	0	0	0
PICS bags	75	84	61	100	74	0	39	16	29	75
Super grain bags	81	74	83	100	74	0	100	95	96	94
Commercial plastic silos	2	4	0	0	11	0	0	2	0	0
Steel silos	3	2	0	0	11	0	0	0	0	0
Solar dryers	0	0	0	0	0	100	0	0	0	0
Moisture meter	0	0	17	50	5	0	0	0	0	0
AflaSafe	0	0	11	50	11	0	0	0	0	0
Baited traps	0	0	39	0	26	100	0	28	4	19

Abbreviation: ICST, improved crop storage technology.

could afford three meals a day. Table 3 shows the percentage of survey participants who use the 10 ICSTs.

Our survey results show use levels of the PICS and Super Grain bags as generally high for women and men in the maize value chain. Over 65% of women and 70% of men said they know how and when to use the bags as well as their benefits. The awareness level for the nonbag storage technologies was generally low among men and women. Ownership and access to silos, moisture meters, and solar dryers were low for men and women farmers, traders, and aggregators. Among the survey participants, men dominate input dealerships (19 men to 1 woman) and warehouse managers (18 men to 2 women). The one female input dealer had access to a solar dryer and sold baited traps. No warehouse managers used silos or solar dryers.

Men and women surveyed perceive the following gains from using ICSTs: grain protection, increase in the number of months for storing maize, higher quality grain, higher prices for commodities in the market, and improvement in household food security status.

Survey results reveal cost as the main constraint to ICST use for men and women, followed by the durability of material and local availability. Contrary to our expectation, women did not register more constraints or restrictions than men for using ICSTs. Neither men nor women consider their spouse's agreement to be an important constraint or motivating factor for technology adoption.

The four main motivating factors for adopting ICSTs in order of importance are: (1) minimal demand on time (to use technology), (2) no negative environmental consequences, (3) interest shown by other actors, and (4) peers using/doing business with the technology. There were a few slight differences in men's and women's rankings for motivation factors. For women aggregators, issues of capital (i.e., low level of capital investment is required and capital to invest is available at a low interest rate) were the most important motivating factors for ICST adoption. Also, the one female input dealer was highly motivated by technology availability in the community.

Regarding men's and women's access to information on ICSTs, our survey results show that both men and women rely on varied sources for obtaining technical information on ICSTs, although more women than men depend on relatives than the formal sector for such information. Unexpectedly, although more women than men had been trained in the use of simple tools for detecting fungus, women farmers use these tools less than men farmers (Table 3). The FGDs and interviews confirm women's training in simple fungus-detecting tools through women's groups.

State of (dis)empowerment for women and men

Our Q-WEAI was estimated based on the WEAI-related survey and FGD questions to measure the extent that maize producers in our study sites are (dis)empowered in the five domains: production, access to resources, control over income, leadership, and time allocation (Table 1). Our Q-WEAI results show that both women and men in our study sites are disempowered (with an overall Q-WEAI score of less than the 80% threshold), but women are more disempowered than men. Our Q-WEAI results for the domain indicators are shown in Figure 1 (see Table 1 for corresponding domains).

The lowest scoring Q-WEAI indicators are critical indicators that should be addressed to increase empowerment for women or men in the study sites. Figure 1 shows the top contributors to women's disempowerment in the study are: input in productive decisions, control over the use of income, and leisure, respectively, indicators of the production, income, and time domains. The Q-WEAI results show women as most disempowered and men as most empowered in "input in productive decisions," an indicator of the production domain. While women are disempowered compared to men in the overall Q-WEAI results, men are insufficiently empowered in agriculture in our study. The top contributors to men's disempowerment are the three indicators of the resource domain: purchase, sale, or transfer of assets; access to and decisions about credit; and ownership of assets (Figure 1).

Q-WEAI results suggest that men are less empowered than women in the resource domain, especially regarding the transfer of assets and access to credit. The "purchase, sale, or transfer of assets" is the Q-WEAI indicator of most empowerment for women, and it is the only indicator for which either gender is empowered above the 80% threshold.

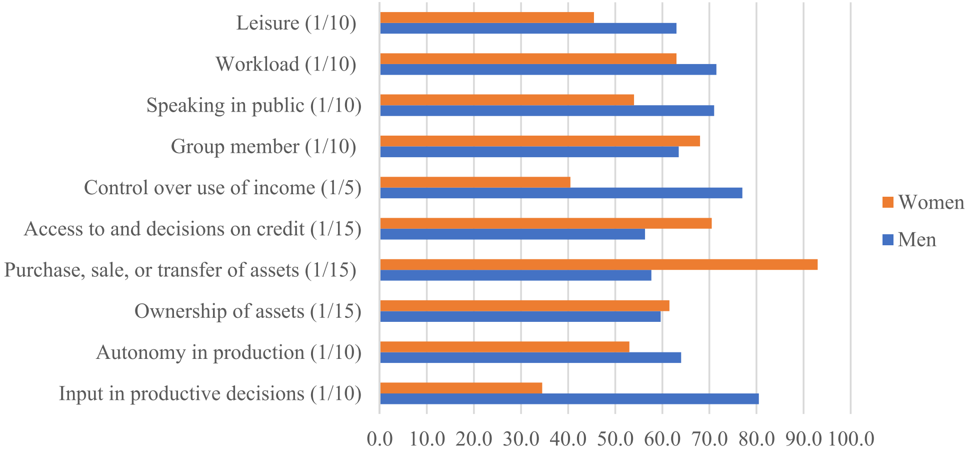

FIGURE 1 Results of quasi-women's empowerment in agriculture index (Q-WEAI) showing the extent of (dis) empowerment in the various domains.

However, it is one of the indicators of most disempowerment for men (Figure 1). Explaining men's disempowerment, FGD participants say that, in many instances and especially in households where men are not indigenes of the hometown of their wives, assets are jointly owned and men are *obliged to consult* with their wives before debts are accrued and assets are transferred. Interestingly, FGD participants also say that married women *always act in consultation* with their husbands.

Regarding men's disempowerment in "access to and decisions about credit," FGD participants express that women's groups have been targeted for trainings and opportunities for credit. According to both the FGDs and survey, husbands do not usually question wives' needs for small amounts of credit to expand business or support household consumption.

The third contributor to men's disempowerment—the resource domain's ownership of assets—is also the indicator for which women and men share their most similar level of disempowerment. Study participants' agricultural assets for supporting postharvest management of maize include machines for shelling, drying, winnowing, bagging, and weighing; pans; silos; warehouses/storerooms; mobile phones; and "vehicles." The major postharvest assets of both women and men surveyed are pans and storerooms. Warehouses and silos tend to be commercial facilities in town or are community-based and accessible to both men and women, but our survey results show its management tends to be dominated by men (see also Ministry of Finance [MoF], 2016). "Vehicles" owned by farmers and other service providers include bicycles, tricycles, tractors, and motorcars. Most of these "vehicles" are owned by men and hired out to both men and women.

Regarding decision making in multiple areas, more than 75% of both male and female farmer survey respondents say that women participate (at least occasionally) in decision making on sourcing of credit, land use, and purchase of farm and postharvest inputs (Table 4).

The income domain's indicator (control over the use of income) is one of the lowest Q-WEAI scores for women; women score 40%, while men score 79% (Figure 1). Regarding control over income from the sale of maize produced by farmers, the survey shows that 70% of women farmers compared to 85% of men farmers control how to save part of the income and what to spend the money on. FGD participants say that women have partial control over the use of income.

In both the FGDs and survey, the freedom of men and women to spend as individuals or in consultation with each other was household-specific. FGD and survey participants listed these necessities for household expenditures: food, school fees, utility bills, medicare, mobile phone credit, vehicles, and housing construction. The survey results indicate that among this list, women spend more on food, children's education, and medicare than men.

In the leadership domain, the Q-WEAI results show women as more empowered than men in group membership. Both the FGD and interview participants note the external support services that organize women-only groups to explain women's empowerment in group membership. Kapitsa (2008) confirms the organization of women-only groups. When asked in the survey, "Can women be executive members of mixed-sex groups?," 94% of men and 96% of women say "yes." However, we find barriers for women's empowerment in mixed-sex groups, as the FGDs offer a more nuanced view of executive members (i.e., leaders) and public speaking. Overwhelmingly, the FGDs confirm that all women can be leaders in women-only groups, but participants stress that "well-educated and courageous" women can be leaders in mixed-sex groups. FGD participants agree that when women join mixed-sex groups, there is a social norm of masculinity for which "men direct and lead," and they say that this interferes with women's choices and so women opt for executive positions *other than* president or chairperson. Some participants explain away the lack of women in leadership roles by saying that women shy away from public speaking. FGD participants

TABLE 4 Perception of women's participation in decision-making areas of production and postharvest.

	Decision-making area							
	Type of land to use		**Purchase of farm**		**Purchase of postharvest inputs**		**Sourcing of credit**	
Perceived extent of women's participation	**Men (%)**	**Women (%)**	**Men (%)**	**Women (%)**	**Men (%)**	**Women (%)**	**Men (%)**	**Women (%)**
All the time	7	19	13	22	17	23	12	27
Most of the time	53	28	33	24	39	23	40	33
Occasionally	21	27	30	30	18	16	39	31
Never	20	26	24	24	25	38	9	9

Source: Survey results of men and women farmers.

agreed to such participant statements as this one: "Men are better empowered in public speaking not due to their sex, but more due to higher exposure and higher participation in formal schooling." The latter part of this statement on schooling is reflected in the lower level of literacy among women compared to men in our study (Appendix A).

An important empowerment factor for women in agriculture, including technology adoption, is local institutional (government and nongovernment) support of women farmers that was observed during community visits and confirmed through the key informant interviews and FGDs. There are local government services in agricultural extension, business advisory, information, cooperative organization, community development, and social welfare in each of the 216 district assemblies of Ghana. The extension officer to farmer ratio is 1:500 households with an average of only two officers in each district (of up to 1 million average population) for the other services (Ministry of Food and Agriculture, 2012). Interview and FGD participants note that in the last decade rural women have become the greatest beneficiaries of the government's business advisory and extension services, because they have been targeted and organized into community groups for sensitization and capacity building, including on technology adoption.

According to the key informant interviews, the private sector (including not-for-profit organizations) is also a significant participant in women's empowerment. The inclusive business models adopted by private businesses and out-grower and contract farming schemes have allowed women to be trained to participate in all nodes of the agricultural commodity value chain. In all four regions visited by the study team, there was at least one project organizing women in maize, soy beans, and rice, and training women to obtain credit and use improved technology for enhancing crop productivity. Such trainings aim to improve women's participation in productive decision making during the organization of inputs and credit for completing cereal production and postharvest activities.

Based on the literature on different descent regions (e.g., Fortes, 1984), the expectation was that women in patrilineal regions are likely to be more disempowered than in matrilineal regions, where women inherit property. However, we find only a slight difference in women's (dis)empowerment in agriculture between our study's patrilineal and matrilineal regions. Specifically, survey participants' perception of women's participation in decision making concerning land use, purchases, and credit show mixed results for the two regions. Women in the Upper West (a patrilineal region) are the most disempowered, yet women in the Northern region (also patrilineal) are more empowered than women in the Ashanti and Brong-Ahafo (matrilineal) regions. In both the matrilineal and patrilineal regions, we find that men may dictate women's engagement in agriculture regarding commodities, scale of operation, location of business, use of income, investment in assets, business association, and use of time.

Gender division of labor

The time domain includes two indicators (leisure and workload), and these are related to a gender division of labor. Leisure is one of the top contributors to women's disempowerment in our Q-WEAI study, with women more disempowered (score = 45%) than men (score = 63%) (Figure 1). This does not mean that women find no time for relaxing or other leisure activities, but leisure is one of the most critical indicators for addressing women's empowerment as per the Q-WEAI results. As previously noted, women are also critically disempowered in "control over use of income," and we find that this overlaps with the leisure indicator in terms of spending income on leisure. FGD participants (men and women) say men spend more time on leisure as well as more money on "entertainment" and "past-times" than women. Regarding workload, women are also more disempowered than men

(Figure 1), and the FGDs show that women's workload at home and on-farm is heavy. Our findings on women's disempowerment in leisure and workload confirm the "time poverty" that women face in relation to gender division of labor, which places responsibility for housework and childcare on women and girls, regardless of women's farming or other work (Chant, 2006; Folbre, 2006).

During the FGDs and in the surveys, participants were asked about gender roles and activities performed at home, on the farm, and off the farm. We find that despite an increased acceptance of males—particularly boys—assisting with housework and childcare, the bulk of such work is still placed on females in the study sites. Regarding gender roles, FGD participants perceive that activities are not as rigidly divided between male- and female-only activities as in the past; today in their communities, girls may engage in work that the FGD participants label "difficult" (e.g., construction, repairs, and large animal rearing) and boys may engage in work that FGD participants consider "soft and for females" (e.g., fetching water, cooking, and caring for babies). FGD participants perceive that among household work, childcare is one of men's most common activities with this caveat: *when men are at home* and there are children, they prefer to care for them by watching them play, playing with them, or putting them to sleep *rather than* doing any other activity besides construction.

When probed about the intensity of work, both FGD and survey results show that girls and women maintain the greatest involvement in housework and childcare. Participants say: girls are raised to stay at home with their mothers, and boys to follow fathers to farms when they are not in school; girls do more housework than boys. During an FGD, a man from Akrobi states, "Boys do not stay at home. They like playing with friends in the community so you will hardly get them to sweep." A man in Babasso summarizes the local gender roles in agreement with participants: "When there are both boys and girls, there is division of labor. But nothing stops any of them from doing work at home." A woman in Konbiahi clarifies, "If you have only boys, they will definitely do what people call ladies work." A woman in Sekyedumase confirms this, "I had no girls, so all the home chores were done by my boys."

Regarding the intensity of men's contributions to housework, women in Nkonsia agreed with this FGD participant statement: "Our men only work on the farms. They think they should not bring themselves down to doing jobs at home which are for women and children." Mangoase women agreed to a similar statement. In a mixed-sex group in Zuo, a man states, "We [men] do little of the day-to-day housework, but when it comes to fixing leaked roofs and bulbs and other things that are very physically challenging, we are not found wanting." A woman in Mangoese says, "The fact is most of the time, during the day, men are not at home; they are in the farm or at the common sitting place for men in the community, so you cannot call them to assist in anything." Women in Mangoese and Tuobodom echoed that statement. A Gbabshei woman adds, "Some of the men are good, so they wash their own clothes and start cooking when you [i.e. women] are late in coming home from the market."

In sum, as expected from the scholarly research (e.g., Gillies, 2003), we find that gender roles place a heavier housework and childcare workload onto females in comparison to males. In addition to these activities, women farm with their husbands or as heads of household. A woman in Nkonsia says the farm workload is high because the input cost is too high: "We cannot hire labor and pay for fertilizer and the herbicides, so we do everything ourselves [without technologies]. Farming is too physically challenging." Study participants also say that women's participation in agricultural marketing on their own behalf and for family farms has been less restricted to women than other activities in the agricultural value chain (see also Doss, 2011). In this study, the majority of men work mostly on their farms. Only a few husbands take care of livestock outside the home, and occasionally husbands work as paid laborers on other people's farms within or outside the community.

DISCUSSION

The survey results on technology awareness, use, motivation, and perceptions of constraints and gains show that the ICST capacity of both men and women is being built in Ghana. The Ghanaian Government's response to improving smallholder participation in its agricultural modernization agenda has been to provide subsidies and development projects to increase the adoption of new and improved technologies (Buah et al., 2011). In Ghana, most agricultural technology transfer programs of the last two decades have targeted women, especially those who belong to recognized farmer-based organizations or out-grower/contract farming schemes. This is in response to the recognition that developing women's technical and entrepreneurial skills is critical given the increasing food demands, the changing context of agricultural trade, and the unpredictable long-term effects of climate change; technology development and transfer in Ghana have been largely driven by capacity building with women's empowerment as a key strategy (Njobe, 2015).

This government strategy, particularly the targeting of women's groups for trainings and access to credit, appears to have had a positive (although insufficient) effect on women's empowerment in our study sites. As noted in our results, institutional support through government and nongovernment programs is touted for improving women's empowerment, particularly through women's groups that receive trainings to participate throughout the agricultural value chain. Trainings for women that study participants largely referenced were for obtaining credit, and this is also reflected in the Q-WEAI results, which reveal women are more empowered than men in access to credit. This appears related to the sprawl of microcredits and "savings and loans" that target women and is located closer to rural communities, as observed by team researchers in our study sites and as documented elsewhere (Global Forum for Rural Advisory Services [GFRAS], 2013). In rural Ghanaian communities, governmental and nongovernmental organizations organize women in groups, provide financial literacy trainings, and link them to financial institutions (rural and community banks, savings and loans companies, and microfinance schemes). GFRAS (2013) notes that over the past two decades, there have been several efforts to overcome gender biases in advisory services that have had positive outcomes in rural Ghana.

While women's growing capabilities as a result of these programs that target women have been touted, some researchers suggest that many of the property rights and technology-related projects have been implemented with only modest achievements for women's empowerment (Domingo et al., 2015; Huyer & Mitter, 2003). For example, community leaders are sometimes engaged and convinced to change their stance so that women will have greater access to and control over resources, but this often lasts only for the life of the project. At the end of the project, women revert to prior positions; only in a few cases have women kept their new positions, such as to be able to use the land for a different crop, rent land out to a new user, invest in livestock, maintain savings accounts, and use funds at will (Domingo et al., 2015).

In this study's PHLIL Ghana sites, the importance of participating in groups for social and economic benefit is not lost on farmers regarding the postharvest of maize, but barriers to women's leadership reflect gender norms that are biased in favor of men as given leaders in mixed-sex groups. Other studies find similar barriers to women's empowerment in the leadership domain (Baden, 2013). Gotschi et al. (2008, p. 650) find that, despite women's participation in groups, it is "difficult to transform social relations into improved access to information, access to markets, or help in case of need" for women; they add: "While there were no significant differences in the investment patterns of men and women in terms of participation in group activities and contribution of communal work, access to leadership positions and benefits from social capital were unequally distributed" in favor of men. Domingo et al. (2015, pp. 79–80) discuss gender norms in and beyond group settings that perpetuate gender inequalities:

> "[I]mportant constraints to women's participation in organised groups remain and there is only so far that collective action can go in addressing deep-rooted inequalities … [R]estrictions on women's mobility or the burden of care work can create barriers to women's participation in meetings and prevent women from assuming leadership roles … [W]omen are often excluded from formal or informal networks in the private sector, with gender-based stereotypes and a lack of role models often blocking women's professional advancement and limiting their voices in business communities and policymaking."

Thus, group participation and access to credit, while important steps for empowerment, do not sufficiently address gender norms that foster inequalities along value chains. Indeed, our Q-WEAI results show women are more disempowered than men in agriculture regardless of the years of programs targeting women as beneficiaries through groups and access to credit.

A more meaningful approach to achieving significant change in women's empowerment beyond the life of a project would be to challenge deep-seated gender norms (e.g., a gender division of labor) that perpetuate inequalities and restrict women's empowerment in multiple domains. A major finding from our study is the inequitable division of unpaid household and care work. Gender inequalities reinforced by a gender division of labor have stalled women's empowerment in agriculture and other sectors.

How might gender inequalities impact the adoption of ICSTs in our project sites? While women's empowerment may impact women's technology uptake, this study is not able to report on a conclusive relationship between uptake/nonuptake of ICSTs and (dis) empowerment. Nonetheless, we find that although more women farmers than men farmers had been trained in the use of simple tools for detecting fungus, women farmers use these tools less than men farmers. This survey finding provides one example of how women's overall disempowerment in our study may potentially limit the adoption, transfer, and scale-up of ICSTs, and the ultimate impact of ICSTs on food security for smallholder farmers. In this study, cost is the main constraint of ICST use, and minimal demand on time (to use technology) is the main motivating factor for ICST adoption. The cost (constraint) of technology adoption particularly relates to the income domain, and the minimal time demand (or motivating factor) of technology use fits with the time domain. Two Q-WEAI critical indicators (i.e., low Q-WEAI scores) for women are control over the use of income and leisure, respectively, of the income and time domains. These critical indicators reflect gender norms that also relate to women's disempowerment in other domains (e.g., leadership). The combination of cost and time factors for ICST adoption and women's disempowerment in income and time suggests that women's group trainings and access to credit for women are not enough to scale up technology adoption among women.

Given our finding of the importance of cost and time for the adoption of ICSTs, women's disempowerment in the income and time domains may likely impact the adoption of ICSTs by women in the maize value chain. Again, however, we stress that we do not find a conclusive relationship between uptake/nonuptake of ICSTs and (dis)empowerment. Following a discussion of these critical indicators for women in our study, we propose policy recommendations to address these indicators to increase women's empowerment and technology adoption to improve food security.

Critical indicator: Control over the use of income

Women in our study sites are critically disempowered in their control over the use of income, and disempowerment in the income domain likely impacts women's adoption of technologies, as our study finds cost is a top constraint in the adoption of ICSTs. Women's empowerment in the income domain is also important for children's health and education because women and men often spend income differently due to the gender role of women as primary caregivers (e.g., Adeyemi, 2010; Koopman, 2009; Manda & Mvumi, 2010; Quisumbing & McClafferty, 2006; Sherah & Theuri, 2015; World Bank, 2007). Studying Ghana, Maxwell et al. (2000) find that, holding household structure constant, having a woman as head of household positively impacts calorie availability, reflecting differences in spending priorities between male- and female-headed households. Also conducting research in Ghana, Levin et al. (1999) observe that women earn lower incomes than men, but tend to allocate more of their budget to basic goods for themselves and their children, while men spend more on entertainment for themselves only. Our study results echo these earlier findings that women spend more on food, children's education, and medical care than men, and men spend more on leisure activities for themselves.

Women's disempowerment in their control over the use of income potentially creates barriers to ICST adoption, and this disempowerment is related to gender norms that perpetuate gender inequalities and impact women's control over income use in at least three ways. First, across our study sites, FGD participants say that married women always act in consultation with husbands. In male-headed households, this may create a barrier to ICST adoption if the husband prioritizes other expenditures. Given men's empowerment in production decision making in this study, men may, for example, prioritize spending on production technologies over postharvest technologies.

