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ORIGINAL ARTICLE

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Policy options to reduce patient visits in specialized service centers: A case study in speciality and subspeciality clinics in Iran

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Abstract

Hospital congestion, delayed discharge, and bypassing primary care facilities are challenges facing the Iranian health-care sector. We conducted a case study at the Sheikh al-Rais Specialty Clinic, Tabriz, Iran, to find plausible, practical policy options for designing and implementing a referral system to reduce and regulate referral volumes to this clinic. We first reviewed the evidence on existing options of hospital congestion and unnecessary referral reduction by conducting a scoping literature review and then supplemented the findings with 18 semistructured interviews. We examined the perspectives of service users and experts in the field. Six practical policy options were identified: institutionalization of the referral system and family physician program, reinforcing gatekeeping system, use of telemedicine, utilization of educational algorithms, implementation of electronic health records, and establishing specialized clinics in different city areas. Local context adaptation, ensuring the availability of resources, political support, and feasibility are critical factors for successful policy implementation.

KEYWORDS

family physician, health policy and systems research, hospital queueing, Iran, policy option, referral system

Key points

- Improving documentation using electronic health records, integrating electronic health records with referral systems, controlling and reducing the demand for unnecessary referrals through screening mechanisms,

and the ability to refer patients to the most appropriate level of referral are crucial.
- The workload in (sub-) specialized university clinics can be reduced by implementing the proposed policy options.
- Establishing an electronic health record system is pivotal in providing advanced and qualified health-care services.

INTRODUCTION

An effective referral system helps to ensure people receive the best possible care closest to home and enables a close relationship between all health system levels (World Health Organization, 2017). Such systems can help with efficient utilization of available resources by preventing repeated and unnecessary referrals to more specialized (and more costly) services and averting waste of financial and human resources. Effective referral systems can bridge different service providers and play a key role in enhancing access to a better quality of care by avoiding unnecessary use of specialized services (Barnett et al., 2016; Heshmati & Joulaei, 2016; Khangah et al., 2017). However, an efficient referral system needs an appropriate stratification of health services and a mutual exchange of information between healthcare providers at different levels (Vest et al., 2019).

In Iran, the public healthcare network was established in 1985, which led to improved overall health indicators, particularly in access to primary health-care services (Doshmangir et al., 2019). However, despite expanding the public health network across the country and strengthening primary care units, a working referral system with stratification of health services was lacking (Tabrizi et al., 2017). Some attempts at reforming the referral system were made three decades ago in rural and urban areas during the Family Physician Plan implementation (1989) (Takian et al., 2013, 2015). It aimed to reduce the number of referrals to secondary care services and provide easier access to secondary care services (Mohammadibakhsh et al., 2020). Unfortunately, the incomplete implementation of the Family Physician Plan led to an increase in the overall number of visits to specialists and subspecialists in clinics affiliated with medical universities in different cities of the country (Doshmangir et al., 2017) and the overall public dissatisfaction with the referral system (Fardid et al., 2019).

Overall, despite numerous efforts over the past decades, the problem with unnecessary referrals persists. Medical staff continues to satisfy patients' demand (and not necessarily their clinical need) for secondary care services, leading to self-referrals, incomplete referral forms, and unnecessary referrals (Esmaeili et al., 2015; Kavosi & Siavashi, 2018; Moghadam et al., 2012, 2013). Almost half of the patients dissatisfied with their family physicians were not referred to a desired secondary care service (AshrafianAmiri et al., 2015). The Sheikh Al-Rays Clinic of Tabriz University of Medical Sciences, Tabriz, Iran, illustrates this problem. The speciality and subspecialty centers experience a high burden of referrals to clinics from Iran and bordering countries. Given the lack of service stratification and referral system, absence of electronic records, and the lack of specialist services due to insurance coverage, the clinic experiences substantial hospital congestion primarily due to unnecessary referrals. We conducted our study in this clinic to find plausible, practical policy options suitable for designing and implementing a referral system to reduce the volume of referrals in the clinic.