Second, gender norms limit women's income-earning potential. For instance, our study finds that men dominate management positions as well as mixed-sex group leadership positions, which builds one's skills and reputation as a leader and that, in turn, could open more opportunities for higher paying positions (e.g., management) (Mukhopadhyay et al., 2006). Other studies confirm that women in Ghana and elsewhere do not have the same opportunities as men to earn income, gain skills, and participate along the value chain; women face greater difficulties in transforming their labor into more productive employment activities (Dolan & Sutherland, 2002). In our study, women's income is less than men's, as expected from the scholarly research. Women's lower income due to gender norms likely hinders women's ability to spend on technologies, as cost is the main constraint to technology adoption in our study.

Third, gender norms include a “feminization” of responsibility for housework and childcare or a “care economy” that perpetuates unequal responsibilities and spending between men and women, particularly for children (Chant, 2006; Folbre, 2006). As such, women's ability to spend (their already limited) income on postharvest technologies is further limited by gender norms for which women spend more on food, children's education, and medical care than men. Of course, this type of women's spending is an important household contribution. However, regarding spending on food, increased calorie availability does not necessarily mean improved food safety and nutrition due to toxins related to improper postharvest drying and storage. Postharvest technologies increase food security (i.e., calorie availability and nutrition) and food safety, thus making ICSTs important for farmers involved in postharvest activities to access. Women's spending to improve household food security could go further by countering postharvest loss food insecurities with the purchase and adoption of ICSTs. The unequal responsibilities and spending between men and women are also evidenced in our finding that men spend more than women on leisure activities for themselves. Given the interaction of the empowerment domains, our findings on women's disempowerment in their control over the use of income dovetails with the next critical indicator: leisure.

Critical indicator: Leisure

In our study, men and women participants agree that women are more disempowered than men in leisure and workload (both indicators of the time domain), and our Q-WEAI results reveal leisure as a critical indicator. Similar to women's disempowerment in their control over the use of income, gender norms related to time use hinder women's participation, and productivity along the agricultural value chain. Women's critical disempowerment in leisure reflects a gender division of labor, namely, women's unpaid labor in the form of housework and childcare that limits women's time for leisure as well as off-farm income opportunities.

Other studies confirm that women face time poverty due to a gender division of labor that normalizes the "feminization" of reproductive labor (housework and childcare) and a "care economy" based on women's unpaid labor; in other words, women's time poverty results from placing responsibility for housework and childcare on women in addition to farming or other work instead of a more equitable division of labor in the household (Chant, 2006; Doss, 2011; Folbre, 2006). Time poverty and a gender division of labor that impacts women's empowerment are observed in most agricultural value chains in Ghana (Kitalyi, 1998). Elsewhere, Dolan and Sutherland (2002, p. 28) find in Kenya's horticulture value chain that married women "faced the greatest time poverty, as they had to care for their husband and children, as well as fulfill their responsibilities at the packhouse and/or on farm." In our study, women face a heavier workload and less leisure time than men due to a gender division of labor. Women's disempowerment in time use has implications for ICST adoption, as the most important motivating factor for adopting ICSTs (for men and women) is minimal demand on time to use the technology.

RECOMMENDATIONS

Although women's participation in the activities that move harvested grain from the farm to the final consumer is significant, our study finds that women in the maize value chain are less empowered than men in the PHLIL Ghana study sites. This study speaks to concerns about food security and postharvest losses, as women's disempowerment constrains women's adoption of technologies (Morris et al., 2002; Okorley et al., 2001). The findings of this study suggest that gender equality programs, led by a range of development actors, need to more sustainably challenge rigid gender norms, especially a gender division of labor that disempowers women and girls (in comparison to men and boys) and potentially impacts multiple empowerment domains.

Despite the benefits of projects that target women's groups for access to credit and other trainings, both of which can increase women's empowerment, women's workload and related time poverty may not be lightened by projects aiming to address gender inequalities. This is problematic as studies find a link between gender division of labor and poverty in SSA (Kes & Swaminathan, 2006). Baden (2013, p. 304) finds in Ethiopia, Mali, and Tanzania:

> "[W]omen's lack of time and restricted mobility due to family responsibilities remains a barrier to many women engaging in markets as well as in marketing groups. Women's groups accommodate this more, for example timing their meetings to suit members' needs including caring responsibilities, since they are

> more flexible and responsive to women's needs, but efforts to reduce women's workload or address social attitudes to enable their effective participation in markets were not, in general, factored into the design of the interventions studied."

Projects that support gender equality but do not address the need to reduce women's workload or change social attitudes about care work or housework fail to ameliorate a major barrier to women's participation along value chains. Women and men may not equally benefit from the introduction of postharvest (and other) technologies if women are unable to adequately engage with technologies due to a gender division of labor that disempowers women as a social group across social, economic, and political arenas (Domingo et al., 2015, 95; Leonard & Tronto, 2007).

While acknowledging the complex and deep-seated inequalities associated with gender norms, we provide recommendations to move toward a more sustainable empowerment of women *beyond* the life of specific projects. Our study findings support the call for a more comprehensive approach to combatting gender inequalities, including a gender division of labor that impacts multiple domains of women's empowerment (Baden, 2013, pp. 306–307). Specifically, to better address this study's critical indicators (i.e., the related income and time domains), we recommend the following strategies for governments and nongovernmental actors working on food security and other development projects.

a. *Engage men, women, and community leaders in transformative gender norms education*:

Sociocultural institutions, including gender norms, create conditions that facilitate or undermine the possibilities for empowerment (Hill & Khan, 2008; Jacobs, 2011). We recommend that projects addressing women's empowerment in agriculture (and other areas) incorporate transformative gender trainings and workshops with men, women, boys, and girls to address gender norms for a more sustainable impact on gender equality at the local level. To reduce gender inequalities and better empower women—and in turn empower men and rural communities as a whole—transformative gender norms education would engage men and women across households and community leaders. Domingo et al. (2015) echo the need to engage a wide range of actors to alter gender attitudes and behaviors that hinder women's voice and agency along value chains.

Transformative gender norms education challenges rigid gender norms,including a gender division of labor that disempowers women and girls. Mukhopadhyay et al. (2006) provide examples of culturally appropriate transformative gender norms education (e.g., trainings and workshops) in developing nations with farmers and others. As part of our PHLIL project, we have included gender sensitization workshops for women and men that have included discussion and guidance for: husbands to support wives in their participation in leadership and capacity-building activities; men and women to improve workload sharing to reduce women's time poverty and more equitably distribute household and carework; community leaders to support gender equality and challenge rigid gender norms that have particularly disadvantaged girls and women in the areas of education, leadership, and entrepreneurship along the agricultural value chain. Among community leaders, for example, extension workers should move away from the traditional focus on household heads to ensure that women farmers are also included in trainings; in addition, extension services should be inclusive of women who face time poverty and limited mobility (O'Brien et al., 2016).

While we acknowledge the complementary work that men and women household members often do as well as women's unique role in the birthing and breastfeeding of children, both men and women are providers for children and the responsibilities of caregiving and housework should not be assumed to be “women's work”; we also note that men and women's “responsibilities” have varied over time and place (Leonard & Tronto, 2007). In the agricultural value chain, for instance, men should be invited and trained in nutrition and processing alongside women, so that husbands may be as likely as wives to engage in feeding nutritious meals to their children. In our study, a woman in Tuobodom asserts, “A husband participating in any activity at home depends on his level of education or how enlightened he is; the enlightened men like to support [in housework and childcare] without fear of public criticism.” By engaging men in addition to women, transformative gender norms education can help decrease women's time poverty and improve women's participation throughout value chains in Ghana and elsewhere.

b. *Increase funding to improve girls and women's levels of education*:

The education of females should be improved to contribute toward a more comprehensive approach against gender inequalities as well as to address our study's critical indicators (in the income and time domains). Female education levels are related to the need for transformative gender norms education, as our study finds that girls are more likely than boys to be pulled from school to assist with housework and childcare in our study locations. We find that a gender division of labor has limited females in comparison to males in terms of time to attend school and study at home, and education is linked with women's income and leadership.

Women's lower level of literacy and higher education compared to men in our study is concerning for various points in the agricultural value chain. In this study's survey, female farmers, traders, and aggregators have less education and wealth than their male counterparts (Appendix A), and our study finds that women's lower level of literacy compared to men appears to impact women's empowerment in the leadership domain. Not only is women's lower education level implicated in women's lack of leadership positions in mixed-sex groups as well as disempowerment in public speaking, according to our FGDs, but illiteracy may also impact women's ability to effectively use ICSTs (Njobe, 2015). Our survey shows that more women than men depend on relatives than the formal sector for technical information on ICSTs and that women are expected to depend on husbands and other adult men for agricultural information due to low levels of literacy (see also Kapitsa, 2008). However, previous studies reveal that it is problematic for women farmers to rely on husbands to disseminate agricultural technology information (O'Brien et al., 2016). Since improvement in women's empowerment is related to adult literacy, Ghana's community development and functional literacy offices of the local government should continue women's adult literacy classes. When women can read and write, women's empowerment and self-confidence in negotiating rights in the home, in mixed-sex groups, and in the market should increase, and this could reduce the negative impact of gender inequalities on technology adoption and food security.

State and nongovernmental budgets supporting education should be increased and incentive packages developed to further boost women's enrollment in literacy classes as well as girls' enrollment in secondary/higher education. Along the agricultural value chain, women's education level is related to child nutrition. Smith and Haddad (2000, p. 2) find women's education “relative to men's to be strongly associated with child malnutrition in developing countries. Improvements in female secondary school enrollment rates are estimated to be responsible for 43 percent of the total 15.5 percent reduction in the child underweight rate of developing countries during the period 1970-95.” Consequently, supporting the education of girls through secondary school, especially in rural communities, is important for improving both women's empowerment in agriculture and child nutrition. In addition, our survey finds that women are more likely than men to work in processing (Appendix A). This indicates that women should be key targets for interventions to improve nutrition through the processing of maize. However, as previously noted, we stress that men should also be involved in interventions to improve nutrition to challenge rigid gender norms and increase men's participation in the feeding of nutritious meals to children. Our recommendation to improve girl's and women's education does not negate the importance of boy's and men's education.

c. *Increase mixed-methods research to better address data gaps, and to develop and evaluate women's empowerment measurements and projects*:

Although development projects have targeted women with interventions that can impact food security, women's empowerment (e.g., in leadership) related to gender equality agendas “remains fundamentally under-explored” (Domingo et al., 2015, p. 85). To ensure that agricultural technology programs contribute toward gender equality, Kes and Swaminathan (2006, p. 24) stress the research “need to identify the community specific causes of why women are unable to access these technologies and subsequently address these in their design to make sure women benefit equally [with men] from their interventions.” Responding to these research gaps, we recommend mixed-methods (qualitative and quantitative) research and the development and evaluation of women's empowerment measurements and projects.

Specifically, more time-use analysis is needed to address data gaps, especially regarding the intensity of workloads that impact income and time in developing nations (Bardasi & Wodon, 2006, p. 76). Advocating both qualitative and quantitative methods to analyze local social norms and time use patterns, Kes and Swaminathan (2006, p. 27) write, “Time use analysis can strengthen the policies in sectors that are identified as key to reducing poverty and improving living and working conditions of women, including agricultural modernization and commercialization…” For evaluating policies and interventions, time-use analysis tools should be designed for local contexts and local perceptions of time, and they should “capture individuals' work intensity and the tradeoffs they face” to avoid omitting women's household and “care activities” as work (Kes & Swaminathan, 2006, pp. 24–25). Additionally, “agriculture is the dominant sector in SSA and there are distinct seasonal variations in the workloads of women and men. Therefore, it is important to undertake the surveys over a year at different points in time to capture the impact of seasonality” (Kes & Swaminathan, 2006, p. 25).

In the design of development projects, measuring gender division of labor in housework and childcare should be incorporated to provide insights into women's empowerment. Folbre (2006) “suggests developing measures of individual disposable income and individual disposable time that would be net of financial and time responsibilities associated with care. In addition, she suggest[s] measures that would particularly incorporate gender gaps in disposable time and income as well as care responsibilities” (cited by Klasen, 2006, p. 146). Discussing gender-related human development measures, Chant (2006) calls us to “improve the quality and coverage of sex-disaggregated data on material poverty, on the economic returns of male and female labor, and on gender differences in expenditures in work time and time use” (cited by Klasen, 2006, p. 147). As adapted for our study, the WEAI is one tool that can assist in this research area.

Researchers should evaluate tools that measure women's empowerment in comparison to men's. In particular, our Q-WEAI study raises questions for further research and evaluation of perceived versus actual levels of empowerment between men and women. Future studies should evaluate the measurement of empowerment with qualitative and quantitative data to determine if local gender norms impact the study participants' perceptions of empowerment in comparison to the actual practices that the WEAI domains seek to measure. For instance, when inquiring about empowerment in the leadership domain, researchers should dig deep into the extent of women's participation in decision-making roles at the community level, as the perception of women's empowerment in comparison to men may contrast with women's actual leadership roles in community groups. Studies should also disaggregate data on the women who are in leadership roles in single- and mixed-sex community groups. Our study's focus groups suggest that more educated or formally employed women, if any, may serve in some leadership roles (although not in the top positions) in mixed-sex groups. This echoes findings from Kabeer (2011), whose studies from Ghana, Egypt, and Bangladesh, show that "women in formal employment were more likely to be treated with respect within their community and consulted by others for advice and information" (cited by Domingo et al., 2015, p. 77).

Assessing empowerment within and across the WEAI domains requires qualitative and quantitative methods to illuminate differences between perceptions and the actual extent of gender inequalities. For example, our Q-WEAI results on asset ownership show women as slightly more empowered than men, but men were much more likely than women to own "vehicles" and enterprises, and women's engagement as owners of livestock enterprises was lower than men's. (Some women raise small ruminants and local poultry on a subsistence basis, but not as an enterprise.) Costlier assets in our study are owned or managed by men, yet men's perceptions in our study suggest that they, nevertheless, feel disempowered compared to women in asset ownership. Similarly, Rustad (2016) finds a disconnect between perceived and actual inequalities among social groups, but that study did not examine gender inequalities or empowerment.

Regarding access to credit, even if women are found to be empowered in this area, future research should ask, "Do married women have equitable control or decision-making power over the use of that credit?" In our study, women in FGDs report that they "consult with" their husbands. Does such consultation mean equitable household bargaining power for men and women? In one study of Ethiopian farmers, consultation means that the husband tells the wife what is being done, and this does not reflect the WEAI vision of actual empowerment for women in decision making (O'Brien et al., 2016).

Mixed-methods studies should be designed to evaluate male and female perceptions versus actual extents of (dis)empowerment across WEAI domains. Our findings on men's perceptions of their disempowerment in comparison to women lead us to ask: Do some men view women's empowerment as a win-lose proposition rather than a mutual benefit for households and communities? Do local social norms on masculinities and femininities, gender roles, and gender relations impact participants' perceptions of (dis)empowerment, especially in programs that explicitly include women's empowerment as a goal? Thus, future studies on empowerment and gender equality projects should also incorporate questions to evaluate the impact of measuring and promoting women's empowerment on men's perceptions of gender inequalities and their own empowerment in comparison to women. If local men's perceptions of their disempowerment outweigh their actual disempowerment compared to local women, then development projects should improve the translation of gender equality goals in that locality.

Further, more research is needed to evaluate gender equality agendas, including programs promoting ICSTs, as gender norms can impact the adoption of storage technologies for food security. For instance, income is an important domain for entrepreneurship and investment in postharvest activities, including the adoption of ICSTs, and gender equality programs would ideally improve married women's household bargaining power toward more equitable control over income. However, more research is needed to evaluate programs' impact on developing capacities and social norms that foster equitable male and female relationships at the household and community levels. Are gender equality agendas and their related programs contributing to more equitable relationships between males and females in households and communities? Have men's views shifted from patriarchal norms toward an understanding of the importance of gender equality for the household and community? In addition, more mixed-methods research is needed to assess the effect of targeting women during technology transfer processes on gender relations and inequalities as well as to assess the design, introduction, and monitoring of technologies for women's empowerment. What is the relationship between the transfer of maize storage technology and gender disparities in Ghana?

More specifically for Ghana's gender equality agenda, future studies should evaluate the impact of Ghana's Gender and Agricultural Development Strategy (which began in 2016) and its national Gender Policy (launched in 2013) on women's participation in agricultural value chains, as both of these policies prioritize women's empowerment. Have Ghana's gender equality policies effectively challenged patriarchal social norms and improved women's participation in the food system? What is the state of women's empowerment in agriculture in relation to Ghana's gender equality policies? Such questions could also be applied to evaluate gender equality agendas beyond Ghana.

d. *Reduce time poverty, especially for women and girls, through improved access to basic infrastructure services (e.g., water and electricity) and time-saving technologies*:

Governments and partners should invest more in infrastructure and technologies to decrease time poverty related to household and care work duties (Domingo et al., 2015, p. 95). A “constraint to development in Sub-Saharan Africa,” women's time poverty is due in part to “a lack of access to basic infrastructure services such as water and electricity” and “care economy” demands (Bardasi & Wodon, 2006, pp. 91–92). Beyond farming, rural women and girls in SSA: are primarily responsible for traveling to fetch water and biomass fuel (e.g., wood) for cooking; experience higher “time poverty” than men and boys; and, after accounting for time spent working in paid and unpaid labor, women, and girls have less time for rest and leisure than men and boys (Bardasi & Wodon, 2006). Time poverty impacts monetary poverty, time spent by children working instead of being enrolled in school, and the nutritional status of children (Bardasi & Wodon, 2006, p. 92). Bardasi and Wodon (2006, p. 76) explain:

> “In Sub-Saharan Africa, the issue of time use is especially important because of the high workload carried by many and the relationship between time use and consumption poverty. Households have a high probability of being consumption poor, so that any opportunity to enable them to make a better livelihood, for example by shifting time from low- to high-productivity activities should be pursued.”

Investments to decrease “household time overhead” and its related time poverty would “reduc[e] the tradeoffs among competing uses of scarce labor,” and this would “have important multiplier effects on improving health, saving time, and enabling girls to go to (and stay) in school” (Kes & Swaminathan, 2006, pp. 27–29). Poverty reduction and nutrition strategies should, therefore, address women's time poverty.

In our study, women state that they want time-saving technologies, and we find that time and income are critical areas for women's adoption of ICSTs. Governments and partners should create and disseminate time-saving technologies to increase women's participation in formal labor, which itself improves household nutrition (Kes & Swaminathan, 2006, pp. 22–23, 27). Addressing women's immediate and practical concerns related to time-intensive work, including domestic work, is important to achieve the long-term goals of women's empowerment in agriculture and other value chains.

LIMITATIONS AND FUTURE STUDIES

We call this a quasi-WEAI or Q-WEAI study to acknowledge the influence of the WEAI on our study and analysis. Barring the limitation of not employing the WEAI, the information collected from women and men actors in the value chain is useful and appropriate for our study. We included key informants who are leaders and technical experts to validate and fill any gaps in information. Interviewing spouses (as done in the WEAI) may have some value addition, but our lack of spouse interviews should not minimize this study's results. Future studies could employ the WEAI. This study did not administer the WEAI, which at the time of this study did not include all 10 of our context-specific technologies that we include in our survey.

One may view our inclusion of actors along the value chain as a study limitation. The two main findings from our Q-WEAI—that cost and minimal demand on time promote ICST uptake—were derived from a sample that included farmers, as well as warehouse operators, input dealers, maize traders, and maize aggregators. Given that the actors further along the maize value chain may be using more and different types of ICSTs that are more high-end and costly, their reasons for constraints on cost will likely be different than that for maize farmers. Actors further along the value chain have a different livelihood situation and agricultural enterprises than most maize farmers, and the stated factors affecting uptake may be for different reasons. For example, actors further up the value chain may have employees that use the technologies rather than actually using the technologies themselves, so their reference to minimal time demand could relate to the wages they pay employees, and hence impact on business profits, rather than the demand on their own time, which will rather likely be the case for maize farmers. Analyzing all actors in the value chain could risk confounding the Q-WEAI results, but our key gendered findings did not change when we separated the actors. This study focuses on women's empowerment in the value chain. We asked men about both men's and women's empowerment; we asked women about both men's and women's empowerment. Our study's inclusion of actors along the value chain is an important contribution to assessing perceptions of empowerment. Moreover, we stress that the relationship between the empowerment results and the technology uptake is suggestive, not conclusive. Next, we discuss how our survey results on ICST uptake relate to the livelihood situation and agricultural enterprise of each actor.

We asked Q-WEAI survey participants to describe their personal perceptions of and experiences with postharvest technologies and institutions (e.g., credit) for maize farming. The actors along the value chain are all involved with maize farming, and the majority of survey participants are maize farmers and not further along the value chain, even though those actors may also farm. For example, we surveyed only 20 warehouse operators and 20 input dealers compared to 145 maize farmers (Table 2). We asked Q-WEAI survey participants to rank factors that would motivate them to continue to use or start using the maize farming technology, and their rankings support our general findings if we pool or separate actors (Supporting Information: Annex 1). Farmers harvest maize for home consumption and surplus sale to aggregators and traders. Famers' livelihood concern is food security, and they highly rank time-saving technologies with little or no negative consequences on health. Input dealers are enterprise operator/owners whose livelihood concern is increased income. The key consideration for both male and female input dealers from our survey is whether the time spent in applying technology is long or short. Warehouse operators are enterprise operator/owners who receive fresh grain for medium- to long-term storage, and their livelihood concern includes increased income and environmental soundness. Both male and female operators are motivated by the time-saving and minimum negative consequence character of technology. In our context-specific Q-WEAI survey, all 10 technologies, except the plastic and steel silos, can be time-consuming for warehouse operators; they prefer bagging in 50–100 kg bags and stacking packaged grain to storing in small containers (less than 7 Mt). Men and women warehouse operators and input dealers stressed their preference for less time-consuming technologies, but the women also ranked a low level of capital investment as important for increasing their use of a technology.

In our survey, male and female traders and aggregators appreciate technologies with a minimum demand on time and a low level of capital required. Traders are merchants who buy bulk and operate as wholesalers or buy from wholesalers and operate as retailers of grain to consumers (to prepare human food or animal feed). They hold inventory to assure regular supply. Traders' key livelihood concern is increased income. Any technology that assures food safety, is patronized by other actors in the value chain, and can easily be financed will interest traders. These maize retailers hold small volumes, and they are more likely to adopt the food and pheromone-baited traps for monitoring insects, and the hermitic bags and silos. Aggregators are merchants who buy for traders and agro-processors in the industry (manufacturing animal feed or human food); they travel to the cottages and hamlets to assemble grains for bulk distribution. They hold inventory to assure regular supply and occasionally speculate on price. Aggregators' key livelihood concern is increased income. Any technology that assures food safety, is patronized by other actors in the value chain, and requires low investment will interest aggregators. Such technologies are applied at the least cost. Maize aggregators usually buy and hold bulk stocks for distribution; they are more likely to adopt the food and pheromone-baited traps for monitoring insects than any of the nine other technologies. In sum, less time-consuming and labor-demanding technology tends to have demand from farmers, traders, and other actors in the value chain. Perhaps, doing business in technologies that save time can result in a higher return on investment due to more rapid sales. Future studies could assess more nuanced differences in technology uptake factors across the value chain actors that go beyond the scope of this study.

While our study finds that women are more disempowered than men, both men and women need to be more empowered in agricultural value chains. However, we emphasize that more research is needed to evaluate men's and women's perceived empowerment versus actual empowerment in agricultural value chains. As discussed, a word of caution in the Q-WEAI results on men's disempowerment, in particular, is in order due to what appears to be discrepancies between perceived versus actual disempowerment of men in comparison to women (e.g., in assets). In this vein, there may be differing ideas of (dis) empowerment by study participants. For example, one idea of disempowerment may reflect rigid gender norms that assume men should have some power over women in contrast to shared power with women in a household; male participants may ascribe to a rigid view of masculinity rather than accepting a wider range of possibilities or masculinities. Rigid gender norms, which favor a patriarchal view of men and women, contrast with the Q-WEAI (and WEAI) vision of women's empowerment. As such, if a male study participant adheres to a rigid gender norm, then he may perceive that he is disempowered if his wife gains access to credit through a women's group (and he does not gain access through his men's group) even if she does not have full control over the use of that credit due to her husband's decision-making power. Regarding decision-making power, study participants may have different definitions of consultation, as another study (O'Brien et al., 2016) finds that "consultation" may mean that husbands inform wives about decisions rather than seeking their input. In our study, it appears that (some) men who feel "obliged" to consult with wives about decisions feel disempowered by this, despite the finding that women "always" consult with husbands—this is an example of discrepancies between perceived and actual disempowerment in comparing men and women. Thus, future studies should analyze perceived versus actual (dis)empowerment from the researcher's standpoint.

Future studies should investigate men's and women's perceptions of their own empowerment in relation to development projects. One such example of a study on women's empowerment in an agricultural development project is O'Brien et al. (2022), which employs qualitative methods like participatory research activities to understand context-specific interpretations of empowerment. Since quantitative measures of empowerment (like a survey) applied across contexts can miss localized meanings, we recommend qualitative methods to gather nuanced explanations of perceived empowerment from study participants themselves. Qualitative methods can help us to better understand men's and women's different perceptions of empowerment and gender-based constraints/opportunities within the same context, as perceptions of empowerment may not match with less expressive quantitative measures of empowerment. It would be useful, for example, to determine if men perceive any increase in women's empowerment as a decrease in men's empowerment. Some men in Ghana and elsewhere in Africa have reported to at least one coauthor of this paper that women's empowerment must disempower men because they view women's empowerment as a zero-sum game. However, studies show that women's empowerment can improve household income, nutrition, and other areas of well-being for men and communities too (O'Brien et al., 2022). Thus, we further encourage development projects seeking to empower women to educate study participants, households, and communities about the benefits of women's empowerment for men, families, and communities, and to educate that both men's and women's empowerment are not mutually exclusive.

CONCLUSION

In this PHLIL Ghana project study, we collected data from more than 400 stakeholders, primarily farmers, in the maize value chain. Our findings confirm that ICSTs help decrease postharvest losses and improve food security by increasing the time that grains can be safely stored and the number of families who could afford three meals a day after the use of an ICST. However, women as a social group are disempowered compared to men working in the maize value chain, and this likely hinders the impact of ICST contributions to improve household food security. Future studies should determine if there is a conclusive, known relationship between the uptake/nonuptake of ICSTs and (dis)empowerment.

Drawing from the pioneering methodology of the WEAI and conducting a Q-WEAI analysis, we find that cost and time poverty are the most important factors influencing the adoption of ICSTs, and relatedly, women are critically disempowered in the income and time domains. Despite international partnerships with state and non-state agencies in multiple African countries to address food security (Cotula et al., 2011), our findings highlight the need for governments and development partners to implement more substantive gender equality agendas to empower women in agricultural (and other) value chains. In particular, women's time poverty related to rigid gender norms hinders women's participation in agricultural (and other) value chains. Women's empowerment will likely be a continuous struggle over time, as regression in gender equality has been evidenced historically and globally, especially if community leaders return to or maintain rigid gender norms at the local level. Thus, we recommend a multidimensional approach to achieve women's empowerment across the domains with special attention to reducing women's time poverty through: (1) transformative gender norms education that engages men, women, and community leaders; (2) investment in improving levels of female literacy and secondary/higher education; (3) mixed-methods research to address data gaps and evaluate women's empowerment measures and projects;

and (4) investment in infrastructure and time-saving technologies that address women's practical needs and gender role constraints.

Incorporating gender equality agendas in a sustainable manner beyond the life of a project is of utmost importance for decreasing poverty and improving household food security. This requires challenging social norms that perpetuate gender inequalities, which our study confirms disadvantages women as a social group. Perhaps, most importantly for researchers, our study reveals the need to measure perceived versus actual gender inequalities, as gender forms a part of sociocultural norms that may reflect a patriarchal perspective that disavows the importance of women's empowerment. In research on poverty alleviation, food security, and the promotion of gender equality in rural Africa, Guèye (2000) stresses the importance of taking sociocultural issues into account when designing, implementing, monitoring, and evaluating development projects. Our PHLIL Ghana project heeds this call through ongoing gender analysis of local maize value chain sites. Informed by an in-depth gender analysis, this study's recommendations can be applied to other agricultural technology projects as well as other economic sectors that interest policymakers, researchers, and development partners.

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ETHICS STATEMENT

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

Table A1.

TABLE A1 Sociodemographic characteristics of respondents—farmers.

Characteristic	Men	Women
Age (years)		
Range	21–73	26–74
Mean	42	44
SD	11.7	11.0
Education		
% Literate	56	26
% Illiterate	44	74
Religion		
Christian	43	46
Muslim	53	54
Traditional	4	0
Marital status		
Married	84	90
Single	16	10
Other occupation		
Trading	61	83
Processing	0	6
Wage work	5	6
Artisanship	34	5
Crops other than maize[a]		
Cereals	64	23
Legumes	84	74
Roots and tuber	30	40
Vegetables	39	47
Fruits	9	7
Wealth rank (GHS total earnings)		
≤5000	75	93
>5000	25	7
Location		
Ashanti	20	30
Brong-Ahafo	18	33

(Continues)

TABLE A1 (Continued)

Characteristic	Men	Women
Northern	31	23
Upper West	31	14
Perception of quality of life		
Child education	92	98
Medicare	90	77
Water/sanitation	93	95
Asset (mobile phone)	85	86
Concrete wall/aluminum roofing	33	32
Transport	87	90

Abbreviation: GHS, Ghana currency code.

[a] Maize is a seasonal crop grown as monoculture or polyculture. Maize farmers also grow root and tuber crops, such as yam, cassava, and cocoyam; other cereals, such as millet, rice, and sorghum; nuts and pulses, such as beans, cowpea, soya beans, ground nut; vegetables, such as okro and pepper. About 50% of maize harvested by households is sold. For households that harvest large volumes, higher proportions are sold. In households where maize is cultivated for both cash and food, when maize is in season, income from maize may form a larger proportion of household income.

Source: Survey data, July 2016.

APPENDIX B

Table B1.

TABLE B1 Proportion of respondents confirming participation in maize production activity all of the time.

Activity	Male (%)	Female (%)
Land preparation	83	81
Planting	96	97
Taking care of field (weeding, pesticide, and fertilizer application)	84	79
Group farm labor	81	68
Harvesting	97	98
Transport from field	99	95
Shelling	94	93
Drying at home	97	98
Bagging	98	97
Application of chemicals to harvested maize	34	21
Storage	83	81

Source: Survey data, July 2016.

APPENDIX C

Table C1.

TABLE C1 Factors that will motivate respondents to continue to use or start using the technology (mean rank results from individual sample survey).

Factors	Warehouse operators		Input dealers		Traders		Aggregators		Farmers	
	M	F	M	F	M	F	M	F	M	F
Interest is shown by other actors	3.83	7	4	6	3.46	4.34	4.08	6.44	3.93	3.93
Capital to invest is available at low interest rate	4.83	4.5	4.63	4	4.23	4.05	4.63	5.5	5.6	4.65
Low level of capital investment is required	5.28	4.5	4.42	3	5.08	4.6	4.13	2.5	5.55	5.53
There are no negative environmental consequences	2.78	1	3	7	3.15	4.35	3.69	4.31	3.14	3.66
There is minimum demand on time to use technology	2.33	2	2.68	2	4.46	4.07	3.73	4.75	3.82	3.83
Technology is readily available in the community	6.89	3	6.42	1	5.38	4.84	5.29	5.13	5.5	5.51
My peers are using/ doing business in it	5.39	6.5	5.37	5	4.62	4.05	4.54	3.06	3.81	3.2
My spouse agrees to the suggestion to use it	4.67	7.5	5.47	8	5.62	5.71	5.92	4.31	4.65	5.69
Test statistics										
Male	Warehouse	*N*	18							
		Kendall's *W*[a]	0.365							
		χ^2	46.037							
		df	7							
		Asymp. sig.	0							
	Input dealer	*N*	19							
		Kendall's *W*[a]	0.267							
		χ^2	35.509							
		df	7							
		Asymp. sig.	0							
	Trader	*N*	13							
		Kendall's *W*[a]	0.127							

(Continues)

TABLE C1 (Continued)

	Warehouse operators		Input dealers		Traders		Aggregators		Farmers	
Factors	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
		χ^2	11.564							
		df	7							
		Asymp. sig.	0.116							
	Aggregator	*N*	24							
		Kendall's *W*[a]	0.101							
		χ^2	16.895							
		df	7							
		Asymp. sig.	0.018							
	Farmers	N	88							
		Kendall's *W*[a]	0.154							
		χ^2	94.704							
		df	7							
		Asymp. Sig.	0							
Female	Warehouse	*N*	2							
		Kendall's *W*[a]	0.952							
		χ^2	13.333							
		df	7							
		Asymp. sig.	0.064							
	Trader	*N*	43							
		Kendall's *W*[a]	0.053							
		χ^2	16.006							
		df	7							
		Asymp. sig.	0.025							
	Aggregator	*N*	16							
		Kendall's W[a]	0.27							
		χ^2	30.25							
		df	7							
		Asymp. sig.	0							
	Farmers	*N*	57							
		Kendall's *W*[a]	0.159							
		χ^2	63.624							
		df	7							
		Asymp. sig.	0							

Abbreviations: Asymp. sig., asymptotic significance; F, female; M, male.

Source: Survey data, July 2016.

[a] Kendall's coefficient of concordance.

APPENDIX D

Table D1.

TABLE D1 Farmers' ranking of activities that males and females engage in at home.

Activity	Rank[a]			
	Boys	Girls	Men	Women
Sweeping/cleaning of the house	5	1	8	5
Water fetching	2	5	3	4
Washing (clothes)	4	4	4	3
Cooking meals	9	3	9	2
Child care	5	2	2	1
Animal care	1	6	5	8
Petty trading	6	7	6	6
Agro processing	7	8	7	7
Building construction	3	9	1	9
Molding of bricks				
Support process				

[a] 1 = *most done activity*; 9 = *least done activity*.

Source: Survey data (and cross-checked with Focus Group Discussion data).

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COMMENTARY

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

The global challenge of cancer governance

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Abstract

The global cancer statistics are stark, accounting for nearly 10 million deaths in 2020, around one in six of all deaths globally. The World Health Organization estimates that 70% of these cancer deaths occur in low- and middle-income countries and cancer will continue to rise as a proportion of deaths in these settings. We may usefully characterize cancer as a "social mess," a set of interrelated problems and other messes including poverty and social determinants of health. One part of cancer's "messiness" is the governance deficit around cancer burden and regional inequities This policy paper assesses the field of global oncology governance and the interplay of legal instruments, soft law, national developments, donor activities, as well as partnerships, networks, and coalitions. Cancer governance is central to tackling cancer inequalities. Continuing to probe the complexities of cancer governance requires attention to market mechanisms, international agreements, soft power, political willpower, partnerships, collaborations and networks, and patient participation. Governance is inseparable from "paradigmatic" framings and cancer must be seen as a human rights issue.

KEYWORDS

cancer governance, global health, LMIC

Key points

- Cancer is a "social mess," a set of interrelated problems and other messes including poverty and social determinants of health.
- Cancer governance is central to tackling cancer inequalities: legal instruments, soft law, donor activities, networks, and coalitions.

- Governance is inseparable from “paradigmatic” framings and cancer must be framed as a human rights issue.

INTRODUCTION

Global cancer statistics are stark, with nearly 10 million deaths in 2020, around one in six of all deaths globally. The World Health Organization (WHO) estimates that 70% of cancer deaths occur in low- and middle-income countries (LMICs) and cancer will continue to rise as a proportion of LMIC deaths as the result of aging and falling mortality attributable to other causes (Gelband et al., 2016). Cancer leads to immeasurable individual and community suffering. It is also a systemic evil—a barrier to health system-strengthening, sustainable development, and social justice (Daniels & Donilon, 2014; Knaul et al., 2021; Patterson, 2018). For the Global South, the pandemic further compounded the challenges of planning, financing, and implementing adequate cancer control measures (Mutebi, 2021). Cancer is Janus-faced, laying down intensely personal challenges but with solutions that are irrevocably global (research, financing, workforce). Grossi (2022) writes “Cancer is bigger than any one organization or country.” Governance is the heart of tackling the global cancer burden and reducing cancer inequalities, a global health, and social and economic challenges of our time.

THE “MESSINESS” OF CANCER GOVERNANCE

Cancer is complex both as disease and health system challenge. There are over 600 types of cancer and cancer control activities (prevention, screening, diagnosis, surgery, curative therapies, and palliative care) range across the cancer continuum (WHO, 2020a). It is not straightforward to disentangle cancer from other noncommunicable or infectious diseases (NCDs) (Collins et al., 2019). Many cancer control activities (e.g., trade, transport, environment, education, and fiscal policy) fall outside the healthcare system and may not involve health professionals (Institute of Medicine, 2007). Prevailing assumptions that treating cancers in poor countries is just too difficult or that the disease is the result of individual responsibility help fuel the *5/80 cancer disequilibrium* whereby 5% of cancer spending takes place in LMICs, but those same countries account for 80% of disability-adjusted life years lost to cancer (Farmer et al., 2010). In discussing cancer, we may usefully characterize it as a “social mess” (Horn & Weber, 2007), a set of interrelated problems and other messes including poverty and social determinants of health.

One part of cancer's “messiness” is the governance deficit around cancer burden and regional inequities (Sullivan, 2018). Cancer is a disease bedeviled by need for cross-border collective action but global interdependency, widely accepted for infectious diseases, remains less well understood for NCDs (Hatefi et al., 2018). Health governance involves multi-level actors—states, intergovernmental organizations, and nonstate actors—but where no centralized authority binds states to rules. Global cancer governance concerns formal *and* informal institutions, rules *and* processes that ensure cross-border action and cooperation (Fidler, 2010). Setting health priorities and allocating available resources are national decisions; however, in LMICs, these decisions are strongly influenced by the global health community, including public, private, and third sector interests, that provide advice, support, and funding (Institute of Medicine, 2007).

Activating political will

The global prioritization of tackling cancer is relatively recent and explicitly acknowledged in the *1996 The Global Burden of Disease* (Murray et al., 1996). The 2000 World Health Assembly subsequently endorsed “intersectoral action, appropriate legislation, health care reforms, and collaboration with nongovernmental organizations, industry and the private sector” to tackle NCDs (WHO, 2000). A cancer resolution at the 2005 World Health Assembly called on Member States to develop national cancer plans and reinforce programs, and identified the need for funding mechanisms and treatment options suited to developing countries (WHO, 2005). The Global Action Plan that followed contained interventions to address modifiable risk factors (tobacco, diet, inactivity, alcohol), and highlighted the WHO Framework Convention on Tobacco Control and strategies targeting unhealthy diet and alcohol harm (WHO, 2008).

Cancer was back on the “global menu” with the 2011 UN Political Declaration on Noncommunicable Diseases (Sullivan, 2012), only the second time specific health issues had been discussed at a UN General Assembly (the first being HIV). The meeting focused global attention on NCDs but fell short of providing targets, timelines, or new funding mechanisms (Patterson, 2018). WHO's 2013 Global Action Plan acknowledged the primary role and responsibility of Governments in addressing NCDs alongside international cooperation to underpin national efforts (WHO, 2013). To track progress, Member States adopted time-bound commitments to set national NCD targets, prepare national plans, reduce NCD risk factors, and strengthen health system responses. Progress in meeting these commitments has, however, been disappointing (WHO, 2020a).

A 2020 World Health Assembly resolution called for the elimination of cervical cancer and led to the first global health strategy for the *elimination* of a cancer as a public health problem (WHO, 2020a). A second major initiative seeks to level global inequalities in treating childhood cancers whereby only 20%–30% of children in LMICs survive, compared to more than 80% in high-income countries (WHO, 2020b). For both of these initiatives implementation funding gaps loom large. WHO regional frameworks for action, influencing health policies and formulating regional cancer responses for member states, include those for the Eastern Mediterranean and the African Region (WHO, 2020a). Global commitments to tackling the cancer burden span United Nations agencies including the UN Interagency Task Force on NCDs (and WHO's Global NCD Platform) (United Nations Inter-Agency Task Force on the Prevention and Control of Non-communicable Diseases, 2019). International trade agreements with potential impact on cancer control include the WTO Agreement on Trade-related Aspects of Intellectual Property Rights. This TRIPs Agreement allows a government to approve the production of a patented product or process without the consent of the patent holder in circumstances of national emergency. Such “compulsory licensing” may improve pharmaceutical availability (Farmer et al., 2010) and has widened access to oncology medicines in Thailand and India (Bognar et al., 2016).

The World Cancer Declaration launched under UICC leadership at the 2006 World Cancer Congress—later aligned with the Global Action Plan—is a consensus statement and sets targets for tackling the global cancer burden and inequalities. The Declaration called for cancer control to be integrated into the global health and development agenda and, alongside the NCD Alliance, significant UICC advocacy helped position NCDs in the 2030 Sustainable Development Goals (United Nations, 2018). Target 3.4 is to “reduce by one-third premature mortality from NCDs through prevention and treatment, and promote mental health and wellbeing.” This marked a watershed in global development in acknowledging NCDs, including cancer, as urgent health and development challenges. Reductions in cancer deaths will be essential in meeting such targets and cancer control a pillar of any strategy towards achieving Universal Health Coverage (Target 3.8).

Setting priorities and investing wisely

Global commitment to tackling cancer and meeting goals and targets must be translated into national actions that reflect domestic circumstances: epidemiology, finance, and infrastructure. The "global" cancer burden is unique *national* burdens, risks, and solutions (Wild, 2019). The 2005 World Health Assembly called on all countries to develop National Cancer Control Plans (NCCPs) for situation analyses, to understand risk factors, document cancer control activities and resources, and assess political and socioeconomic context. NCCPs have the potential to improve country cancer outcomes at the population level however many countries lack high quality and operational plans (Oar et al., 2019). For example, research suggests half of NCCPs do not outline referral pathways from primary care for patients with potential cancer-related symptoms (Nicholson et al., 2018).

Cancer registries providing population-based data are central to implementing NCCPs. However, population-based registry coverage in the Global South remains patchy and, alongside resource constraints, in some LMIC countries cancer is not a reportable disease within national legislation (Patterson, 2018). The 2017 World Health Assembly Cancer Resolution reaffirmed global commitments to addressing cancer and reiterated calls for adequately resourced national cancer control plans and for improvements in disease registries (WHO, 2017). With only 35% of countries having a high-quality PBCR in 2019 (WHO, 2020a) it is urgent that national systems— supported by international collaboration— prioritize financing, infrastructure, and human resourcing of effective registries. The International Agency for Research on Cancer champion the collection of quality cancer data and with WHO have developed guidelines for establishing cancer registries, as well as the Global Initiative for Cancer Registry Development utilizing regional hubs, for example, the African Cancer Registry Network (Mery & Bray, 2020). The International Atomic Energy Agency supports radiotherapy within its human health portfolio and acknowledges that equipment and training must be embedded in a wider context of cancer control strengthening. IAEA organizations have supported more than 90 governments via imPACT review missions and through WHO cancer initiatives in cervical, childhood, and breast cancers.

Donor dissonance

Longstanding criticism is levelled at bilateral, multilateral, and philanthropic donor failure to spend enough on cancer control in LMICs compared with other diseases and the absence of cancer from the donor-driven global health agenda (Bollyky et al., 2017; Farmer et al., 2010). Bilateral (government and development agencies), multilateral (UN and Development Banks), and philanthropic (private, NGO) organizations allocate about 2% of budgets for NCDs (WHO, 2020a), a miniscule amount in comparison to funding for HIV and other infectious diseases. There is a lack of bilateral enthusiasm for funding NCD control, either directly or through organizations that resemble Gavi, the Vaccine Alliance. There is a lack of funding to support essential pillars of national cancer action such as national registries (Sullivan, 2018). Despite the absence of dedicated budget or programs to address cancers, bilateral aid agencies could prioritize cancer control within their national-level discussions and fund specific projects that align with NCCPs (Institute of Medicine, 2007). While smaller-scale initiatives do exist some argue that the international response has struggled without US leadership (National Academies of Sciences, Engineering, and Medicine, 2017).