METHODS

First, to identify plausible, practical policy options on designing and implementing a referral system and reducing referral volume to this clinic, we conducted a scoping literature review of studies reporting on existing options of hospital congestion and unnecessary referral reduction. We focused primarily on studies conducted in Iran and university clinic settings. Next, based on the scoping review findings, we developed the interview guides (expert participants or service users) for the semistructured interviews. We then examined the perspectives on the possible options of service users and experts in the field by conducting 18 semistructured interviews. Participants were selected by purposive and snowball sampling methods. Only participants who consented took part in the interviews. Service users ($n = 14$) were recruited among those referred to the case study clinic (characteristics in Supporting Information: Table 1). Characteristics of interviewees are reported (Supporting Information: Table 2). A group of experts ($n = 18$) included those working in Tabriz, Iran, and those who specialized in health policy, health-care management, and social medicine. All interviews were continued until data saturation was achieved and lasted approximately 40–50 min. Interviews were recorded and transcribed verbatim and analyzed using the content analysis method. After extracting and formulating the policy options, they were prioritized by a group of field experts.

RESULTS

Results of the scoping literature review and semistructured interviews indicated that existing health system problems (i.e., lack of adequate governmental referral system, lack of connection between different levels of the referral system, specialized) (Almaspoor Khangah et al., 2017; Gholizadeh et al., 2016; Mehrdad, 2009), cost management policies, and the Iranian resistive economy that circumvents the existing sanctions against the country were among the main system-level reasons behind a high volume of (often unnecessary) referrals (Abdi et al., 2019; Fardid et al., 2019; Janati et al., 2017; Sajadi et al., 2019). Service user-level reasons included self-referral, incorrect referrals, and affordability of services due to low clinical service tariffs and insurance coverage.

Further analyses elicited six plausible, practical policy options to reduce hospital congestion and unnecessary referrals: the institutionalization of the referral system and family physician program, reinforcing gatekeeping system, use of telemedicine, utilization of educational algorithms, implementation of electronic health records, and establishing specialized clinics in different areas of the city. Service users emphasize more on increasing access to services, while experts were aware of the limited resources in this area and experts believed that the cost-effectiveness of services should be emphasized. Table 1 summarizes the advantages, disadvantages, and implementation considerations for each policy option elicited based on our results. Also, the perspective of expert participants or service users was clarified in Table 1.

Policy option 1—Institutionalization of the referral system and family physician program

Among fundamental steps suggested for the institutionalization of the referral system were performance and behavior management of primary and secondary care level staff and management of expectations and behaviors of patients. Implementing the referral system and the family physician program should be performed simultaneously and with sufficient

TABLE 1 Advantages, disadvantages, and implementation considerations for each policy option

Policy options (perspective of expert participants or service users)	Advantages	Disadvantages	Implementation considerations
The institutionalization of the referral system and family physician program (perspective of expert participants)	Cost reduction; increasing services effectiveness; increasing job and general medical status; reducing competition to enter medical assistant courses; facilitating achieving health system goals	Possible dissatisfaction among the people and some politicians; severe obstruction by the "invisible hands" of the health system; weak coordination between important stakeholders, such as the medical system and insurance and private companies	Strong and national determination of the Ministry of Health; internal and external cooperation
Reinforcing gatekeeping system (perspective of expert participants)	Reducing unnecessary referrals to specialists; creating opportunities for family physician residents to become more familiar with different types of patients and their future work environment	Possible customer dissatisfaction if they do not visit a specialist they wanted and incurred high cost; need to create a culture at the community level; needs a large workforce and number of students; possible violation of the level of health services	Strong information system; a basic visit by a general practitioner or social medicine resident, or family physician
Use of telemedicine (perspective of expert participants and service users)	Improving and facilitating equal access to quality health-care services; reducing costs and increasing productivity; reducing medical errors; increasing the confidence in the integrity and accuracy of the information in the health system; reducing the cost of referring to a specialist and time spent on intracity trips	Potentially time-consuming; technical limitations and software requirements; needs to change the organizational culture, attitude and behavior of employees of the health system and patients; cost restrictions; resistance of individuals and organizations with change	Information technology support; changing organizational culture
The utilization of educational algorithms (perspective of expert participants)	Potential to reduce medical errors; supports decision making and participation in telemedicine care; increasing the confidence in the	High cost and time necessary for culture building at the community level; the need to guarantee the rules regarding the confidentiality of client and patient	Writing unambiguously and concisely; attractive and understandable; reducing costs and increasing productivity

(Continues)

TABLE 1 (Continued)

Policy options (perspective of expert participants or service users)	Advantages	Disadvantages	Implementation considerations
	integrity and accuracy of the information in the health system; reducing cost and time spent on intracity trips; reducing unnecessary traffic and air pollution	information on the Internet	
Implementation of electronic health records (perspective of expert participants)	Provides a possibility of training health-care professionals; facilitates cost-effectiveness and equality in national and local health systems; empowers the patient in the care process	It takes time and might bear the high cost for proper advertising and culture building	Requires robust information and communication system; provides a possibility of a systematic review of data regarding health results
Establishing specialized clinics in different areas of the city (perspective of service users)	Increasing the quality of service delivery; reducing the workload of different clinics	Increasing the number of specialized and sub-specialized service providers; inductive demand, and increasing the number of referrals	Establishing clinics in different areas of Tabriz; increasing access to services in different areas

planning. Another essential step would be establishing oversight and monitoring of management and reimbursement for services at all healthcare system levels (Barouni et al., 2020; Doshmangir et al., 2017).