Despite growing global recognition of the importance of NCDs few analysts anticipate major global funds being allocated toward national cancer prevention any time soon (Gelband et al., 2016). The available resources focus on prevention and screening programs because of their cost-effectiveness with a corresponding neglect of diagnosis and treatment. Access to cancer treatments is not working for most of the global population with emphasis skewed toward prohibitively expensive cancer drugs, and with surgical (Sullivan et al., 2015) and radiotherapy (Gospodarowicz, 2021) interventions overlooked for LMICs. The 19th WHO Model Lists of Essential Medicines was updated in 2015 with 16 cancer drugs—including three high-cost medicines—added (Chivukula & Tisocki, 2018), and four further cancer medicines added to the 23rd list in 2021. However, there is insufficient access and need for international collaborations (i.e., global governance *innovations*) to allow LMICs access to affordable "essential" medications (Cuomo & Mackey, 2018; Fundytus et al., 2021). To date, relatively little use is made of TRIPS compulsory licensing, and we have not sufficiently interrogated how governments may better exercise actual and latent power under this agreement (Ooms & Hanefeld, 2019).

Such incongruity, whereby allocation decisions fail to follow evidence of NCD needs and treatment options results in bumpy and stunted cancer control pathways for the Global South. Weak donor support for NCDs/cancer is explained in part by the limited progress in framing cancer control as an urgent global priority.

Twinning, partnerships, networks, and coalitions

Legal instruments, soft-laws, member-state commitments, and donor activities are markers on the landscape of global cancer governance. There are also less institutionalized relationships that draw together and mobilize diverse stakeholders to shape policy and service responses. These typically link healthcare interests in high- and low-income countries (local providers, professional groups and associations, research institutions, international organizations, Third Sector bodies, advocacy groups, national governments). Activities are multi-level (local, national, regional), multi-modal (advocacy, technical support, digital mentoring, site visits), and multi-nodal (decentered leadership, devolved decision-making) and increasingly promote equitable relationships and a "collaborative ethos of global oncology" (Mutebi, 2021) that counters paternalistic models of collaboration.

Twinning—long-term pairings of established cancer centers with new or existing centers (Institute of Medicine, 2007)—is a well-established cancer collaboration, including World Child Cancer since 2007 to support countries to develop local solutions rather than importing them wholescale (Hopkins et al., 2013). Pairings may involve South-South support, for example, the Uganda Cancer Institute was facilitated to support stakeholders in Swaziland in setting up and operating a cancer unit in Mbabane Government Hospital (Kiyange et al., 2018). Instances of *partnerships* include an initiative first convened by a national sponsor organization, US National Cancer Institute, subsequently continued under the leadership of a volunteer-led expert, the Africa Cancer ECHO Steering Committee spanning six countries (Nakaganda et al., 2021). Enduring partnerships that last beyond the grant cycle is a key benchmark when assessing meaningful collaboration.

The language of collaboration is increasingly one of *networks*, with decentered relationships independent of governments and major institutions. National exemplars include the UK Global Cancer Network (Stanway et al., 2021) ("not-for-profit network of UK-based individuals and institutions working in partnership with colleagues in LMICs") and the emerging Canadian global cancer control network (Rodin et al., 2021). Elsewhere, the City Cancer Challenge (C/Can) innovation has been to operate at the city level to improve access to quality cancer care (Adams et al., 2017). C/Can brings together city-wide commitment and public-private collaborations in low-resource settings (including a strong patient voice), focusing on the policy environment and cancer control plan, encompassing core cancer services including improving diagnostic capacity.

Tackling the cancer burden has produced national and global *coalitions*— language previously associated with political and military urgency—harnessed for addressing cancer. These include patient-focused organizations organized around specific cancers (lung, kidney, ovarian), and as a response to the pandemic, the Global Cancer Coalition Network, collectively representing over 750 cancer patient advocacy and support organizations (Global Cancer Coalitions Network, 2020). Similarly, UICC as a global cancer organization representing all cancer types has formal relations with WHO, and connects leaders and advocates to influence policy.

Alongside specific objectives—advocacy, training, or technical support— most network initiatives have sustainability and shared decision making as key goals. Interestingly, research on global health networks identifies effective networks as where their members develop a persuasive *framing* of the issue, including problem definition, and agreement on solutions. Moreover, effective coalitions reach beyond traditional health constituencies and engage the politics and power relations, rather than focussed solely on technical aspects (Shiffman et al., 2016).

Cancer collaborations include private institutions taking the lead in twinning, and those initiatives address specific cancers (e.g., childhood cancer), or provide resources for capacity-building, training, medicines, technology, and capital investments (Blanchard et al., 2021). The Global Coalition for Cancer Diagnostics is a public–private initiative developing collaborations across diagnostic organizations, civil society, local innovators, and advanced start-ups to support locally-led cancer care initiatives in LMICs. Collaborations are essential to ensure technology uptake: adoption, implementation, and finance. Private finance for cancer control in low-income settings may support necessary investments (WHO, 2020a) although if predominantly aimed at new precision cancer medicines it risks exacerbating treatment imbalances, including prevention (Gospodarowicz, 2021; Wild, 2019).

Pharma companies provided access initiatives for 57% of essential cancer medicines on the EML in 2017 (Cuomo & Mackey, 2018). However, evidence is limited on the implementation and impacts of such Patient Assistance Schemes' clinical and cost-effectiveness from a patient and healthcare system perspectives (Felder et al., 2011). Beyond access to medicines and the pharmaceutical sector, understanding the impact of all private sector initiatives will improve accountability of providers to patients. Private global health programs must evidence impact and sustainability, and also acknowledge the potential for redundancy and unnecessary competition. Of a reported 129 private-sector cancer-care initiatives, 19 operate in Kenya, with the majority of these initiatives supporting capacity-building activities (Doshi et al., 2020).

Straightening things out?

There need remains for effective coordination (resolutions, statements, commitments, and initiatives), including WHO and regional offices, the World Bank, and regional development banks, as well as bilateral donors. Some suggest improved coordination necessitates a UN program and call for IARC to be a specialized UN agency within the UNDG (Cuomo & Mackey, 2018). Such an agency would undertake negotiations with national governments, Third sector partnerships and networks, and sponsorships with private organizations. Pooled procurement would also be a major new responsibility and allow greater LMIC access to cancer medications. For others, the way forward lies in innovative coalitions, such as an NCD Cooperative, an international public–private partnership organization beyond health that advocates, negotiates, and innovates incentives and financing (Nishtar, 2017). There is a clear lack of innovative financing instruments in global health for NCDs

(Atun et al., 2017). Scanning the "global menu" it remains to be seen whether there is appetite for a global fund for cancer similar to AIDS, TB, or malaria (Cortes et al., 2020).

Irrespective of whether coordination is refreshed or radically refashioned it is crucial to avoid centralization and compliance that stifle fresh thinking (Farmer et al., 2010). Emerging understandings of governance point to leadership being multi-level with key roles for national research funding bodies, nongovernmental agencies, states, and levels of civil society (WHO, 2020a). It is incumbent upon those shaping resource allocation and service interventions to make patients central to decision-making, amplifying voices of the Global South within any "ethos of global oncology."

It is increasingly clear cancer matters globally. Governance matters for cancer control for reasons of responsiveness, responsibility, transparency, and accountability. Governance is fundamental to furthering the goal of participation, necessitating a role for civil society in agenda setting and mobilizing resources (WHO, 2020a). The international community has been slow to acknowledge and meaningfully include civil society organizations in the political response to NCDs (Dain, 2019). Many countries lack strong patient advocacy, although cancer advocacy organizations in high-income countries are now beginning to mentor those in LMICs. The Cancer Advocates programme developed by UICCC supports civil society in LMIC settings to strengthen their advocacy capacity for improved cancer control.

Global governance is messy. Continuing to probe the complexities of cancer governance involves market mechanisms, international agreements, soft power, political willpower, partnerships, collaborations and networks, and patient participation. Governance is coordination, cooperation and funding mechanisms, and engages compliance, innovation and effectiveness. Governance is inseparable from the "paradigmatic" framings that are brought to bear. The framing of problems has implications for proposed solutions. Regrettably, cancer remains some distance from being framed as a human rights issue (Boyle et al., 2019; Farmer et al., 2010). Evolving cancer governance, however messy, will be much easier to live with when framed by fundamental human rights: the optimal treatment, at the appropriate time, every time.

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Neil Lunt is the sole author and conceived, researched, and prepared the manuscript.

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The author declares no conflict of interest.

ETHICS STATEMENT

The article does not report primary data or raise issues related to informed consent and confidentiality. It did not require formal ethics committee review.

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COMMENTARY

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Digital health services in Bangladesh—The need for a sustainable design framework

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Abstract

Bangladesh received the United Nations Award for DigitalHealth Development in 2011. Inspired by the recognition, the country has launched several digital health initiatives over the last decade. However, despite achievements in expanding information and communication technologies, recent studies show that current digital health services are difficult to use, fail to meet user needs, are subject to threats in data privacy and security, lack a robust digital infrastructure, and do not benefit from a cohesive policy and regulatory environment. As the country currently deals with the post-COVID-19 consequences, it is high time for its healthcare policymakers to address these challenges and take the necessary actions to establish a people-centered framework for digital health service design and operations. In this commentary, we proposed a design framework for digital health services that address these ongoing challenges in the digital health services of Bangladesh. We believe the proposed framework stands to help Bangladesh and other coutnries attain sustainability.

KEYWORDS
digital health, patient-centric framework, policy design, sustainability

Key Points

- Most digital health services in Bangladesh lack usability, user-centricity, data privacy and security, digital infrastructure, technical and resource expertise, digital literacy, motivation, and trust of all healthcare stakeholders.
- It is time for Bangladesh's health policymakers to address the ongoing challenges that demand a

people-centred digital health service design and operations framework.
- This policy perspective proposes a design framework for digital health services that addresses the ongoing challenges in the digital health services of Bangladesh.

INTRODUCTION

In 2009 Bangladesh set a target to become a fully digital nation by 2021, an effort known as “Digital Bangladesh” (Islam & Grönlund, 2011). Since then, the nation has made remarkable progress in expanding information and communication technologies (ICT). The country has already attained nationwide mobile network coverage (Statista, 2018), which includes 54% of mobile phones, 41% of smartphones (“The Daily Star,” 2021), and 28.8% of internet users of the total population (“Dhaka Tribune,” 2021). Furthermore, the country has taken various initiatives to increase financial resources to access ICT services and improve peoples' digital literacy (Rosa, 2017). By aligning with the “Digital Bangladesh” vision, the country has also made a massive technology deployment and transformation in the health sector over the last decade. This includes the development and implementation of District Health Information Software 2 (DHIS2), Digital Dashboard, Shared Health Record (SHR) system, National Health Data Warehouse, Digital Health Hub, Civil Registration and vital statistics (CRVS) system, Video Conferencing, Bulk Messaging Service, Telemedicine, Teleconsultation, E-prescription, and E-referral (Ahmed et al., 2014; Ahmed et al., 2014; Khan et al., 2019). However, these implementations only ensure the country's foundational readiness for digital health and lack in ensuring sustainability due to the impact of different ongoing challenges such as limitations in usability, user-centricity, data privacy and security, digital infrastructure, technical and resource expertise, budgetary constraints, and absence of regulatory and policy guideline in the existing context (Chowdhury et al., 2021; Gordon et al., 2020; Hoque et al., 2014; Islam, 2020; Khatun & Khanam Sima, 2015; Kiberu et al., 2017; Mistry, 2021). These challenges directly affect peoples' motivation and trust (Akter et al., 2012; Chowdhury et al., 2021; Grath-Lone et al., 2021; Sorwar et al., 2016). In addition, a few studies have examined localized digital health services (Ahmed et al., 2014; Ahsan & Raihan, 2013; Haque et al., 2012; Islam, 2020; Khan et al., 2019; Mistry, 2021). Most of these research studies address chronic diseases only (diabetes, cardiovascular diseases, cancer) (Islam, 2020), with a few exceptions such as maternal and child and mental and behavioral health (Mistry, 2021; World Health Organization [WHO, 2020]). However, the efficacy of these areas is yet to be fully understood (Islam, 2020).

The maturity of a patient-centric digital health service depends on its usage, resources and ability, interoperability, and impact on the operating health system (Flott et al., 2016). In this data-driven era, these digital health initiatives are unable to sustain without addressing those burning challenges. To be successful, Bangladesh needs to explore the possibility of integrating emerging information technologies within the existing infrastructure to address the current and future data needs of digital health, a data-centric, predictive (analytics-based), scalable digital health system (Svensson, 2019; Zahid et al., 2021). Furthermore, to achieve sustainability, Bangladesh must develop a practical system design framework (Islam, 2020; Sorwar et al., 2016) for digital health initiatives, both to establish standard guiding principles and ensure effective regulatory monitoring.

Bangladesh initiated a national digital health strategy in August 2019 (WHO, 2019a), though it has yet to be implemented (Bangladesh Ministry of Health and Family Welfare [MoHFW], 2020). As part of the development roadmap, the country recently participated in a four-day consultative workshop facilitated by the WHO, 2021. However, to the best of our knowledge, the government has established no public collaborations and has not reportedly on what, if any, progress it has made with the program. Moreover, as the post-COVID-19 consequences continue in Bangladesh, progress is further delayed. Therefore, while the national digital health strategy development is in progress, we would like to draw the attention of the country's key health policymakers to consider the proposed system design framework in designing and developing digital health services for a sustainable digital health ecosystem.

SUSTAINABLE DESIGN FRAMEWORK FOR DIGITAL HEALTH SERVICES

Figure 1 depicts a system design framework that could serve as the basis of a national digital health strategy. The proposed framework delineates the technological aspects of sustainability in digital healthcare and the needed actions to achieve it in operating services. Furthermore, it addresses the ongoing practical challenges of usability, user adoption, data privacy and security, transparency, traceability, accountability and auditability, data exchange, scalability in digital health services, and the potential to improve the existing real-world context.

User-centricity

User centricity is vital for a system's success, especially in a progressive data-driven environment like Bangladesh. As most of the existing digital health initiatives of the country lack user-centricity (Alam & Khanam, 2023; Islam, 2020), policymakers must establish a user-centric system design guideline to ensure active users (e.g., patients, physicians, caregivers, and public health practitioners) engagement and derive success. Dashboards and UX design will follow from these multiple categories of users. To ensure user-centricity, digital health services should be intuitive and straightforward (Labrique et al., 2018; Nath & Sharp, 2015). The framework should also incorporate cultural aspects (values, traditions,

FIGURE 1 A conceptual design framework for Digital Health Service.

translation, environment) while designing services and interventions (Marwaha & Kvedar, 2021). Moreover, digital health services should complement users' practical, clinical, and emotional needs (Cresswell et al., 2013; Imison et al., 2016; Principles for Digital Development Working Group, 2016d; Stickdorn & Schneider, 2012; UK Department of Health & Social Care, 2019). Improved interoperability (discussed below) will help in the pivot toward user-centricity, making it easier to deploy locally customizable solutions based on a syntactically consistent data platform (WHO, 2019b). Digital health services may adopt an established health data documentation standard from a matured digital health entity such as HIMSS (Healthcare Information and Management Systems Society) or UKHDRA (UK Health Data Research Alliance) to support the system's interoperability need. In addition, it should be customizable, representing the users' lifestyle (Cheon et al., 2016). Communication between stakeholders through digital health services should be concise, exchanging minimal essential information (Jackson et al., 2018; Phillips et al., 2015). Furthermore, besides computers, digital health services should be accessible through smart gadgets such as smartphones, notebooks, and tablets, all of which enrich health equity in remote setups, bridging the digital divide. Lastly, digital health services should include an effective user feedback system to facilitate further design and development of user-centricity, advancing the efficacy of digital health services (Principles for Digital Development Working Group, 2016d).

Security and privacy

Due to the recent growth of cyberattacks (Global Digital Health Partnership [GDHP 2019b]) and the possibility of unauthorized access to digital health systems (Brothers & Rothstein, 2015), data security and privacy are critical components of digital health services. For Bangladesh, this is crucial as the regulation of data security and privacy policy lacks the protection of contemporary data ownership, access, control, sharing, storage, and anonymization needs (the latter of which is the irreversible removal of the link between an individual and his/her health record data to the degree that it would be virtually impossible to re-establish the link) (Alam, 2018; Chevrier et al., 2019; Hoque et al., 2014). Data security and privacy policies concerned with digital health services should explicitly define data sovereignty, ownership, access, storage, and control over data usage in simple language (Principles for Digital Development Working Group, 2016a). All personally identifiable information should be anonymized for any usage by the service users (Ipsos MORI, 2014; California Institute for Telecommunications and Information Technology (CITIT), 2014; Vithiatharan, 2014). Where an exception applies, personally identifiable information's deanonymization (a reverse engineering process where data de-identification is cross-referenced with other data sources to reidentify the personally identifiable information) must be strictly limited. It should be in accordance with the principles of limited purpose, data minimization, protection, and transparency (European Union [EU]., 2018). The services must incorporate data security by design and default (EU, 2018).

Besides conventional techniques, digital health services should also incorporate contemporary security techniques such as multifactor authentication (Borde, 2007; Mikkelsen et al., 2020) or data access, management, and control using robust solutions such as Distributed Ledger Technology (DLT, a digital system for recording the transaction in which the transactions and their details are recorded in multiple places simultaneously). Unlike traditional databases, distributed ledgers have no data storage center or administration functionality (Alladi et al., 2019; Nasajpour et al., 2020; Sharma et al., 2019; Troy & Mary, 2022; Zahid et al., 2022). Furthermore, digital health services should include appropriate mechanisms to circulate breach notifications (to the affected user), system updates, security updates, or changes (Fernandez-Aleman et al., 2015; Mikkelsen et al., 2020). Including these in the data security and privacy policy will ensure transparency in service operations (EU, 2018), growing trust among users and encouraging them to engage actively with digital health services.

Traceability

Due to disruptive changes and a gradual increase in breach incidents, traceability has become a significant need for digital health services. In today's data-driven world, digital health services need to be equipped with digital tracking (Agarwal et al., 2018; Frøen et al., 2016; WHO, 2018). Digital tracking has the potential to: (a) minimize delays in treatment and care delivery, (b) assist health practitioners in decision-making at the point of care, (c) provide personalized healthcare in the care cycle, (d) schedule follow-up consultation, and other relevant services (e.g., diagnosis, pathological tests), (e) facilitate in maintaining checklists for case management, and (f) reduce time and cost of healthcare and delivery at remote settings (WHO, 2019b). Digital tracking is critical to a data-driven society, both to attract users and engage them in digital health services for care management and decision-making (The Office of the National Coordinator for Health Information Technology, 2018). WHO (2019b) recommends digital tracking in sharing health status and related services (e.g., appointment scheduling and payment). Tracking helps address population inequities and weak spot(s) in the health systems and services (e.g., when community workers went into the field to address COVID-19 outbreaks). It provides healthcare practitioners, patients, and public health professionals with the needed linkage(s) to “close the loop” of unmet healthcare needs. Overall, digital tracking ensures accountability at the individual and population health levels.

Digital tracking must also ensure strict data confidentiality. Digital health services should incorporate appropriate technological solutions (Encryption Schema, Artificial Intelligence, DLT) to ensure the required privacy and confidentiality for the system. They should establish a unique identity management system for all users (Imison et al., 2016; WHO, 2019b; Yao et al., 2010). The unique identification system is capable of: (a) assisting in patient searches; (b) reducing redundant entries in patient registries; and (c) improving intervention efficiency, treatment quality, and care delivery (WHO, 2019b). It has the potential to facilitate information exchange, or interoperability, across different healthcare providers, digital intervention, and population health (WHO, 2019b). Bangladesh has already transformed its national identification system and birth registry into a digital format (Election Commission Bangladesh, 2014). Digital health services should utilize these achievements in developing a unique health index for all its residents.

Transparency

In the digital world, 'transparency' means outcomes are predictable from the point of input in a system cycle (Rouse, 2014b). Transparency is one of the key demands users make of digital health services (Cordina & Greenberg, 2019). Transparency in digital health services can be developed by establishing a data flow map and can assist in classifying instances such as data processing information (including trace and track record) and interchanged data types (UK Department of Health & Social Care, 2019).

Furthermore, transparency can help digital health services to comply with regulatory standards. However, a data flow map may cause data misuse, such as niche advertising (Bigelow, 2018; Crawford et al., 2015). Therefore, the policymakers must prioritize this in developing the digital health strategy and establishing a health data usage policy for third parties. Besides, digital health services may incorporate appropriate information technology such as Artificial Intelligence, Machine Learning, and Deep Learning, including details of the technology adopted (e.g., schema, mechanism, protocol, algorithm information) (Shneiderman, 2022). It potentially establishes an informed consent management mechanism within the system and ensures the best transparency practice for its users.

Accountability and auditability

Due to the gradual demand for transparency in digital health services (Cordina & Greenberg, 2019), accountability has become a significant issue in care services and delivery. Accountability supports improving a system's auditability. Auditability means examining and evaluating the existing system infrastructure, executions, and regulation policies (Rouse, 2014a). Accountability and auditability improve the transparency and traceability aspects of a digital health service. Therefore, to ensure systems' information transparency and traceability, digital health services should maintain standards (local or international) for security and performance evaluation. It may involve collaboration or include initiatives such as: (a) Computer Incident Response Centre (GDHP, 2019b; Ruefle et al., 2013), (b) Real-time threat sharing among different health stakeholders using traffic light protocol (GDHP, 2019b), (c) Common Vulnerability Scoring System (CVSS) for all medical devices used in the digital health (EU, 2018; Mell et al., 2007; Skierka, 2018), and (d) integrating Privacy Impact Assessment (PIA) (European Commission, 2016; EU, 2018). These mechanisms and initiatives ensure accountability and auditability of the services as per the regulatory policy (subject to availability and international standards) and add value to care delivery.

Interoperability

By definition, interoperability means the capability of strategic data exchange, access, integration, and use within health information systems, applications, and devices (HIMSS, 2020). It ensures the "standard meaning" of data for all the connected healthcare systems (Feldman et al., 2018). Interoperability enables seamless health data exchange within or beyond the organization and regional boundary. In the current digital health context, interoperability has become a precondition for digital health services. To achieve interoperability, digital health services must confidently confirm user identification in the system (GDHP, 2019b). It is achievable using standardized identifiers such as the National Health Index, a unique number assigned to each person using health and disability support services (Ministry of Health New Zealand, 2021). As Bangladesh has already established such an identification system (National Identification and Birth Registration Number), policymakers must act quickly to develop an NHI to enable interoperability.

Digital health services must adopt a common interoperability standard for their ecosystem (European Commission, 2014; Ferranti et al., 2006; GDHP, 2019b; Liaw et al., 2014; McMorrow, 2014). They may consider adapting open-source platforms (subject to budget or preference) such as OpenMRS (www.openmrs.org), CommCare (www.dimagi.com/commcare), OpenSRP (https://ona.io/), and OpenDataKit (https://opendatakit.org/). They may also consider proprietary standards such as FHIR (www.hl7.org/fhir/overview.html). These interoperability frameworks are easy to adapt and offer flexible feature support. Interoperability can potentially improve access equity, quality of coordinated care, and service delivery of digital health systems (GDHP, 2019b). However, the decision of how to implement interoperability may also have implications for transnational patients (Lee et al., 2021). Policymakers, therefore, must consider interoperability for the ecosystem with significance.

Scalability

Scalability is the expandability of the system in proportion to the system's gradual needs (Bondi, 2000). User expect to drive it over time. As the current technology infrastructure of digital health services is becoming ineffectual in supporting the current and future health data needs (Svensson, 2019; Zahid et al., 2021), providers must take necessary actions for system scalability. First, policymakers must develop a standard guideline for facilitating emerging information technologies such as Big Data, Artificial Intelligence, Machine Learning, Deep Learning, Augmented technologies, Digital Twins, and Fitness devices into the system. In addition, they should strictly monitor the status of minimum data quality standards (GDHP, 2019a, 2019b; Principles for Digital Development Working Group, 2016b) in information exchange within the ecosystem. Major governing entities such as WHO (World Health Organization), IMF (International Monetary Fund), USAID (United States Agency for International Development), and United Nations have already introduced data quality assessment frameworks (MEASURE Evaluation, 2018; IMF, 2023) and strategoes (IMF, 2013; WHO, 2016), and fundamental principles (UN, 2015) that can be used as reference points for evaluation. Digital health service providers should also employ effective impact evaluation matrices (considering multiple factors such as priorities, expertise, time, and investment) for system scalability and risk (GDHP, 2019b; Principles for Digital Development Working Group, 2016b). These steps will ensure effective assessment outcomes for the system scale (Principles for Digital Development Working Group, 2016c). Digital health service providers should also consider effective collaboration and iteration in system design and development processes to ensure the highest possibility for system scale.

DISCUSSION

Sustainability in digital health services depends on effective system scalability and interoperability. To harness scalability and interoperability, digital health services need to ensure effective presence and support for user-centricity, data security and privacy, traceability, transparency, auditability, and accountability in the system. Digital health services should adopt agile design processes for their operations and service quality improvement. They should accommodate regular technological updates by integrating emerging information technologies (Zahid, 2021; Zahid et al., 2021). However, this updating practice sometimes involves large-scale technological implementation and may include risk of failure (as evident in developed economies). Therefore, integrating emerging technologies should be determined on a small scale, incorporating a low-tech approach (Sawadogo et al., 2021). In this way, local communities would be encouraged to innovate in agile ways with as much emphasis on how their goals could be supported by low-tech service provision as on links to digital infrastructure (Norman, 2023).

As Figure 1 depicts, realizing such a comprehensive framework requires technical resources, expertise, and consistent financial support (Labrique et al., 2018). The government of Bangladesh can arrange the needed funding in various formats (e.g., state fund, public–private partnership fund, international donors) with effective management, monitoring, and control support from the MoHFW. Figure 2 illustrates the strategies and emerging technologies that can potentially realize the much-needed framework and achieve the desired sustainability.

The sustainability of such a proposed framework includes environmental impact and energetical cost associated with ICTs (Chevance et al., 2020; Freitag et al., 2021; Waterman et al., 2015). Therefore, the government of Bangladesh should address these perspectives

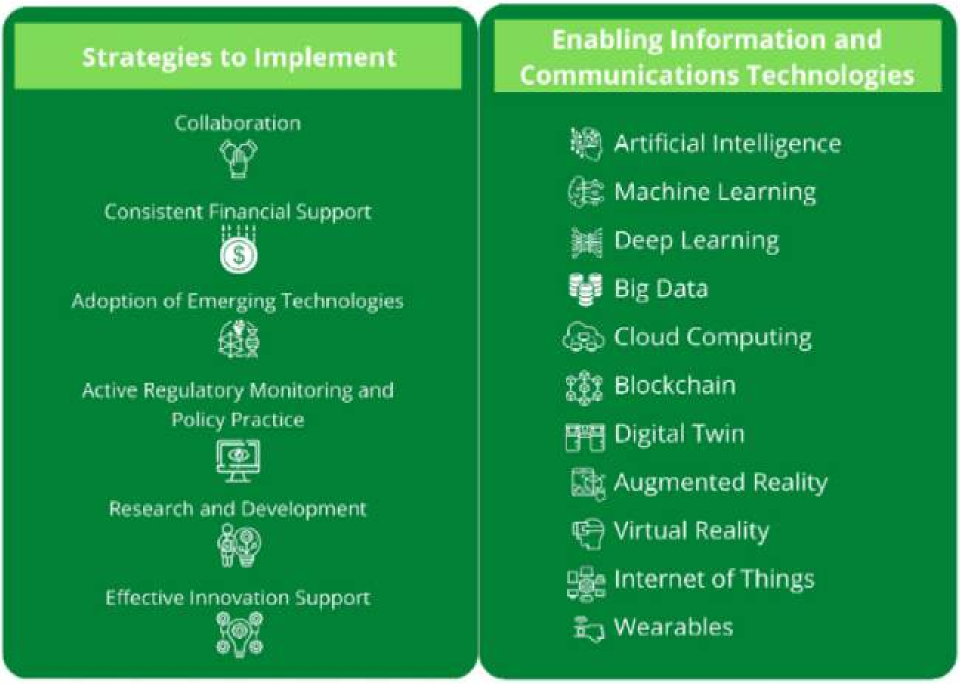

FIGURE 2 Potential implementation strategies and emerging technologies for sustainable digital health service.

with significance and determine appropriate actions with supportive arrangements. For instance, they may review the other available frameworks in neighboring countries (if any) or matured digital health systems (UK Department of Health & Social Care, 2019). Furthermore, they may evaluate and analyze Bangladesh's digital health literacy context and develop a precise action plan addressing the existing constraints.

The proposed framework highlights the needed technological implementations and actions to achieve sustainability in digital health services. It supports service innovation by facilitating the continuous iteration of system design and development. The framework is potential to address the ongoing challenges of usability, user adoption, data privacy and security, transparency, data exchange, and scalability in digital health services. We believe that considering such a framework in developing the national digital health strategy will potentially develop an effective citizen-centric sustainable digital health platform for the country. Lastly, we believe that adopting the proposed framework will build users' trust in the system, ensure active user participation (motivation) (Zahid & Sharma, 2023), and derive success for digital health services.

CONCLUSION

The Covid-19 pandemic made clear that information technologies play central roles in global healthcare (Buehler et al., 2020; Scott, 2020; Tonby et al., 2020). Healthcare stakeholders now have recognized the significance of data-driven digital health services in ensuring the sustainability of healthcare systems (Zahid & Sharma, 2023). By emphasizing the importance of system design principles, we have proposed a framework in this commentary for effectively implementing digital health services in Bangladesh. As the national digital health strategy development is under-way, we anticipate that our proposed framework will actively support policymakers in formulating a comprehensive and data-centric approach. Doing so, Bangladesh can emerge as a beacon of digital healthcare progress and serve as a role model for other nations to emulate.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

ETHICS STATEMENT

The article does not report primary data or raise issues related to informed consent and confidentiality. It did not require formal ethics committee review.

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

The Political Life of an Epidemic: Cholera, Crisis, and Citizenship in Zimbabwe

Chigudu, Simukai

Cambridge University Press: New York, 2020. |Includes bibliographical references and index. *pp. 299*. LCCN 2019042514 (ebook)|

Simukai Chigudu's *The Political Life of Cholera: Cholera, Crisis and Citizenship in Zimbabwe* examines Zimbabwe's catastrophic cholera outbreak of 2008–2009, which caused more than 100,000 cases and nearly 5000 deaths. The book answers three key questions. First, what were the historical and political–economic factors that account for the origins and scale of the cholera outbreak? Second, how did different organizational entities, communities, and individuals act in response to the outbreak? Third, how has the cholera outbreak been committed to historical memory and what political subjectivities have the epidemic generated?

Chigudu's analyses and frameworks cut across epidemiology, political science, technology, and infrastructural studies, as well as medical sociology and anthropology. The interdisciplinary nature of the study is not surprising considering the training of the author, first as a physician and public health expert, and later as an African studies and international development scholar.

Historical events have both remote and immediate causes, and the cholera epidemic is no exception. In a narrow biological sense, cholera is an acute bacterial infection of the intestine caused by the ingestion of food or water contaminated by certain strains of the organism, *Vibrio cholerae*. For Chigudu, beyond biological causality, Zimbabwe's cholera epidemic was remotely caused by deficits in infrastructure. Chigudu traces the historical roots of these deficits to exploitative policies of the country's former colonial government in health and hydraulic sectors.

Chigudu argues that total collapse of the health system contributed to the spread of the epidemic in Harare and the Zimbabwean suburbs. Where clinical coverage was inadequate throughout much of the country, patients were forced to travel long distances for treatments. In addition, there were critical shortages of essential medicines while frequent electricity outages prevented the use of hospital machinery. Basic equipment such as disposable gloves, syringes, rehydration fluids, and bandages were in short supply. In addition, the health-care workforce's welfare was not taken seriously, which led to exodus of skilled workers. Chigudu also posits that poor surveillance was also a causal factor. He shows how cholera was able to spread undetected throughout Zimbabwe, rendering health professionals unable to provide timely treatments to those in need. Further complicating the situation was Zimbabwe's disastrous economic downturn which increased the vulnerability of the populace to cholera through food insecurity and malnutrition. Therefore, Zimbabwe's political conflicts and economic crisis prepared the foundations for the proliferation of cholera outbreaks in the country.

As Chigudu explains, Zimbabwe's cholera epidemic was followed by political contests. The epidemic was first greeted by government's denial of that there even was an outbreak. In the same manner, the government's actions were characterized with ambivalence towards poor people. For example, limited effort was made to improve the water system. The epidemic therefore exposed the Zimbabwean government's inability to attend to the welfare of the population. Chigudu argues that the ruling party blamed the crisis on interference by neocolonial and imperial Western interests. The government concluded that the developed world wanted to use the cholera crisis to prove that Zimbabwe is a failed state.

Chigudu also shows how the crisis was politicized and weaponized by the Zimbabwean government. Hence, the political life of the epidemic exposed and contested how governmental systems and processes failed. This failure was due to racism, colonialism, hyperinflation, embezzlement, and underinvestment that have characterized the political–economic frameworks of health-care provisions of the country. Finally, Chigudu shows how the epidemic contributed to the already large-scale movement of more than 38,000 Zimbabweans into South Africa and the entire region of southern Africa.

The ongoing COVID-19 pandemic reinforces the importance of Chigudu's book, which provides essential frameworks for interdisciplinary studies into the impacts and management of diseases, particularly those that reached global scale. Fundamentally, Chigudu is correct that cholera is characteristically episodic and dramatic. Hence, in terms of acts, scenes, spaces, and times, a cholera epidemic calls for critical understanding of not just the epidemic's epidemiology, but also the various corollaries underscoring its emergence, rapidity, and morbidity One of the unique aspects of this book is how the author highlights the intersections between epidemics and politics of health. Remarkably, the varying shades of structural violence, health inequalities and inequities embodied in the handling of epidemics are indicators of a failure of bureaucratic and governmental structures. Epidemics test sociopolitical systems, which in turn can help understand a country's political challenges, including the capacity and legitimacy of government. Epidemics expose the limits of national and international agencies in health-care delivery.

The Political Life of Cholera is a case study that shows how infrastructure sometimes facilitates racist domination within public health. Chigudu provides a framework which can be used to understand some of the lived experiences of the global South during colonialism and continued effects of neocolonialism. Following Chigudu's conclusions in this book, it is clear that epidemics and pandemics do not just only involve physiological or biological processes but occur in negotiation with social, cultural, and political worlds. Putting this differently, pandemics and epidemics are not just epidemiological but also historical, economical, political, and social.

The Political Life of Cholera: Cholera, Crisis and Citizenship in Zimbabwe shows that the study of epidemics sits at the intersections of history, public health, epidemiology, political science, and international studies. It also emphasizes how the study of epidemics affects our understanding of global health priorities as well as how these epidemics have continued to influence infectious disease management and public health modeling. This book will be a welcome addition to the literature for scholars who seek a comprehensive and critical understanding of diseases, epidemics, and pandemics.

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Xiaoping , Fang . China and the cholera pandemic: Restructuring society under Mao

Pittsburgh: University of Pittsburgh Press, 2021. ISBN: 9780822946625, x+312 pp., $55.00, Hardcover.

The first global pandemic of cholera originated in the Bengal Delta in 1817. The first cholera pandemic reached China both by land and sea in 1821. After that, the world experienced six cholera pandemics until 1923. The seventh one started in Indonesia in 1961 due to the El Tor vibrio and transmitted it worldwide, including China. *Vibrio cholerae* caused the El Tor biotype or the last cholera pandemic (Hu et al., 2016). Xiaoping Fang has reconstructed the last cholera pandemic, which contributes to both social history and public health history in the People's Republic of China during the cold war politics, particularly from 1961 to 1965. Fang, who is an Assistant Professor of History at Nanyang Technological University in Singapore, and whose research focuses on the history of medicine, health, and disease and the sociopolitical history of Mao's China after 1949, has already published one book and several peer-reviewed journal articles on these topics (Fang, 2012, 2015, 2019, 2020). Through rigorous archival research and in-depth interviews with the survivors of the cholera pandemic, cadres of the health department, and clinic doctors, Fang's current book explores the post-socialist Chinese history between the Great Famine (1958–1961) and the Great Proletarian Cultural Revolution (1966–1976) with a focus on his home village in Zhejiang Province's Wenzhou area.

Following the frontispieces of the book, the author presents three maps indicating his study areas and the origin of the seventh cholera pandemic. In total, 4 maps, 13 tables, and 19 images or figures support his descriptions throughout the book. Excluding the introduction and concluding remarks, the book is divided into three parts consisting of a total of seven chapters. The first part, “Global Pandemic and Mobility,” consists of two chapters titled “The Origins of the Epidemic: Migrants and Refugees in Cold War Asia” and “Mobile People, Mobile Disease.” This first part explores the Chinese diaspora and the global cholera pandemic within the context of Indonesia and China's transnational politics from the late 1950s onward. Also, part one features the local cholera pandemic in Wenzhou Prefecture during the summer of 1962.

Fang suggests “population mobility and displacement resulting from wars, rebellions, and social and political chaos have often led to the outbreak of pandemics” (p. 8). Some experts on pandemics and mobility studies may disagree with Fang's observations. Their explanation is that population mobility and displacement may not be responsible for “the outbreak of pandemics,” instead, it may assist in transmitting contagious infections. For example, 2019-nCoV is the temporary name of a novel coronavirus never identified in humans, which is later given the new name of COVID-19. Human mobility or transregional connectivity facilitated the spread of the COVID-19 virus worldwide. Therefore, we can say that human mobility and transregional connectivity make smooth the transmission of virus or infection, whereas every “outbreak of pandemic” has its root cause, such as the COVID-19 of the novel coronavirus or the bacteria El Tor vibrio for the seventh global cholera pandemic.

The book's second part, “Contagion, Social Divisions, and Borders,” contains two chapters, “Social Divisions, Epidemiology, and Disease Distribution” and “Quarantine and Isolation: The Rise of Multiple Borders.” This second part examines the social settings and symbolic borders associated with rural/urban, male/female, and military/civilian. It further investigates different social borders and practices such as home quarantine and isolation for interrupting the contamination of dangerous infections. The author underscores the influence of population movements and the crossing of provincial administrative frontiers. He further illustrates different reasons for human mobility; however, the absence of sufficient data regarding migration within different local contexts may be a potential shortcoming.

The third part, “Pandemic Emergency, Data, and Social Structure,” is comprised of three chapters: “Comprehensive Inoculation, Rural Rhythms, and Compiling Registers,” “Stool Samples, Archiving Patients, and Statistical Politics,” and “No. 2 Disease: A National Secret.” The third part of the book investigates comprehensive inoculation emergency programs, epidemic statistical politics, and the reasons for politicizing the cholera pandemic as the “No. 2 Disease.” The author brilliantly illustrates the remedial system in China; however, he overlooks the curative methods of cholera in originating places, such as Indonesia and Bengal. During the last cholera pandemic, oral rehydration solution (ORS), an effective and successful curative method, was applied in Bengal. With the assistance of experts from the United States, the Cholera Research Laboratory (CRL) was established in East Pakistan, which is presently Bangladesh. The CRL experimented with ORS in the late 1960s and early 1970s in Bangladesh. Although Fang devotes little space to the topic, CRL became one of the most significant medical advancements of the 20th century. In the book's last part, Fang shows the Chinese Government's secrecy regarding the cholera pandemic. Such secrecy surrounding pandemic-related policies was perhaps implemented to avoid political unrest within China. In addition, the politicization of the cholera pandemic also occurred in 19th-century British India, which constituted the areas of South Asia under the influence of the English for hundreds of years. This 19th-century epidemic was highly political because it was a potential threat to British colonial power.

The book traces the transmission of the seventh cholera pandemic from Makassar, Indonesia, to Wenzhou Prefecture, China, between 1961 and 1965. Undoubtedly, this text significantly contributes to the existing knowledge of public health history based on several related areas. Fang attributes the rise of health emergencies to the formation of health governance and the development of pandemic surveillance under socialism in China during the mid-20th century. This book also contributes to the medical history literature on the role of infectious disease in socialist statecraft. All in all, this book is a concise and powerful description of the El Tor cholera pandemic. The writing style is clear and easily accessible for general and professional audiences alike, requiring little previous exposure to this topic. Indisputably, Fang's recent book is a groundbreaking work of inquiry in relation to history in general and the history of epidemiology.

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Perilous Medicine: The Struggle to Protect Health Care from the Violence of War

Leonard Rubenstein

Columbia University Press. ISBN: 9780231192460 416 pages

> *There were seventeen premature infants in incubators in the neonatal wards. "Each of us carried two or three babies and ran to the basement of the Obstetric and Gynaecological Hospital. Bullets and shells fell all around us as we ran carrying the children," she wrote. Thirty-three older children had to be moved as well. Five minutes after the staff got all the children out, a shell hit the neonatal unit, destroying the incubators and incinerating the unit.*

This dramatic description could be from Syria or Yemen or even from Ukraine. However, nearly 30 years ago, it was from Bosnia when Serbian forces bombed Sarajevo—regardless of civilian infrastructure or casualties. Contrary to common belief, violence against health care systems—including personnel and infrastructure—is not something new in the history of warfare. Despite the Geneva Conventions, there has never been "a golden age" where the warring parties had respected the health care of the enemy forces.

Research of violence against health care has been limited and has focused on public health effects. Leonard Rubenstein is a human rights lawyer and the Director of the Program on Human Rights, Health and Conflict at the Center for Public Health and Human Rights, at the Johns Hopkins Bloomberg School of Public Health. In *Perilous Medicine*, Rubenstein provides a comprehensive explanation of the motives and reasons for attacks against health care in conflict settings.

The book is based on 13 different case studies from Kosovo to Syria in which Rubenstein sheds light on the perpetrator's possible mindsets and intentions that lead to violence against health care professionals, patients, and health care infrastructure. Cases include events in which health care protection has failed; health professionals have been killed, kidnapped, and forced to work for armed organizations. Ambulances have been stopped at checkpoints, and facilities have been bombed, robbed and burned. In these case studies, Rubenstein elevates the voices and spotlights stories of health care professionals whose work has been directly impacted by war. The stories lead the reader into a very dark world where professionals work and risk their lives to save others.

The ethical and moral questions about the legitimacy and means of warfare have always been topical, especially as concerns what is allowed and under what conditions attackers are entitled to damage civilian infrastructure. Rubenstein highlights two opposing doctrines. On the one hand, there are strategic and tactical reasons for warfare (such as "military necessity") which make the use of force acceptable even against civilian targets in certain situations. According to the international law, such damage or injury must be proportional to the direct military advantage anticipated. The attacker must take all possible measures to prevent civilian casualties, and excessive force must be avoided. On the other hand, there are situations where, for example, hospitals or ambulances are used for military purposes. In that case, the immunity granted by international agreements ceases. As an example of this dilemma, Rubenstein uses the U.S.-led coalition's attack against ISIS on Raqqa in Syria in 2019. ISIS headquarters were located within the city's largest hospital, and medical staff and patients were used as human shields. Rubenstein criticizes the coalition for attacking the hospital, presumably without warning and without an effort to minimize civilian casualties. Although ISIS was largely defeated, civilians paid a high price for military victory.

Rubenstein skilfully underscores the main structural problem that health care faces in conflicts: how to protect civilians when international politics, laws, or norms do not prevent warring parties from the perpetuation of violence? The great powers, which play a decisive role in international politics, have in most cases themselves acted at least as an enabler of violence. As a glaring example, Rubenstein cites the U.S. arms trade to Saudi Arabia, which is known to have used U.S.-supplied defence equipment to bomb health care facilities and personnel in Yemen.

The author offers several concrete ideas for addressing these problems. First, we need to understand the causes of the violence, which is the most significant contribution of this book. Second, Rubenstein argues, standards and practices that protect health care need to be strengthened. All parties to conflicts must commit to protecting health care. Rubenstein calls for a new kind of leadership and international solidarity demanding action to protects health care from violence in armed conflict.

Rubenstein's book sounds the alarm about the threat that global violence poses to health care systems, especially in fragile and conflict-affected countries. The author skilfully highlights the complex international and local political environments and circumstances that underlie acts of violence. The hard fact is that hostilities threaten the well-being of millions of people. And, as Rubenstein makes clear, violence against health care systems is a major but often underappreciated global problem. Although health indicators are improving in many countries, violence threatens this progress necessitating further action.