> The referral system will not work until structural changes are made at all three levels of the health system, and setting up a referral system cannot be the first step in a family physician system. The four pillars of the family physician system, namely, the family physician team, the referral system, the electronic file and the free public insurance, should be launched simultaneously. The family physician system is like a chair, and if one pillar of the chair is missing, there will be no longer a seat for justice in health or social justice (P-E-3).

The role and position of the provider in the health service chain and referral system are also significant. "Any provider in the health system can be a referrer. Behvarz and the health workers are the first referrers, and the family doctor can refer to a more specialised level with a specific framework" (P-E-5). "The frequency of visits to the Sheikh Al-Rais Clinic in the first level should be reduced by managing the behaviour of the main service activists" (P-P-5). "It is frequently assumed that the customer receives the most appropriate service and care from the most appropriate service provider in the nearest place of residence. If this principle is indeed implemented, it can be useful for the health system and customers" (P-E-9).

The principle of health services stratification assumes that gatekeeping happens at the primary care (general practitioner) level and not at the specialized secondary care level. Also, there should be an excellent working link to all necessary secondary care level specialists. The behavior of patients is managed through education and culture building (first step) and the use of "control knobs" in the second step (e.g., tariffs and admission caps for self-referrals). Finally, it is also essential to manage the behavior of physicians at the secondary care level by incorporating educating them about the referral, creating incentives by providing feedback in evaluation, and via professional performance and reimbursement.

Implementation of this option requires robust determination of the Ministry of Health and changing institutionalized nonsystematic referral behaviors with extensive internal and external cooperation to overcome existing problems. Implementation of scientifically sound and evidence-based options could lead to savings via cost reduction, increasing the effectiveness of service provision, increasing medical job status, reducing competition to enter medical assistant courses, and ultimately facilitating the achievement of health system goals. However, shortly after implementation, implementation of this option could lead to dissatisfaction of patients who benefit from the current situation without a proper referral system, mainly if they do not get an appointment they desired. Therefore, it is essential to ensure good coordination between essential stakeholders to avoid conflict of interest among specialized medical groups.

Policy option 2—Reinforcing gatekeeping system

The gatekeeping system needs to be reinforced. Patients should be entitled to ask for a referral to a specialist or treatment only after visiting a general practitioner, family physician, or a social medicine resident, who will determine whether this referral is clinically necessary. "The workload of general practitioners is expected to increase with doing this step. However, the workload can be reduced by setting up a strong information system and educating physicians on how to correctly complete forms and referral documents" (P-E-2). Other incentives, such as increased self-referrals tariffs, should also be considered, particularly those who bypass the gatekeeping system. "If at the first level, the doctor does not recognise the need for a referral, but the patient insists on a visit to a speciality and subspecialty specialist, the suggested solution is to increase the health-care costs more than the approved healthcare tariffs. Bypassing the primary care referrals should only be allowed for patients who do not have access to a family physician and have been referred to specialist care by a general practitioner" (P-E-1).

Reinforcing gatekeeping system will require the implementation of a robust health information system that can manage healthcare data. The health information system will rely on other systems that can collect, store, manage and transmit patient's electronic records (electronic medical or health records), clinical decision support systems, hospital or practice operational management systems (billing and scheduling), patient portals that allow patients to access their health data (medication, lab results, appointment information), remote patient monitoring systems (telehealth), and system that can handle data related to the activities of providers and health organizations. When this option is implemented, corresponding measures should also counteract family physicians' improper intentional and unintentional referrals. "The establishment of the referral system can be facilitated by ensuring that the proper distribution of service provider centers and family physicians is in place. But also, by defining the referral route for each centre, the range for each level, and establishing the correct link between the levels of care with the possibility of two-way communication and information exchange. Finally, the performance of family physicians can be assessed on these bases. By integrating paraclinical services, increased patient satisfaction will be one of the important consequences" (P-E-10).

One of the advantages of reinforcing gatekeeping system is the reduction of unnecessary referrals to subspecialists and specialists. As a result, specialists will have enough opportunities to visit patients, conduct more research and have scientific contact with other reputable scientific centers. Besides, family physician residents will also become more familiar with their patients and their future working environment. The disadvantage of this solution might be the possible patient dissatisfaction, particularly if they have to pay extra for bypassing the gatekeeping system. Moreover, the implementation will require a change in culture at the community level, as in Iran, a referral to a subspecialist or specialist creates a sense of confidence. It will also require more staff, that is, general practitioners and medical residents. "There are approximately 2000 visitors per day at the Sheikh Al-Rais clinic. About a quarter of them are here for the first basic visit (i.e., visiting a general practitioner, social medicine resident, or a family doctor). Assuming that all patients come to the clinic in the morning and the standard time of 10 minutes per visit is honoured, about 50-67 doctors or residents are needed, which is practically, logically, and economically not feasible. However, it is possible to reduce the number of visits by capping the number of patients for each doctor. In this way, this strategy can be managed with the presence of 20-30 doctors" (P-E-5).

Some experts also suggested that the deployment of generalists in the specialized center was a contravention of health-care services stratification. If the specialized services are provided at the primary health-care level, it violates health-care services stratification. Hence, such a policy option cannot be generalized or recommended for implementation everywhere. Overall, keeping the situation as it is practically impossible in the long run, both for nonresident clinics and, most importantly, for patients and insurance companies that cannot keep on reimbursing separately for two visits for one patient on the same day. Finally, this option should be introduced gradually to allow users and providers to familiarize themselves and get used to the new gatekeeping system.

Policy option 3—Use of telemedicine

When using telemedicine, a client can explain the symptoms and the need for a referral using designated websites or a smartphone application before and during the electronic appointment (Rubinger & Bhandari, 2020). A general practitioner can then decide whether a referral to a subspecialist or specialist is needed. This option requires a robust health information system and the necessary infrastructure (Darvish & Far, 2017). However, it enables the clinician to establish visual connections between the patient, the family physician, and the specialist, facilitating the consultation process and establishing trust. "Today, various countries use advanced technologies to provide prevention, treatment and rehabilitation services. In our country, due to infrastructural problems, it is not yet possible to use these facilities on a large scale. However, by focusing on the elements and effective components of referral systems and strengthening them, these facilities can be used to reduce the burden of visits to many clinics" (P-E-10).

Similar to reinforcing the gatekeeping system, this option requires adequate infrastructure and a robust health information system to manage healthcare data. This option also requires changing the organizational culture and cultural perception of "virtual" consultations and meetings. New technologies, like telemedicine, can improve equity in access to quality health-care services. Other possible benefits include cost reduction, productivity increase, reducing medical errors, and increasing confidence in the integrity and accuracy of the information in the health system. Another advantage is reducing patients' time spent on intracity trips, which, in turn, can reduce unnecessary traffic and air pollution in the city of Tabriz and in Iran in general. At the same time, this solution also requires the creation of appropriate culture at the community level and overcoming the initial resistance of individuals and organizations within the healthcare sector. It also needs support by appropriate legislation regarding the confidentiality of patient information stored online. The use of telemedicine consultations might also be limited by existing infrastructure, internet speed connection, and software availability. Implementation of this strategy would also require substantial financial investments, which might not be available.

Policy option 4—Utilization of educational algorithms

Educational algorithms (or maps of medicine) are online, evidence-based resources that were first used by providers in the United Kingdom, Sweden, and Denmark (Heinrichs & Eickhoff, 2020). These algorithms include patient care and treatment maps and exhibit a clear picture of the complete patient's pathway (i.e., from when the symptoms were reported until treatment/discharge), which can save time for the patient and the doctor and reduce costs. The standard disease algorithm is developed based on existing evidence and relevant experts' advice, and different interventions are identified at different stages. “By following the algorithm, people can receive training and information about their care, and if they need to consult a doctor at any stage, these items will be identified in the algorithm with a phone sign. The patient receives help from the doctor (full-time GP) by calling” (P-E-12). Educational algorithms can make it easier to understand when and how to refer or get a referral to a specialist and subspecialty. This method can be used for conditions that can be self-managed or with the help of a consultation with a general practitioner over the phone. The patients can also be taught to study this treatment algorithm before being referred to a specialist and subspecialty. The content should be written unambiguously and concisely and compiled in an attractive and understandable format for patients, using lay language.