US president Joe Biden recently called the Russian leader Vladimir Putin “a war criminal” for his atrocities in Ukraine, such as the attacks against health care in Mariupol. This constitutes a true test for the international community. Does the will and ability to punish war crime on the highest level exist?

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BOOK REVIEW

Psychiatric Casualties: How and Why the Military Ignores the Full Cost of War

Mark C. Russell | Charles Figley

Columbia University Press, 2021. ISBN: 0231187769

Because the U.S. military's most valuable resource is its soldiers, it would make sense for it to provide its soldiers with the best care possible. While such care is often provided to address physical ailments, psychiatric issues often are ignored. In their book *Psychiatric Casualties: How and Why the Military Ignores the Full Cost of War*, physicians Mark C. Russell and Charles Figley explain why this happens by showing a dilemma the military faces with mental health.

The military has two options. First, it can support soldiers by acknowledging the psychological damages of war and committing to supporting soldiers in their healing. However, this comes at the risk of losing soldiers, bankrupting the military, and ultimately harming the military's war-fighting mission. The second option is to support the military by ignoring the issue and avoiding responsibility for the consequences. This will save the war-fighting mission yet sacrifice the individual soldier as cycles of behavioral health issues are perpetuated. Both authors, army veterans, and experts on military psychology provide a comprehensive and damning case that the military has a culture and policies that offer harm instead of healing for soldiers' mental health.

Russell and Figley dredge up a staggering amount of evidence to support this claim, starting with a short history of wars from the Crimean War to modern-day conflicts. They show how the military learns valuable lessons about psychiatric care, and then ignores them, only to be unprepared and relearn them at the start of the next war.

The second chapter shows why we care that psychiatric care is inadequate. Not only does it affect individuals' mental well-being, but also their physical health, their family relationships, and society. Every year 200,000 service members retire to civilian life (Lawrence, 2018). Veteran mental health is vital to public health as it affects divorces, ever-increasing military suicide rates, skyrocketing costs of care, drug use, homelessness, and more. Getting care for military mental health can have great positive impacts on the health of our society.

The authors present 10 “Dark-Side Strategies,” or ways the military perpetuates its mental health problems. The first “Dark-Side Strategy" details how the military vilifies mental illness, characterizing it as weakness or moral failure. The second strategy is abuse at the hands of the legal system, which leads to incarceration or even execution of soldiers who need psychiatric care. The third strategy uses shame and humiliation to subdue mental illness. Fourth, the military simply ignores the psychiatric toll that war inflicts.

The fifth strategy is to purge weakness through such tactics as rejecting potential soldiers with a history of parental divorce, shyness, or repeating a grade. According to the authors, the military largely ignores the fact that these screening tests are ineffective and that the highest predictor for war-stress injury is the length of combat exposure. The sixth strategy involves delaying accurate reports on military mental health and even deceiving the public.

Seventh, the military refrains from providing correct diagnoses and pressures soldiers to accept false pre-existing conditions. With these diagnoses, the military also finds roundabout ways to dishonorably discharge service members with mental illness. The eighth strategy shows how the military avoids centralizing responsibility for failures in mental health. The ninth strategy is providing inadequate, experimental, or downright harmful treatment. Evidence shows that the military's established methods of care, such as the frontline psychiatry treatment, are “substantially more likely to harm service members and their families than to help.” Finally, the final strategy is that the military perpetuates neglect through their indifference to the problem and continued refusal to learn the lessons of the past.

Chapter 14 explores three ways change can be accomplished. We can do nothing and hope the military changes internally, Congress can be petitioned to exert pressure on the military, or class action can be taken to force change. Unfortunately, the research presented by the authors shows that the most likely way to enact change is litigation. They offer 24 policy changes that can improve the military's approach to mental health. These are vitally important because without solutions soldiers will continue to be abused and hurt; then, once discharged honorably or through backdoor means, their mental health becomes the burden of society as they become civilians.

This is an incredibly important book. It highlights the ethically deplorable actions of the military and shines a glaring and unattractive light on a huge problem America has in one of its longest existing and largest organizations. These problems are not isolated but affect the nation and bleed into civilian life as well. They must be addressed and solutions, such as the ones offered by Figley and Russell, need to be implemented to save the service member, their families, and all who are affected by this issue.

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BOOK REVIEW

The Work of Hospitals: Global Medicine in Local Cultures

William C. Olsen and Carolyn Sargent

Rutgers University Press, 2022. p. 270. ISBN: 978-1978823037.

What happens when hospital healthcare systems do not achieve their idealized purpose of providing adequate healthcare? This question is acknowledged throughout *The Work of Hospitals: Global Medicine in Local Cultures*, an ethnographic anthology about how hospitals function as biomedical social institutions that sometimes come into conflict with cultural values within communities. This edited volume clearly shows through patient and researcher narratives that strain between westernized hospital systems and local cultural practices can undermine health delivery services and lead to poor health outcomes for community members.

Edited by medical anthropologists William C. Olsen and Carolyn Sargent, this book contains 13 chapters divided into three parts with intertwining themes: I. Global Medicines in Local Cultures, II. Care Giving and Hospital Labor, and III. Hospitals and the Patient. Part I emphasizes the lack of inclusion and understanding of culturally-based practices and views of the body. Medical education is rooted in biomedicine and medical technology, which expands the cultural divide between the practice of hospital medicine and the values upheld by members of the community the hospital serves. This is further exacerbated, as highlighted prominently in the outlining of the Peruvian cash transfer program *JUNTOS* in Chapter 1 and the comparison of ethnographic accounts of the Lower Congo and Northern Uganda in Chapter 5, by Hoke et al. and Janzen, respectively, when hospital clinics serve as institutional actors of state policies and social guidelines. These guidelines, which further the idea of hospitals as "corporate institutions" (p. 96), are often structurally biased against many low-resource and ethnic cultures that seek those same hospitals for care.

Part II ("Care Giving and Hospital Labor") expands on the disparity between hospital and cultural values, and how care is often dictated by state authority and financial resources. As addressed in Chapter 8 (Strong) with nurse interviews from the Rukwa region of Tanzania, capitalist shifts in healthcare priorities affected the culture surrounding nursing practice within the community from one of prominence and selflessness to a profession perceived by media as devoid of compassion, autonomy, and prestige. Moreover, in Chapter 9 Smith-Oka and Hurd show how hospital spaces, as social institutions, further shape constructs of economic hierarchies in their comparison study of private and public hospitals in Puebla, Mexico.

Part III ("Hospitals and the Patient") addresses how social hierarchies in hospital systems reflect the same inequities based on age, gender, and ethnicity that exist in the broader social community. Georges demonstrates these hierarchies in Chapter 12 with an analysis of varying obstetric care in Greece for Roma women and other immigrant and economically marginalized groups. In Chapter 13, Varley also emphasizes these structural inequities with the concept of "night side medicine" in obstetric care through accounts of systemized medical neglect and injustice in a hospital in northern Pakistan.

This book offers an incredible breadth of detailed interview accounts that demonstrate the unrevealed dichotomy between culture and hospital care and how hospital care has failed its purpose in many instances to heal communities. These ethnographic explorations are contextualized with existing medical, anthropological, and historical research references in each part, which is a tremendous asset for readers. Too often, health disparities and mistrust in healthcare systems are seen in the form of numerical statistics, but the melding of high-level patterns and personal accounts allows the reader to see the stories behind these numbers through the lens of individual patients and researchers. Moreover, though hospitals are generally considered structures for restoring health, the authors of each chapter skillfully weave narratives underscoring the way in which hospitals act as facilitators of the same structural inequities visible in the broader social landscape. These authors successfully draw the reader's attention to the value of ethnography as a way to understand the veiled realities of the relationship between healthcare systems and communities.

This edited volume does have some limitations. Many of the chapters were authored by western—often U.S.-based—researchers, which may potentially be a barrier to the interpretation of the individual patients' reflections, especially in global contexts. Additionally, while each of the three parts was grouped according to common themes among their chapters, it is understandably difficult to clearly delineate each of the parts, since many chapters had overlapping themes of caregiving limitations with state policies, patient-hospital relationships, and tensions between community culture and westernized notions of healthcare. That being said, Olsen and Sargent's compilation of evidence-based, anthropological accounts of experienced researchers serves as an essential tool to shape the understanding of global medicine, especially for upper-level undergraduate and graduate students studying global health and anthropology. Furthermore, anthropology and public health instructors would benefit from assigning this book in their courses as it provides in-depth insight into the function of hospital systems in different cultural settings.

As a student of public health and medicine myself, this book shaped my understanding of how social and political environments affect the administration of individual medical care. Imposing western, neoliberal constructs of medicine in global communities that do not hold the same views of the body and medical practice is to both the detriment of the local community and the hospital systems that aim to meet national standards for health. This anthology highlights the importance of hospital ethnography and the need for understanding the historic and cultural influences of care from a medical anthropological lens. Most importantly, as emphasized in the afterword by physician and medical anthropologist Claire Wendland, "hospitals change as the world in which they are embedded changes" (p. 229), and thus there is ongoing work to be done to continue to comprehend the sociocultural landscape of global and local communities and its manifestation in healthcare settings.

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Criminal Contagion: How Mafias, Gangsters and Scammers Profit from a Pandemic

Reitano Tuesday, and Mark Shaw

Oxford University Press, 2021, 304 pp., ISBN: 9781787384460

Criminal Contagion: How Mafias, Gangsters and Scammers Profit from a Pandemic is an important book written by international crime experts, Tuesday Reitano and Mark Shaw. Using multiple cases, statistical analyses, and comparative observations, they present a sophisticated, social scientific study on the ways criminals exploited the global pandemic to their advantage. Thus, while criminals of all kinds benefitted from the heavy-handed lockdowns, ordinary people shouldered the twofold brunt of a public health crisis and an epidemic of crime. The authors argue public safety and security were endangered due to the flawed state response that policed citizens rather than criminals. Although crime activity was at its greatest, according to the authors, the overall government response to illicit activities during the pandemic was at its weakest.

Using the medicalized language of "contagion" and "disease" to emphasize the parasitic and infectious nature of the crime as a social pathology, the book describes criminality as "a virus, epidemic or cancer that mutates or undergoes a metastasis that undermines the body politic and political institutions" (p. 208). Illness metaphors are used to emphasize the human, social, ecological, and economic costs of globalized crime that increased significantly due to the problematic pandemic response by officials. The authors criticize the United Nations for choosing to focus on other issues rather than prioritizing and tackling the urgent problem of crime that is harming communities and society, especially the most vulnerable and marginalized. The authors claim that "if action is not taken immediately, the damage may become irreversible. Especially given that society itself was already sick" (p. 209).

The book analyzes the criminological problem of "virtual violence" such as cyberattacks on the educational sector, unemployment systems, health and medical research institutes, and logistics and transport companies, as well as the rising problem of data breaches and malware crime, the legal streaming of sexual exploitation and domestic violence against women and children, and other forms of online abuse. The authors explain that criminals took advantage of and adapted to an already weak or failing regulatory system. Also examined are various environmental violations that increased in the pandemic such as illegal deforestation, mining, fishing, and other wildlife crimes, including the problem of wet markets relating to the pandemic. Other crimes discussed include human trafficking and smuggling, ghost payrolls, corruption in health sectors, counterfeiting and pirating health products, and peddling fake pharmaceuticals, as well as fraud, doorstep scammers, drug trafficking, identity theft, and kidnapping.

The book also considers the negative pandemic effects on the criminal justice system—such as releasing prisoners into society, disabling the courts from operating, and decreased numbers of available law enforcement officers while also highlighting innovations such as the delivery of a “virtual justice” through a shift to online courtrooms. Other crime-pandemic problems are addressed such as the dangers of medical misinformation, medical fraud, and pharmaceutical crimes, as well as the problem of government corruption and impunity when elites take advantage of the societal crisis. Criminal entrepreneurs and increased gang dominance colonizing urban areas resulting in the violent expansion of illicit economies to maintain community control through the unwritten norms of “criminal governance” is also examined.

Arguing that the pandemic emergency was poorly handled and compromised human rights, the authors state that governments “have abused power, silenced their critics, weakened institutions of service delivery, and kneecapped systems of accountability and transparency—all under the justification of public health and security” (p. 147). To mitigate future heightened pandemic crime, Reitano and Shaw argue that access to reliable, timely, and quality information is essential. An effective response also requires independent and objective media to counter misinformation, prevent corruption, fight organized crime, and hold systems of governance to account.

The book concludes by calling on “policy makers, urban planners, social innovators, architects, tech geniuses and entrepreneurs to develop a role in community safety and security” and “to find ways to erect barriers to the transmission of crime in everyday society” (p. 213). Highlighting the importance of international, national, and local policies, the authors make several recommendations for the prevention, treatment, and cure of the ongoing crime contagion in the postpandemic world. Strengthening law-enforcement, building stronger systems of government and law, developing integrity, and respecting human rights, for example, are needed if governments wish to maintain the trust of those they are meant to serve and protect.

Those medically interested in the relationship between public safety and public health, however, will be disappointed as the primary focus is placed on increased crime commission due to the mismanaged official response of authorities to the global health crisis. Therefore, those seeking to understand the relationship of crime to medical questions of disease, illness, and health policy will be dissatisfied. Nonetheless, I highly recommend the book for its important content, strong presentation of evidence, keen analytic overview, the breadth of crimes examined, and the issue of crime as another epidemic plaguing the planet and requiring attention.

Criminal Contagion is essential reading for those concerned with the ways in which policy and governmental failures contributed to the crime during the COVID-19 pandemic. Its empirically rich analysis draws on vast source material to provide a critical analysis on the impact of the pandemic on organized crime in the global context. Although a great deal has already been published about the impact of the pandemic on the legal economy, far less has been written about the effect of the pandemic on the illegal economy. Therefore, *Criminal Contagion* is a timely contribution to scholarship and fills a major gap in the academic literature by providing an analysis of the relationship between the global pandemic and the growth of criminal governance in society.

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BOOK REVIEW

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I Refuse for the Devil to Take My Soul: Inside Cook County Jail

Lili Kobielski by powerHouse Book, 2018. 152 pages, ISBN13: 9781576878880

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> The subject of prisons and corrections may tempt some of you to tune out…In my submission you have the duty to stay tuned in… This is your justice system; these are your prisons… When the door is locked against the prisoner, we do not think about what is behind it… Still, the prisoner is a person… he or she is part of the family of humankind. Were we to enter the hidden world of punishment, we should be startled by what we see. (Kennedy, 2003)

INTRODUCTION

At first glance, the May 21, 2014 issue of *JAMA* appeared unremarkable. The famed medical journal reported a trial comparing the depot injectable atypical antipsychotic paliperidone with an older generation agent, haloperidol (McEvoy et al., 2014). Another article reported the outcomes of a 3-year study that employed oncogenic drivers to select treatments for patients with lung adenocarcinomas (Kris et al., 2014). A brief piece investigated antibiotic prescribing for bronchitis between 1996 and 2010 (Barnett & Linder, 2014). And readers puzzled at the case of an odd, one-for the-journals case study of an 8-year-old boy found unconscious later to be wakened with amnesia and lactic acidosis, ultimately found to be caused by exposure to high-voltage power lines (Lillie et al., 2014).

Yet perhaps the most unlikely and outlying manuscript of the May 21 issue was not the work product of a pulmonologist, urologist, dermatologist, oncologist, or other physician, but a commentary discussing the accomplishments of a county sheriff whose career history included service as a prosecutor and state legislator before taking responsibility for, among other things, one of the largest jail systems in the United States (Kapos, 2021; Michaels, 2019). "Cook County Jail in Chicago holds the dubious distinction of being the nation's largest inpatient mental health facility, with psychiatric illnesses affecting about one-third of the 10 000 to 12 000 inmates there on any given day" (Kuehn, 2014), the article proclaimed in its opening paragraph, stating a fact clearly seared into what Sheriff Thomas J. Dart views as his civic mission. Testifying before Congress on the lack of available services for the population needing care for serious mental illness, Dart pulled no punches:

“We have criminalized mental illness in this country, and county jails and state prison facilities are where the majority of mental health care and treatment are administered” (Kuehn, 2014).

“On the human side,” Dart, who was named one of *Time* magazine's 100 most influential people in 2009 for his temporary refusal to carry out evictions in the face of what he believed was an unfair system, lamented, “it's outrageous…” (Mikva, 2009). He recognized the futility of incarcerating persons suffering from mental illness, most of whom committed minor offenses resulting from their illnesses and many of whom end up in cells with others similarly suffering, calling it out as what would constitute malpractice in other contexts (Kuehn, 2014). “It's a national disgrace how we deal with this,” he would tell a *New York Times* reporter in 2015 (Williams, 2015). Since then, much has been written about the plight of persons with serious mental illness in the criminal justice system, including Lili Kobielski's portfolio of interviews and photographs at Dart's jail (Kobielski, 2018).

Kobielski declares in the forward to her unpaginated book that:

> The Cook County Department of Corrections is one of the largest single-site pre-detention facilities in the world, with an average daily population hovering around 8,000 inmates. It is estimated that 35 percent of this population is mentally ill. (Kobielski, 2018)

The current population is considerably lower now (Cook County Sheriff's Office, 2020, 2022) as a result of decarceration measures taken to curb the spread of coronavirus disease 2019 (COVID-19) (Jimenez, 2020), and estimates of the prevalence of mental illness within correctional facilities are notoriously difficult to determine. Nevertheless, such were the parameters at the Cook County Jail when Kobielski documented her observations, both oral and visual.

The Cook County jail: A long and sordid history

Cook County Jail is iconic. The Jail is fearful and, like many of its counterparts nationwide, seems to resonate with the penal goals of retribution and incapacitation rather than deterrence and rehabilitation (LaFave, 2010; pp. 26–36). James Gilligan, who directed mental health services for the Massachusetts Department of Corrections for a decade and who was no stranger to those often labelled “criminally insane,” lamented how prisons and their mental health treatment units ultimately “succumbed to the overwhelming sentiment in this country to replace treatment with punishment, and healing with revenge.” Such was the longstanding vibe of the Cook County Jail. It is no wonder why America's most famous attorney, Clarence Darrow, chose the Jail as the venue to give his seminal address on criminal justice directly to those behind its bars a century and 20 years ago. In it, his final paragraph contained a final proclamation of jail abolitionism: “There should be no jails. They do not accomplish what they pretend to accomplish… they are a blot upon any civilization…” (Darrow, 2000; pp. 10–24).

Correctional facilities—and the American carceral system, in general—are typically out of the public's eye. Many are located in distant rural areas and are only newsworthy when an escape or other tragedy rears its head. But the Cook County Jail in Chicago, like many urban jails, is an exception. It is large, densely-populated, and was a recurring feature in the media during the height of the COVID-19 pandemic for its battle against morbidity and mortality (Hendrickson, 2020; Sabino, 2021). Describing the outbreak of COVID-19 at the Jail in April 2020, the *New York Times* declared that the “sprawling facility that is among the largest jails in the nation, has emerged as the largest-known source of U.S. virus infections…” (Williams

& Ivory, 2020). Its notoriety, however, overlooked efforts by staff and attempts to control transmission by decarceration and innovative public health preventive means (Zawitz et al., 2021). These efforts were lauded by some and deemed woefully insufficient by many (Centers for Disease Control and Prevention, 2020; Heffernan, 2020), and resulted in multiple legal actions to safeguard and release the incarcerated, one of which reached the United States Supreme Court (Mays v. Dart 456 F. Supp. 3d 966, 2020; Mays v. Dart 974 F.3d 810, 2020; Dart v. Mays, 2021; McGhee, 2020).

Yet the history and social meaning of the Jail extends far beyond its occasional role as an epicenter of disease. Each of the men and women housed there has a story to tell and an image to reveal in a facility that has gained notoriety for its role as one of the nation's largest mental health facilities with a long history that must not be ignored if one is to appreciate the importance of this unique institution in the nation's criminal justice history.

The Cook County Jail may never escape its infamy. The Jail's misfortune as an focal point of COVID-19 is merely the most recent of its troubles. The federal government's civil rights authorities have long aimed their sights on the Cook County Jail for decades, seeking the intervention of federal courts to safeguard the rights of the men and women incarcerated there. Most recently, a July 11, 2008 findings letter issued pursuant to an omnibus investigation of the Jail by the Civil Rights Division of the United States Department of Justice, noted that the facility had already been warned of “life-threatening deficiencies in sanitation and safety measures at CCJ [Cook County Jail].” (Fitzgerald, 2008; p. 2). Specific findings included:

> …that inmates confined at CCJ are not adequately protected from harm, including physical harm from excessive use of force by staff and inmate-on-inmate violence due to inadequate supervision… that inmates do not receive adequate medical and mental health care, including proper suicide prevention. CCJ inmates also face serious risks posed by inadequate fire safety precautions. Finally, we find that environmental and sanitation deficiencies at CCJ result in unconstitutional living conditions for inmates. (Fitzgerald, 2008; p. 3)

> …these conditions have resulted in serious harm to CCJ inmates. Three inmates committed suicide at CCJ in the first four months of 2008. During our investigation, we identified multiple preventable inmate deaths and a preventable amputation, due to inadequate medical care. In 2006, separate incidents of unchecked inmate violence resulted in two inmate deaths. In a one-week period during March 2007, CCJ documented 35 inmate fights, required 27 uses of force, and found 46 weapons within the facility. The myriad of serious incidents summarized here, and others discussed herein, indicate that CCJ is not adequately providing for the safety and well-being of the inmates. (Fitzgerald, 2008; p. 3)

The resulting court case brought by the United States government lasted a decade as the Jail tried to bring itself in line with the rather minimalist and vague standards required by the United States Constitution. But no court case can substitute for Kobielski's photograph of three simple words of graffiti scrawled on a Jail wall: “shit show central.”