When implemented correctly, educational algorithms can lead to the appropriate referral to secondary healthcare services and specialists. Using this method could cut down waiting times and costs. Physicians consider such algorithms to be a very valuable and effective tool (Brennan et al., 2011; Holt-Lunstad & Smith, 2016). The development of accurate educational algorithms requires time, effort, and sufficient funding. Moreover, it is necessary to support its use by creating a culture and acceptance among the general public to ensure a positive outlook on using this method.

Policy option 5—Implementation of electronic health records

Electronic health (or e-health) records include all the data generated by health-care providers (Latha et al., 2012; Zeadally et al., 2016). Integrated access to all patient data is one of the primary goals of the e-health record, which is critical to improving clinical care and reducing medical errors. The referral process should be completely integrated into the patient health records system. Communication between health-care providers at different levels should also be linked to individual health records. One of the suggestions of the study participants was to prepare electronic health records for all covered population, which could facilitate the introduction of the referral system by documenting, monitoring, and providing complete access to the medical history of the client. “If the electronic health record is designed, there are technical considerations about the referral system and the electronic health file, and if these considerations are taken into account, the results will be obtained by the system” (P-E-6).

To assess the readiness of the health system for electronic health records and electronic referrals implementation, four specific areas such as organizational culture, management and leadership, operational readiness, and technical readiness should be considered. Doing so would increase the chances of being accepted by the health system employees, including doctors, nurses, and even patients. From the point of view of planners and policymakers, e-health records could bring benefits, that is, lead to more transparency in how services and care services are provided and potentially reduce the incidence of medicalisation and service or overuse. According to some interviewees, the countries that have set up the referral system have institutionalized it and found it to be an excellent way to provide and receive care and services. At the same time, penalty fees could account for receiving services outside the referral network.

Implementation of medical records system requires robust information technology support, coordination of users and health information management experts, appropriate health information systems software, coordination between health insurance laws and regulations, additional positive culture building, and promoting the use of modern technology (Shahbahrami et al., 2016). "In fact, it is the best way to implement an electronic health record and upgrade patients' electronic referral system. Each of the measures that are performed for the patient, as well as the referral feedback and care recommendations, must be recorded in the patient's electronic record and considered as part of the patient's electronic record" (P-E-13). Moreover, it might also require evaluation, optimization, and redesign of service delivery processes, leading to continuous and tangible improvement in service delivery processes. More specifically, redesigning service delivery processes might include redefining the course of treatment in the health-care service system, redesigning the patient's treatment in health-care services, reorganizing health-care requests, and revising the coordination and the amount of supply and demand (Porter et al., 2013). Importantly, any revision and redesign must account for patient confidentiality, dignity, and account for cultural aspects of patients and caregivers (Penrod et al., 2012; Pharr et al., 2014).

If implemented correctly, electronic records and referral system is expected to facilitate cost-effectiveness and equality in national and local health systems, allow for a systematic review of the data on health outcomes, empower patients to participate in the care process, and provide a possibility to train health-care professionals better (Snyder et al., 2011). Moreover, electronic health records could provide access to data and health information for providers and allow patients to obtain more information about their health conditions and treatment when necessary. "In addition, it increases confidence in the integrity and accuracy of the information in the health system. Electronic health records can reduce costs and increase productivity, reduce medical errors, support decision making, and participation in remote medical care" (P-E-4).

Reforming the existing referral system would be time-consuming and require a long-term strategy. Obstacles to the implementation of electronic health records and referral systems include technical and software limitations, the need to change organizational culture, attitudes and behaviors of health system staff and patients, cost constraints, and, most importantly, the resilience of individuals and organizations to change (ranging from reservation to opposition). The introduction of the new system might also be perceived as a restriction measure that prevents patients from seeing needed specialists or subspecialists. Moreover, patients may be referred to a specialist in other clinics or even to the personal private offices of specialists, which could lead to additional and higher out-of-pocket expenditure. To avoid this, it was suggested to Sheikh Al-Rais Clinic and others to involve all stakeholders, including providers, patients, policymakers, and insurance companies.