But inferior medicine and violence were not Cook County's most notorious means of dispatching those behind its bars. Between 1840 and 1962, 171 condemned were executed at the Jail, including 67 who died in Cook County Jail's own electric chair (Maghan, 2005). The Jail's death row was popularized in the 60's-era folk song by Phil Ochs, who wrote of Paul Crump, sentenced to death but paroled after penning the novel *Burn, Killer, Burn*. Ochs lyrically summarized the fear instilled by the Jail: “[t]hey sent him to Cook County Jail, a jail known far and wide, where pity was a stranger and brave men often cry.” (Ochs, 2000). Yet it was blues legend B.B. King who forever enshrined the Jail in popular culture with his *Live in Cook County Jail* album, recorded on September 10, 1970 before more than 2000 incarcerated people at the request of the Jail's first African American warden—a psychologist—who brought King in to play at a particularly violent and volatile time in the Jail's history. The concert spent week after week on the charts was named one of the 50 greatest concerts by *Rolling Stone* magazine, and spurred King to found an advocacy organization for incarcerated people (*Happy Bluesman Records #1: B.B. King – Live in Cook County Jail*, 2020; Back, 2015; King & Ritz, 1996; pp. 257–259; Weingarten et al., 2017).

I REFUSE: A FIRST READ, A FIRST LOOK

Lili Kobielski's *I Refuse for the Devil to Take My Soul: Inside the Cook County Jail* (hereinafter, "*I Refuse*") is a simple yet elegant tome of interviews mixed with color portraits of incarcerated people and a handful of employees at the Cook County Jail. Its cover is made to look like notebook paper with multiple writings of people behind bars superimposed over one another. Inside the book are unbound inserts, likewise resembling notebook paper but containing full, legible musings and reflections. Lacking a dust jacket, *I Refuse* has an earthy, organic look and feel to it although its pages are glossy and of heavy stock. The volume is an outgrowth of an earlier project which Kobielski undertook for the Vera Institute of Justice, a prestigious think tank devoted to criminal justice reform. Mary Crowley, Vera Vice President for Communications and Public Affairs introduces the book relying, in part, on a few succinct sentences that summarize the remainder of the collection:

> To fundamentally alter our bloated criminal justice system – which disproportionately targets people of color, those living with mental illness, and the poor – we need a very different set of policy options. But the charge for change is not going to come from policy players, or at least not only them. The beating heart of this work – what animates it, what makes people sit up and pay attention and demand more of their government actors – is the lived experience and voices of those who have been impacted by these policies, of the people in our jails and prisons, and their loved ones outside and often too far away from them. (Kobielski, 2018 unpaginated)

Crowley has thus thrown down the gauntlet. *I Refuse* is not a policy exposition, literature review, white paper, or even an ethnography. It is intended to be a raw, one-way look at the people locked up at the Cook County Jail and a direct recantation of their stories. There is no interlocutor. But *I Refuse* is not meant to instruct or teach the contours of the problems of pretrial and short-term incarceration or set forth the case for diversion programs or other jail alternatives. Nor is it a conversation; there is no back-and-forth between reader and incarcerated person. Rather, the one behind bars speaks and bares his or her body and the reader looks and listens.

To appreciate this book, one must devour it as a work of art rather than a work of social science. There is a danger with such a volume that it will devolve into voyeurism or, even worse, the extreme voyeurism of "prison porn" that feeds a fundamental need to enjoy the suffering of others—a form of the Bedlam syndrome, by which the famed English psychiatric hospital became a venue of comic entertainment (Hattori, 1995) or cable television documentary serials that render the imprisoned the object of involuntary theater. *I Refuse* successfully avoids descending into this shameful genre and remains a straightforward and forthright window into the lives of those incarcerated.

Though the interviewees discuss various aspects of their lives, the intersection of mental illness and the criminal justice system is the overarching theme of *I Refuse*. This is evident from the narratives themselves, hinted at by a photograph of a shuttered community psychiatric institution, and the themes of the brief interviews with clinicians or social service workers, the only nonincarcerated people in the volume.

A basic understanding of the recent history that led to Sheriff Dart's comment assessing the Jail's evolution into a massive psychiatric institution is critical to appreciating the stories of the men and women in *I Refuse*, although it is important to remember that not all interviewees fit the model of transinstitutionalization, a policy phenomenon described below, and it is impossible to know which do and which do not. Likewise, the interviews are limited in length, content, and scope, and whether they serve as adjuncts to the photographs or vice versa is a question the reader may wish to keep in mind. Answers will no doubt differ, maybe within the same reader's experience at different points within the book.

MENTAL ILLNESS AND CRIMINAL JUSTICE: A PERPETUAL INTERTWINING

For those unfamiliar with why mental health should figure so prominently in *I Refuse*, the overrepresentation of persons with mental illness has been a not-so-secret facet of American incarceration dating back to colonial times (Treatment Advocacy Center & the National Sheriff's Association, 2014; p. 9). Fast forwarding to the modern era, fresh data on prevalence and other aspects of mental health in jails are difficult to come by, requiring researchers to rely on statistics that may be a decade old or older and that may or may not be generalizable. Prevalence of mental illness generally differs between jail and prisons, as it does by geography, institution type, the definition of what a case of mental illness is, and measurement methodology (Lovell & Jemelka, 1998; Yi et al., 2016). Add in the difficulty of conducting epidemiological research behind bars and the conditions are ripe for widely varying estimates of just how many persons with mental illness are locked up and their attributes.

Slate et al. (2013, p. 6) write that persons with mental illness “make up an exceedingly large proportion of the criminal justice population.” Collecting studies, and without stratifying by institution, they state that individuals with mental illness appear in correctional facilities at a rate five to eight times greater than in the community. Steadman et al.'s (2009) study of two jails in Maryland and three in New York yielded a prevalence of selected mental disorders of 14.5% (95% confidence interval [CI]: 11.0%, 18.9%) among men and 31% (95% CI: 21.7%, 42.1%) among women (p. 764). Bronson and Berzofsky (2017, p. 1) reported an overall prevalence of 26% of a 30-day history of nonspecific “serious psychological distress” in a survey conducted in 2011 and 2012 and in which 44% had been told previously that they had had a selected mental disorder. An oft-cited, yet methodologically problematic, study using jail data collected in 2002 (James & Glaze, 2006; p. 1; Steadman et al., 2009) opens with the proclamation that “At midyear 2005 more than half of all prison and jail inmates had a mental health problem… represent[ing] 64% of jail inmates.” However, James and Glaze's “mental health problem” is a somewhat convoluted, difficult-to-use, and difficult-to-generalize construct (James & Glaze, 2006; p. 1). The more interesting findings of the study are that, in the 12 months before being interviewed by the researchers, 54% of those in jail met the criteria for mania, 30% reported symptoms of major depression, and 24% reported one or more symptoms of a psychotic disorder (James & Glaze, 2006; p. 1, 2). Only 22.6% of those in jail had received mental health treatment in the year before their arrest (James & Glaze, 2006; p. 9).

Bronson and Berzofsky found that the prevalence of "serious psychological distress" (SPD) was five times higher among persons in jail compared with the standardized general United States population. They found that SPD was more prevalent among women than men, and Whites than Blacks or Hispanics (Bronson & Berzofsky, 2017; p. 4). Indeed, racial, ethnic, and gender disparities weave their way throughout the dyad of jail incarceration and mental illness (Appel et al., 2020; Binswanger et al., 2010; Kaba et al., 2015). As such, the data available is generally not recent and is uneven in its methodology of collection. But taken as a whole, it paints a uniformly grim portrait of jails filled with persons suffering from symptoms of up to and including full-blown diagnoses of serious mental illness. Perhaps no statistic is as somber as the finding that suicide was the leading cause of death in jails in 2016, accounting for nearly a third of mortalities (Carson & Cowhig, 2020). But numbers merely quantify the scope of the problem; they cannot represent the raw human suffering attendant to the statistics.

A full history of the American psychiatric asylum would be fascinating and provide important background, but would also be beyond the scope of this review. Suffice it to say, the psychiatric institution has endured a long journey of social movements since Virginia opened the first American asylum in 1773, the Public Hospital for Persons of Insane and Disordered Minds. Ironically, the Virginia institution's first patient was a transferee from a local jail (Scott & Falls, 2015). For the purposes of this review, the salient social scientific kernel of the relationship between incarceration and mental illness finds its origins in the simple premise promulgated by a British scientist eight decades ago. Lionel Penrose, in 1939, posited that there was an inverse relationship between the availability of correctional beds and psychiatric beds. He based this conclusion on cross-sectional data gathered from across Europe (Penrose, 1939; Schildbach & Schildbach, 2018). Since then, researchers have put the "Penrose Hypothesis" to the test and come up with quite varying results. O'Neill et al. (2018) confirmed its validity in an Irish study. A 2015 study found it to be inapplicable to the European situation at the time (Bluml et al., 2015). Such simple relationships are rarely satisfactory without significant explication, and much research and commentary have amassed on the topic in recent decades (Kalapos, 2016; Lamb, 2015; Prins, 2011; Wild et al., 2022).

The Penrose Hypothesis, over the years, gave birth via various American social, political, medical, and legal meta-phenomena to "deinstitutionalization" or "transinstitutionalization"—the alleged exodus of persons with mental illness from psychiatric institutions to jails and prisons via homelessness and petty crime. In its more nuanced form, transinstitutionalization is a complex conglomeration of shifts in politics, funding, social trends, medicine, and social constructions of mental illness that created an environment that facilitated the depopulation of private and state hospitals as policy and ended up with the incarceration of the mentally ill discussed earlier. Its complexity defies full exposition here. But it begins with the somewhat familiar historical image of persons with serious mental illness in institutional dayrooms getting treatments—sometimes seemingly barbaric—and housed en masse in state or private psychiatric hospitals or institutions attended by a mix of psychiatric staff and orderlies. The heyday of the institutionalization of persons with serious mental illness is largely over. Erickson and Erickson cite statistics by psychiatrist E. Fuller Torrey demonstrating a population-adjusted drop from 885,010 persons in 1955 to just 71,619 in 1994—a decrease of 92% (Erickson & Erickson, 2008; p. 27). Echoing this trend, the only photograph of a building other than the Jail in *I Refuse* is that of the now-shuttered Tinly Park Mental Health Center, which, at one time, treated over 2000 patients but was closed after Illinois cut $113.7 million in mental health services funds (Kobielski, 2018). Torrey calls deinstitutionalization one of the largest-magnitude social experiments in American history (Erickson & Erickson, 2008; p. 26). It is far more complex than the mere elimination of funds for mental health services and the subsequent depopulation of inpatient facilities. The deinstitutionalization narrative began with a confluence of factors, intended to be benign. These factors, beginning in the early to mid-20th century included the increased census of persons with serious mental illness into institutions without concomitant public support, a movement opposing psychiatry as a discipline led by academics such as Thomas Szasz (1961), critiques of the institution by authors such as Erving Goffman (1961), the popularization of such films such as *One Flew Over the Cuckoo's Nest* (Zaentz et al., 1975), the uncovering of abusive conditions at institutions, the passage of the federal Community Mental Health Act in 1965, civil liberties groups winning advances in opposing liberal civil commitment statutes and gaining rights to treatment, and the onset of federal cost-shifting policy with regard to the mentally ill (Erickson & Erickson, 2008; pp. 28–37; Carney, 1992; Parsons, 2018; pp. 72–97; Roth, 2018; Scott & Falls, 2015; Slate et al., 2013; pp. 28–46). These factors can be added to the development of chlorpromazine (Thorazine) (Vaughan, 1957), a medication with antipsychotic properties approved by the Food and Drug Administration (FDA) in 1954 that was soon joined by other agents. Their appearance gave psychiatry the confidence to release institutionalized persons into the community with prescriptions for these new medications (Erickson & Erickson, 2008; Roth, 2018), further contributing to deinstitutionalization. As prison mental health director James Gilligan observed, emphasizing his point with italics, a rarity in academic journals, after deinstitutionalization, “prisons, and the prison mental hospital, have become the last mental hospitals we have.” (Gilligan, 2001; p. 53).

Deinstitutionalization and the Cook County jail

How the deinstitutionalized masses ended up in places like the Cook County Jail and printed on the pages of Kobielski's volume follow a general narrative subject to multiple recent critiques. It is a narrative endorsed by at least one of Kobielski's subjects, Cook County Jail social worker and director of mental health policy and advocacy, Elli Petacque Montgomery, who describes in detail and with keen and empathetic understanding the failure of the policy, the trip to the streets, and the inevitable involvement with the criminal justice system. Her description of the pathway to the Jail is full of more realism and evocative imagery than any journal article can provide and Kobielski should be credited its inclusion:

> It was no surprise that when they closed the major hospitals in Illinois – and folks didn't have insurance – that they would end up here…
>
> Those people would then, just like anyone else, be hungry and cold, and you would see what we call crimes of survival – people that would show up at the 7-Eleven, they're thirsty, and they're drinking, and there's a village of voices in their head. They're disoriented, they don't know where they are, and the police are called, and they're brought in here….
>
> By the time they get to us, they've been off their medications so long, they're disoriented – they absolutely don't know where they are. They think they're waiting for the army, or the delusions are so severe they think someone has literally cut their toes off….
>
> People that historically would have gone to public hospitals or state hospitals are ending up here. We are the de facto mental health hospital now. It is far more expensive to try to manage mental illness and handle incarceration at the same time. It's also countertherapeutic: to have someone in a cell and then try to do

> therapy in a jail that holds anywhere from 8,000 to 10,000 is incredibly challenging. (Kobielski, 2018).

Modern critics of narratives like Montgomery's believe stories like hers have deeper sociological roots. For example, the punitive social mindset that fueled mass incarceration in recent decades swallowed up the mentally ill population (Parsons, 2018; Roth, 2018). Critic Anne Parsons (2018) sees the incarceration of the mentally ill as inseparable from the trends that make inexorably entwine racial injustice with mass incarceration. Yet despite these criticisms as to the mechanisms of implementation, the importance of which should not be underestimated as they may hint at solutions, or at least means of not repeating the same mistakes—it appears that institutions were depopulated and the seriously mentally ill ended up in jail. Whether or not the particular population depicted in *I Refuse* was transinstutionalized remains unclear—certainly, the interviewees appear more articulate than the intakes with debilitating delusions described by Montgomery—and one cannot know what degree of treatment and psychiatric and psychosocial rehabilitation they had received between the trauma of arrival and the relative stability of the interview and photograph. This missing background data would be useful for the reader to know, although providing it would significantly change the character of the book away from its sole focus on first-person narratives. Still, one at times wishes for an intermediate approach.

The plight of persons with mental illness behind bars

But what exactly are the problems of incarcerating persons with psychiatric disabilities? What was Sheriff Dart so concerned about and why? In a joint report, the Treatment Advocacy Center and the National Sheriffs' Association list eight distinct sequelae of using the carceral environment to house persons with mental illness: (1) they remain locked up longer and thus contribute to overcrowding; (2) especially if untreated, they cause major behavioral disturbances; (3) incarcerated persons with mental illness are more likely to be beaten, abused, and raped; (4) they decompensate, or "get worse," especially if not receiving proper treatment; (5) they are more likely to be placed in solitary confinement, where they are subject to additional decompensation; (6) they are disproportionately likely to commit suicide; (7) they cost more to incarcerate; and (8) they are more likely to recidivate, creating an unending "revolving door" phenomenon (Treatment Advocacy Center & the National Sheriff's Association, 2014; pp. 14–18).

There are other serious concerns beyond the list. Serious human rights and constitutional concerns lurk when housing persons with mental illness where they will suffer denial of proper treatment in an environment where they may be unable to conform to the rules of the institution, ending up in a small cell for 23 h or more per day (Siennick et al., 2022). Anyone who has visited enough jails, especially those with solitary confinement or mental health units that resemble solitary will describe the cells—and many detainees—as covered with feces and filth with the units serving as breeding grounds for grotesque self-injurious behavior (Kupers, 2017; pp. 55–58; Hafemeister & George, 2012). Efforts at treatment, to the extent a jail provides them, may be rejected by patients and access to necessary inpatient care is often unavailable for whatever reason. Patients with less acute levels of illness may suffer just the same, facility depending.

Sheriff Dart's reforms in the early 2010s were targeted at the Jail's mental health population, proclaiming "It's a national disgrace how we deal with this." He hired a doctorate-level psychologist warden to run the jail who implemented a host of reforms to the Jail's mental health services (Connolly, 2022; Williams, 2015). When she left 4 years later, he hired another psychologist to administer the institution (Issa, 2019). Dart takes pride in the

Mental Health Transition Center (MHTC) (Riley, 2019; Cook County Sheriff's Office, n.d.), which is referred to by several incarcerated persons interviewed on the pages of *I Refuse*. A dearth of information is available regarding the MHTC, which is regrettable but falls into the pattern of parsimony which at times plagues the book. It appears that the MHTC provides psychosocial and other programming (Riley, 2019) and Dart's web site claims that it "strengthens participant's community transition and long-term recovery plan, aims to reduce recidivism, eliminates criminal thought patterns, equips participants with social coping strategies like thinking before acting, offers mental health and substance abuse treatment, vocational skills training, and educational services, [and] teaches resume writing, professional and social networking, and job interviewing." In addition, a "community van" is advertised as "available to MHTC alumni who need transportation to and from job interviews, doctor appointments and/or court…" (Detainee programs and services: mental health transition center, n.d.). The effectiveness of these and other reentry programs remain to be assessed. Dart's mindset sets him apart from the correctional administrators who take a more classic, punitive attitude toward the psychiatrically disabled. And many of the interviewees sing the praises of the "program" or other unspecified efforts by the Jail at psychiatric rehabilitation or at substance use treatment. The latter includes training in the use of naloxone, an intranasal spray that can reverse the effects of an opioid overdose and save lives (Wells, 2018). A few subjects are critical of the mental health or substance use treatment they receive, but they are generally outliers among the sample.

A TOME OF NARRATIVES

The interviews and photographs of incarcerated persons and, to a lesser extent, of jail mental health workers are the heart of the volume. Regrettably, Kobielski provides no description of her selection methodology: that is, how she chose individuals with whom to speak and photograph. This is unfortunate because there is a certain lack of heterogeneity among her subjects. Jails draw from all demographic strata, and this diversity makes them particularly interesting ethnographic sites.

There is some diversity in age among Kobielski's subjects, but less than one would expect given the universally recognized aging of the correctional population in the United States (Greene et al., 2018). Hence, it would not be surprising to see more subjects over 70 years old. Despite the mental health orientation of the book, we see only two images related to crisis management—a completely bare cell with no fixtures or objects that could be used for self-injurious behavior, and one image of a woman wrapped in a suicide-proof blanket asleep in a cell whose sole comfort appears to be a bed. In the abbreviated version of the book that appeared in *Mother Jones* magazine, Michaels (2019) captions that photograph as "[a] woman sleep[ing] in an isolation cell located in a section of the jail reserved for severely mentally ill inmates." This description is omitted from *I Refuse* and that this is the only image of a person obviously on suicide watch or other elevated level of care or observation is odd given that mental illness is a pervasive theme of the life stories of interviewees. Why that particular cell occupant's narrative—or those of others similarly situated—were excluded from *I Refuse* is unclear and regrettable.

There appear to be no interviews of seriously ill persons housed in the medical unit; likewise, there is a similar lack of interviewees who are mobility-impaired. There are fewer scars on arms or other signs of self-injurious behavior than one would expect to see given the population. An explanation of selection methodology would have enlightened the reader and, as in other areas of the book, provided some much-needed context. The inherent diversity of any facility located in a county as diverse as Cook would seem to call for it.

Narrative building blocks of lived experience

In reading the interview narratives, a pool of personal historical "building blocks" becomes evident. After reading eight or nine interviews, the presence of some permutation of at least some of these building blocks in the majority of interviews becomes apparent. Among others, these life story building blocks include, but are by no means limited to: (1) difficult early family life; (2) substance abuse and addiction; (3) gang involvement or being exposed to gang activity; (4) transition to criminal activity; (5) history of incarceration; (6) decompensation without access to psychotropic medications for whatever reason; (7) redemption in jail, often as a result of substance use or mental health treatment; and (8) the assertion that this will be their last incarceration, often accompanied by a plan for a noncriminal future. There are, of course, numerous other themes, but these occur with regular frequency. Such structural repetition in criminal justice narratives is not unique to Kobielski's subjects. Harding et al. (2017) write of "narrative templates" produced by the institution (Harding et al., 2017), and narrative analysis in other contexts such as chronic illness and cancer reveal similarly repetitive themes, or building blocks (Docherty & McColl, 2003; van der Molen, 2000).

The consequences of this repetition are several. First, from a public policy perspective, it provides a list of sociological targets that should be prioritized to reduce incarceration levels, recidivism, and overall human suffering. Second, this relative uniformity underscores the value of qualitative data for criminal justice research and the possible crossover to a more quantitative analysis. Indeed, the frequency with which these themes arise in narratives could be quantified and, if a team of researchers were particularly ambitious, cross-tabulated across demographic characteristics or even geocoded by the incarcerated person's geographic unit of origin. The repetition of building blocks can become frustrating for the reader seeking a more sweeping diversity of narratives, but the repetition highlights the common pathways that lead one to the Jail. After reading beyond a critical mass of interviews, the personal stories appear to repeat themselves even though the amount of heterogeneity among them should not be underestimated. It is best to read a few narratives at a time and no more. This suggestion is not an indictment of Kobielski's work. She is, essentially, conducting research and reading collected data in its raw form and reading raw data are not always scintillating when digested in large quantities. Nor should the reader mistake the similarity among many interviews as detracting from the importance of what each interviewee has to relay. This error would risk missing the rich and varied narrative between the building blocks. For example, Dwayne, who is either tearful or exhausted in his photograph, laments:

> This is my very first time in here. It's terrible. We living in a mold-infested area, all in the bathrooms and in the bunks, and I got asthma and it's really bothering my asthma. The smell. I been here two and a half weeks. (Kobielski, 2018)

Or Theresa:

> I have 15 kids; I only have 10 living though. I'm here because of my actions being on drugs… It's not my first time really understanding the triggers of my addiction… I started using drugs at the age of 22, I went down an alley where all the rats and garbage is at and I didn't come out until I was 36. I didn't start going to school until I was 11 years old because I was babysitting my brothers, that's why I want to go back to school. I dropped out of school at 16, had my son at 17. Now I'm damn near half-a-century, but I think there's still some brain cells up

> there. I'm determined to get my high school diploma or GED. I'm proud of myself. (Kobielski, 2018)

Though the interviews are diverse in content, albeit somewhat limited to a universe of topics, *I Refuse* is clearly focused on the intersection of mental illness and the criminal justice system. The high prevalence of mental health-related sub-narratives in the words of incarcerated individuals provide ample evidence of this focus. Interviewees are forthright about their psychiatric disabilities. In one of the book's poem-like standalone inserts, entitled *What Are You Saying???*, Marshun, a self-described poet who plans to be a motivational speaker when released, writes, in part, in penmanship with little circles above the lowercase “i”s,

> Bipolar who would have knew that?
>
> Would somehow get married….
>
> Bipolar looked very fine
>
> Until Bipolar became scary…
>
> Bipolar mood swing's pause from the sound on the phone….
>
> Bipolar nice in the public eye yet very violent in the home…

…

> Bipolar you crashed my car and I can't get to work
>
> Abnormal road rage someone died when you drove….
>
> Bipolar prison cell asking everyone what the happen?
>
> Reality “courtroom” prison time mine only option….(Kobielski, 2018)

If interviewees are forthright, so are the staff members interviewed. Printiss Jones, superintendent for the Jail's health care provider, speaks almost venomously before becoming reflective:

> The state should be ashamed of themselves and the court should be ashamed of themselves… This is heartbreaking; this is heartbreaking stuff. I've seen my officers wipe a tear and try to be strong.
>
> Yesterday, we had a lady that, fully clothed, just went and stood under the shower…We finally get her to come out. She's just soaking wet…All this woman is saying during the whole episode is, “I'm not going to the mall! You're not making me go to the mall!”… The staff coaxed her into the chair and she started crying and said, “Why are you making me go to the mall?”
>
> We escort her to her room, the officers help her get her wet clothes off and give her medication, and she goes to sleep. And you come back and look in her room, and you see this woman who was just in severe crisis and is there in a

> balled-up position with a blanket over her. What are we doing? What are we doing? (Kobielski, 2018)

Ostensibly, not all encounters at the Jail would bring a tear to the eye or evoke such sympathy. Correctional officer Gerald Smith admits that “[t]he majority of us who work up here have been attacked physically.” Whether or not “up here” refers to facilities for the mentally ill is unclear. But even the violent episodes which are absent from *I Refuse* do not undermine the book's focus on the jailing of persons with seriously mental illness, regardless of whether their illness manifests itself with silence or violence in response to terrifying hallucinations. Indeed, those who are so ill that they are unable to conform their behavior to a facility's basic rules often fare the worst (Fellner, 2006). Interviewees who praise the jail's efforts cite a combination of therapy and medication as rehabilitative, and many aspire to continue their progress when they transition to the community. Reentry, though, is a difficult, liminal period and the reader cannot help but become invested in the interviewee's post-release success.

A TOME OF IMAGES

Without diminishing the centrality of the narratives, the most salient and noticeable feature of the book is its photographs. There is, of course, no novelty to books of photographs of incarceration, but there is hardly a plethora. Getting access to prisons and jails with a camera on one's shoulder is not easy. Carceral facilities, like military bases, are semi-secretive institutions that often have an aversion to outside oversight or visual inspection. Perhaps the most notable exception is *14 Days in May*, a BBC-aired documentary of the 2 weeks at the Mississippi State Penitentiary at Parchman leading up to the execution of Edward Earl Johnson. The documentary team was granted extraordinary access, even being allowed to witness the testing of the gas chamber on caged rabbits. The team departs Johnson just minutes before his own entry into the gas chamber (Hamman, 1987).

Forging a place in the vsual history of incarceration

Arguably, the general public may be content not knowing what transpires behind prison and jail walls.(Kennedy, 2003;) But for some, the veiled nature of the concrete and iron drives a natural curiosity for images and footage. Indeed, a search of the internet auction site eBay reveals a remarkable collection of carceral photographs and a few full volumes of the micro-genre. The books published differ considerably in style and philosophy. In recognition of the permanence of the micro-genre, the legendary fine arts photography periodical, *Aperture*, recently published a volume of contemporary and historical images of life in corrections juxtaposed against essays by luminaries in the field (Aperture, 2018).

Perhaps the most notable single-artist volume is that of master photojournalist Danny Lyon, who first published *Conversations with the Dead* (2015) in 1971 after being given carte blanche to photograph the Texas prison system. Lyon, by no means a stranger to conflict or social injustice, closed his Foreword with a note of relief:

> I tried with whatever power I had to make a picture of imprisonment as distressing as I knew it to be in reality and the few times that I doubted that wisdom of my attitude, I had only to visit someone I knew in his cell… I am greatly relieved not to visit the prisons any more. In the letters and drawings of a supposed madman [a particular incarcerated person], I have found someone

> much more eloquent than I to explain to the free world what prison is like. (Lyon, 2015; p. 13)

Lyon's photographs are high-contrast black and white and are comprised of a mix of living and working quarters with the men who live and work there. His images possess a certain rawness that Kobielski's lack. The viewer can not be helped but be taken aback by the electric chair, tattoos of naked women, and the image of two naked men in the showers. Readily depicted are agricultural work and daily living that characterized late 1960s prison life—and still do. And Lyon's work contains a plethora of documents which set the stage for his images, something that Kobielski's book might have benefited from. Of course, Lyon's work is far from recent and represents a prison system, rather than a jail of recent vintage such as Cook County. But it is evidence of a very different visual philosophy from that of *I Refuse*.

Also unlike *I Refuse*, in which bars and the visual theme of strict confinement are largely hidden from the viewer, Ken Light's *Texas Death Row* (Light & Donovan, 1997) is overwhelmed by the themes of bars, cells, interaction with correctional officers, and other artifacts of being locked up. The life of a condemned Texas man was brutal, Light wants us to know, and, indeed, his work dates from a period in American history when the death penalty was favored more strongly than it is today and executions more common (Death Penalty Information Center, 2019; Statista, 2020). Light's photos are stark, black-and-white, and generally high contrast. They possess little softness. Indeed, there is little that could be characterized as "soft" about Light's Texas death row.

One of the most unusual of this unusual genre is *Prison Exposures* by Robert Neese (1959) also known as Robert Neese #24933, of the Iowa State Prison at Fort Madison. Neese was a freelance photographer by trade allowed to photograph his incarceration and use his images to punctuate a text-heavy book that is brutally honest about prison life. His epigraph includes the text: "Dedicated to a better public understanding of how our prisons work, and the men who live in them, and the reasons for their living in them." Those who have watched the film *Shawshank Redemption* (Marvin & Darabont, 1994) will find life at the Iowa State Prison during that time period familiar and just as jarring as the movie, even if Neese's photographs are milder than those in other books.

So how do Kobielski's images measure up against those of her predecessors? Most notably, they are in color and lack raw features such as high contrast or unusual graininess. With a few exceptions, they are portraits rather than observational photojournalistic subjects. Which makes sense given that *I Refuse* is, primarily, a collection of interviews rather than a standalone volume of illustrative photographs. Kobielski styles her images collaboratively, thus eliminating the element of naturalism and rendering the book one of portraits rather than raw observation: "Each portrait within is collaborative – I asked, 'How would you like to be photographed?' and then we worked on making the portrait together" (Kobielski, 2018). This collaborative, nonphotojournalistic method will jar viewers who may have hoped for a more documentary, observational approach with subjects in the carceral environments in which they spend their day. Allowing subjects to pose themselves to such an extent creates a risk that those being photographed will exercise undue control over their images just as they exerted a certain measure of control over the content of their interviews. The sociologist Ernest Goffman penned an entire volume, *The Presentation of Self in Everyday Life* (Goffman, 1959) on image management—the deliberate control over the personal image that one displays, a phenomenon with much relevance to the methodology chosen by Kobielski. One can argue that prison or jail is hardly "everyday life," but Goffman's principles still have relevance to Kobielski's men and women:

> Sometimes the individual will act in a thoroughly calculating manner, expressing himself in a given way solely to give the kind of impression to others that is likely to evoke from them a specific response he is concerned to obtain. Sometimes the individual will be calculating in his activity but be relatively unaware that this is the case. Sometimes he will intentionally and consciously express himself in a particularly way, but chiefly because the tradition of his group or social status require this kind of response… (Goffman, 1959; p. 6)

Image management, of such concern to Goffman, is of the utmost importance in carceral settings where hierarchy and the web of social relationships (see, e.g., Archer, 2007) are of primal importance. The classic stereotype is of the need to appear masculine, strong, and devoid of tears or any other signs of weakness that might render one open to victimhood. This image is readily visible in many of Kobielski's photographs of men, who choose masculine poses that accentuate musculature and tattoos. The feminine counterpart stereotype comprises being amenable to membership in a relationship with another person or small group of people who rely on one another for support. These stereotypes certainly exist, the former particularly so in male-dominated gangs, but the diversity of images to be managed in jails and prisons must not be underestimated. And because Kobielski's subjects too rarely self-describe their perceived place in the carceral ecosystemic hierarchy or spectrum of identities, perhaps because excessive self-disclosure could create liability for discipline, it is hard to match up the portraits with the self-description. This leaves the reader guessing and left avoiding stereotypes, which may or may not be such a bad thing. But it fails to present that diversity inherent in the carceral environment.

For the most part, subjects choose to be photographed in environments where they do not appear to be confined, and images of incarcerated persons behind bars or solid doors are generally absent. The Jail is, with some exceptions, depicted as spotless without the buildup of milk cartons, trays, commissary items, and reading material that one might expect. Likewise, with only a few outliers, sensitive areas of the jail such as high-acuity psychiatric or high-security disciplinary areas are absent from the pages. There are many facially deadpan, full-body images of the interviewees, with close-up facials lacking. This is unfortunate; the face is fascinating and the faces of the men and women in *I Refuse* have much to share.

CONCLUSION: THE SOCIAL MEANING OF THE COOK COUNTY JAIL

A raft of recent books on mass incarceration began to sweep bookstores and academic presses in the past decade, anchored by Michelle Alexander's exalted *The New Jim Crow: Mass Incarceration in the Age of Colorblindness* (Alexander, 2010). Other volumes with titles such as “Imprisoning Communities: How Mass Incarceration Makes Disadvantaged Neighborhoods Worse,” (Clear, 2007), “A Plague of Prisons: The Epidemiology of Mass Incarceration in America,” (Drucker, 2011), and “The Insidious Momentum of American Mass Incarceration” (Zimring, 2020) began to pop up. Venters (2019) provides harrowing accounts of tragedies in Rikers Island, New York City's counterpart to the Cook County Jail and Sufrin's “Jailcare” focuses on the experiences of incarcerated women (Sufrin, 2017). As the decarceration movement waxed and waned, books focused on the lived experience of jail and, in particular, the experience of incarcerated persons with mental illness came to the fore. Examples include Ford (2017); Montross (2020), and Roth (2018). Journals burst with literature from many an aspect of the topic (e.g., Ellis & Alexander, 2017; Jacobs & Giordano, 2018; Kapoor, 2020; Segal et al., 2018; Yoon & Luck, 2016). Yet criminal justice reform and the movement to empty jails and prisons trudges along year after year, once a focus of media attention during the height of pandemic when epidemiologists, experts, and advocates identified carceral facilities as hotspots for the spread of COVID-19 (Fuchs, 2022; Jefferson & Alles, 2022; Law, 2022; Minkler et al., 2020; National Academies of Sciences Engineering and Medicine, 2020; Nowotny et al., 2020; Saloner et al., 2020). With so-called "Covid fatigue" and the perceived decline of the virus, the plight of the incarcerated seems to have been forgotten in favor of new and more novel concerns. This is true despite the dire warning of one study specifically targeting the Cook County Jail as a source of community infection, finding that cycling in and out of the Jail accounted for 55% of variance in case rates among Chicago zip codes and, perhaps more amazingly, 37% of variance throughout Illinois. Entrance and egress from the Cook County Jail exceeded other risk factors—a shocking conclusion underlining the role of the jail in community health and a dire source of danger in the midst of the pandemic (Reinhart & Chen, 2020).

But what does it say about us when it took a deadly pandemic to systemically empty our carceral facilities, and only on a limited scale and for a limited time? Where did the men and women of *I Refuse* go if released early on COVID-based grounds? Where are they living given the COVID-impaired safety net? Where do they get their medical care? Addiction and mental health services? Reentry into the community is a challenge without a looming pandemic; the specter of COVID-19 amplifies the challenge (Desai et al., 2021), particularly with meeting social determinants of health and overcoming the inequalities inherent in so many aspects of the pandemic. (National Academies of Sciences, Engineering, and Medicine, 2020; Reinhart & Chen, 2020; Thompson, 2020) (Sheriff Dart's programs sound progressive, but whether they remain in place or are sufficient to meet the needs of the population in his charge are unclear.

Those depicted in *I Refuse* give the reader a brief window into the chaos of their lives at a particular point. Regrettably, a steady flow of subjects will continue to offer Kobielski and her colleagues unlimited opportunities for additional documentation. Many will return. Many will continue to suffer. The fault rests on all of us. *I Refuse* will open the reader's eyes to a world that he or she may not be familiar with. The rest is up to the reader, who will be well-invested visually and cognitively. The Jail may be the occasional focus of epidemiological interest, but disease transmission should not overshadow its historical and social meaning in American penal history. It is far too interesting and valuable an institution to be confined to the study of viral transfer. Its corridors, officers, history, staff, and lived experience of its incarcerated residents are far too rich and intriguing to be limited to that narrow field of study. *I Refuse* offers a meaningful gaze into the lives of those locked up in the Jail—a gaze that must not be ignored even if its scope and breadth are incomplete. Despite its limits, Kobielski's insight into the lives of a vulnerable and oft-ignored population makes her books a valuable and all-too-rare view into one of America's most fascinating and unique places of detention.

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BOOK REVIEW

WMHP WILEY

Robbery in the illegal drugs trade: Violence and vengeance

Robert McLean and James A. Densley

Bristol University Press, 2022, pp. 129. ISBN: 978-1-5292-2391-0

Robert McLean and James Densley provide a valuable look into the world of robbery in the world of drug traffickers, specifically in Scotland. The main methodological approach is the use of snowball interviews, which deliver a variety of rich narratives from victims and perpetrators of robbery. From 2012 to 2020, the authors interviewed 75 men and 8 women who were involved in gang activity or organized crime as well as 38 active offenders. This approach gives an in-depth understanding of the phenomenon compared to quantitative methodology. The findings offer insight into why drug traffickers are often both vulnerable targets and motivated offenders as well as the dynamics of the planning, action, and aftermath stages of such robberies. The authors are right when they claim that “What sets this book apart is that it is shaped by the voices of actors who operate within illicit drug markets” (p. 11).

This short book is comprised of seven chapters. The first is an introductory chapter that details existing research on robbery, the methodology of the book, and outlines key findings. The second chapter describes a historical evolution from robberies typically targeting places, such as banks and commercial businesses, to more frequently victimizing individuals and why this transition has taken place. It also explores why robbery specifically has become prevalent in the context of the illegal drug trade. Chapter 3 delves into the motivations of offenders, such as material gain, the need to nurture an addiction, status, and revenge. Chapter 4 describes how drug-related robberies occur, particularly how they are planned and executed. It also touches on how people in the drug trade try to protect themselves from the predation of robbers. Chapter 5 disabuses the reader of the notion that robberies are always conducted against strangers. Rather, many victims and perpetrators know each other, and may even be friends or colleagues. The sixth chapter touches on the lives of former robbers, why they stop robbing, and the factors involved in reform. The final chapter provides an overview of the findings and make some suggestions based upon them.

The author's interviews garner many insights. They find, for example, that perpetrators are often former victims. Their “victimization set him up psychologically, but also practically (in terms of carrying a knife for protection) to partake in robbery” (p. 32). They also uncover some of the reasons that robbery is so prevalent in the drug trade. These reasons include that because drug dealing is illegal, victims are less likely to resort to police interventions coupled with the fact that they do business in cash and often have a sufficient amount of it (along with drugs) to make robbery remunerative (p. 34). Some of the findings are unsurprising, such as that drug addicts often resort to robbery when suffering from withdrawal and have no other means to secure their next fix, but nonetheless, these findings are important to confirm.

The most important overall finding of the book is that robbery is ultimately tied to its social context. Robbery is a social problem, and not just a problem of individual offenders. To combat robbery it will not be sufficient to take a solely law enforcement-based approach. Catching and arresting offenders, though necessary, will not address the root causes of robbery or end the cycle of robbery. To have a long-lasting effect on the prevalence of robbery, a more holistic approach integrating public policy is necessary. Ensuring mental health services for incarcerated offenders, coupled with support services upon release, can have an outsized effect. One interviewee noted:

> "I got a long time in jail for that because I had other stuff. Inside I got all these mental health assessments and they gave me case workers who said I had suffered PTSD [Post Traumatic Stress Disorder] and was actually insane [mentally ill] or something, and they helped me get a move away from the place I was staying before. I had been saying get me out of the place for years and the police will see that I stop getting into trouble, but they didn't and surprise, surprise, I got in trouble. Since I have been out, I have not got into any more trouble" (p. 99).

The authors suggest in their conclusion that a public health approach, whereby social service agencies are capable of intervening in the lives of potential offenders to provide them education, skills, and other opportunities, are more likely to succeed in reducing the prevalence of robbery compared to law enforcement efforts alone. Functioning schools, availability of mental health services, community mentors, and economic opportunity should all be seen as key aspects of any robbery cessation strategy. This book is recommended for anyone with an interest in the motivations, victimology, dynamics, and potential solutions of robbery, particularly within the context of the illegal drug trade.

Reviewed by William R. Patterson

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

At risk: Indian sexual politics and the global AIDS crisis

Gowri Vijayakumar

Stanford University Press: Stanford, California. 2021. xvi+258 pp. US$26.00 (paperback). ISBN: 9781503628052.

Gowri Vijayakumar's book, *At Risk: Indian Sexual Politics and the Global AIDS Crisis*, provides an excellent ethnographic account of human immunodeficiency virus (HIV)/ acquired immunodeficiency syndrome (AIDS), sex workers, queer, and transgender activism, and the transformation of sexual culture in India. Drawing on a compelling range of sources, including oral history interviews, popular press stories, medical journal articles, public health monographs, and reports of the governments, nongovernmental organizations, donors, and United Nations agencies, the author traces how AIDS and ideas of sexuality associated with it arrived in this country during the age of globalization and gradually became "the 'fulcrum' for constructing difference around race, caste, gender, and class" (p. 6). While exploring the experiences of the AIDS crisis, material practices of the state, and sociopolitical mobilizations in the global South, the book masterfully illustrates the myriad ways in which HIV prevention programs affected and reshaped the everyday lives of the sexually marginalized.

During the mid-1990s, India came to be understood as at risk of becoming what Africa had already become. Scientists, policymakers, and media persons marked AIDS in this country as a Western vice—a sexually transmitted infection, which chiefly spreads through indiscriminate heterosexuality and homosexuality. It was anticipated that the conservative value system and single partner sex life of Indian adults will prevent the infliction of foreign sexual promiscuity into society and thereby reduce the risk of their exposure to AIDS. Vijayakumar shows the initial identification of AIDS as Western was gradually replaced with the theory of African origin of the disease. Soon a heated debate ensued about whether India will face an Africa-like crisis or not—one which located India within a global map of the AIDS epidemic.

Increasing cases of female prostitutes in several parts of the country gave experts credence to claim India's AIDS epidemic as heterosexual, more similar to the African epidemic than Western homosexual ones. Indian sex workers and African sojourners (mainly students) were labelled as high-risk groups. Consequently, they faced many repressive measures taken by the state. In the wake of rising Hindu fundamentalism in the 1990s, these two groups were also stereotyped as hypersexual and perilous to the moral foundation of Indian society. The accounts of a looming crisis were thus, Vijayakumar argues, informed by the gendered, racial, and religious forms of inequality, exclusion, and oppression. However, in all these epidemiological narratives, the LGBTQIA+ community was rendered largely invisible.

The strategy of isolating and criminalizing the gendered and sexual others was largely influenced by the colonial and postcolonial policies of containing deviant sexuality to control sexually transmitted diseases. But such a policy of containment in the early stages of the Indian AIDS response had some unanticipated outcomes. Vijayakumar reveals how the attempt of containing the risk among sex workers, sexual minorities, and transgender people paved the way for the necessary but conditional incorporation of these high-risk groups into the state programs for AIDS prevention. With the establishment of a relatively autonomous, semi-independent agency, the National AIDS Control Organization (NACO), the Indian response to the crisis shifted from a strategy of criminalization and marginalization to a strategy of incorporation.

However, it would be wrong to assume that switching to the policy of inclusion was driven by any urge for adopting an enlightened strategy by the state. The inexorable demands from the high-risk groups for participation in the AIDS programs forced the state to acknowledge the functionality of these groups in the planning and execution of the program. The involvement of international donors in policy formulation also necessitated a reconfiguration of the ways through which the state could respond to the crisis. The author narrates how global funding and the engagement of civil society in the program gave the NACO a distinct hybrid structure. In this process, the Indian AIDS response constructed multivalent spaces within which the sexually marginalized could not only actively engage with the state but also find out new ways of asserting sexual identity. The scenario thus involved a "paradigm shift" from narrow biomedical approaches looking at AIDS as merely a public health challenge toward more rights-based approaches.

It is intriguing that the Indian HIV prevention program was almost identically translated in Kenya, though "the circulation of best practices was never as simple as it looked on paper" (p. 151). The differences and similarities between the conditions of these two countries largely informed how AIDS experts approached transnational exchange to manage the epidemic. India–Africa collaboration, according to Vijayakumar, helped a somewhat sexually conservative state like India gain the status of a model nation within "the global AIDS field." Thus, the book demonstrates how a catastrophic crisis was defined and contested in one global South context and then repurposed in another global South context. It undoubtedly serves as a welcome contribution to the expanding sociological field of sexual humanitarianism.

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ANNOUNCEMENT

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Acknowledgment of 2021 *World Medical & Health Policy* reviewers

Peer reviewers are the foundation of scholarly journals, and we could not publish *World Medical & Health Policy* without you. We know that reviewing manuscripts is often time-consuming, intellectually taxing, and selfless work for which reviewers rarely receive formal acknowledgment or professional credit. While we are tempted to deem it "thankless" work, we hope this recognition serves as a small token of our appreciation. On behalf of the *WMHP* editors, as well as the authors who are the direct beneficiaries of your guidance and critique, please accept our sincere appreciation.

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