Policy option 6—Establishing specialized clinics in different areas of the city

According to the Fourth guidance of the Health Transformation Plan in Iran, the Universities of Medical Sciences all over the country are obliged to develop and establish special clinics inside or outside hospitals and universities in accordance with population needs and coverage but also based on the standards of physical space and equipment of the special clinic of the Deputy of Treatment. Many interviewees believed that to have an efficient public sector at secondary and tertiary levels, specialist physicians should be directed to the public sector, and the number of private offices should be significantly reduced. This can be done by creating specialized clinics in different parts of the city and distributing doctors among them. "But at the same time, the financial resources of the public sector and the revenue of the public sector must increase significantly. We also need to see the organisation, supply, and increase of resources at level one and the family medical team" (P-E-12). However, the increase in resources must be done while controlling and evaluating specific groups to prevent abuse and any potential conflict of interests.

In the health system transformation plan framework, university clinics can be established in different areas of Tabriz. "By dividing the city of Tabriz into six different geographical areas, different clinics can be established, and by dividing university specialists and subspecialists into different clinics and regions, access to specialised and sub-specialised services can be facilitated" (P-P-1). With the establishment of different clinics in different city areas, while increasing access to services in different areas, the quality of services will be expected to increase. Also, reducing the workload of different clinics will make it easier to manage and create a referral system. At the same time, as the number of centers that provide specialized and subspecialized services increases, the induced demands and referrals might also increase.

DISCUSSION

We identified six policy options, delineating their pros and cons, and aiming to reduce the burden of referrals to the Sheikh Al-Rais Subspecialty Clinic. Policy options considered included institutionalizing referrals from the primary to secondary level care and family physician program, reinforcing gatekeeping system, use of telemedicine, use of educational algorithms, implementing of electronic health records, and establishing specialized clinics in different parts of the city and country. However, based on our results, in general, in Iran, there is still no knowledge and understanding of the family physician system among health system officials. Many officials seem to unknowingly misrepresent scientific and global standards, and they insist on their proposed family physician structure. Hence, before implementing the electronic record and referral system, it is necessary to have an accurate long-term roadmap based on the latest available evidence.

In referral models recently launched in high-income countries, the referral process has three separate steps (i.e., registration of referral requests in a specialized center, referral evaluation, and transfer stage) (Chen et al., 2013; Naseriasl et al., 2015). According to several studies, positive and significant results have been obtained from establishing this referral system. For example, there it led to improving relationships between primary care providers and specialist physicians (Le Doare et al., 2009; Protti & Johansen, 2003; Protti et al., 2008; Reponen et al., 2004), increased access to care, facilitated a better exchange of information, improved knowledge management (Warren et al., 2012), provided better integration of services between care levels (Scottish Care Information, 2015), reduced waiting time to receive specialized services, increased speed, safety, and improved the referral process (Liddy et al., 2013a), led to the formation of standard procedures in the referral process (Ellingsen & Obstfelder, 2007), reduced unnecessary specialized visits (Liddy et al., 2013b; Nabelsi et al., 2019), reduced misinformation and mismanagement of the referral process, improved document quality and the quality of health care, and led to a significant reduction in administrative costs (Ball et al., 2016; Cervantes et al., 2003).

Referral institutionalization and electronic health records could serve as prerequisites and a platform for implementing other developed options. Implementing an electronic health record requires an integrated, coordinated and coherent system, political support, organizational coordination, and responsible trustee. The electronic health record can be used effectively after meeting these prerequisites, legal requirements, and ensuring sufficient financing. Culture building and strengthening community beliefs about the importance and necessity of having electronic records in the health system should also be done (Margham et al., 2018). Improving documentation in the form of using electronic health records, integrating electronic health records with referral system, controlling and reducing the demand for unnecessary referrals through screening mechanism, and the ability to refer patients to the most appropriate level of referral are among the advantages of this referral method (Bell et al., 2012; Menachemi & Collum, 2011). There is also evidence of the importance and necessity of having an electronic file in the health system. If culture is created, people or society will be associated and not show opposition or resistance (Coorevits et al., 2013; Esquivel et al., 2012; Menachemi & Collum, 2011).

Health-care systems continue experiencing challenges with equity of access to health care. Hence, innovative health-care solutions are invaluable for tackling inequalities and reducing patient waiting times. Telehealth solutions, such as e-Consults, could increase the efficiency of care provision by improving access to specialists while also optimizing waiting time and place of care (Stroetmann et al., 2010). Telehealth interventions can effectively reduce waiting lists and improve the coordination of specialist services and should be considered in conjunction with clinical requirements (Caffery et al., 2016). However, evidence on the difficulties of introducing technologies such as telemedicine (and eHealth in general) in health-care organizations points to internal resistance to changes in work processes and organizational transformations.

Furthermore, their implementation could be impeded by economic factors and the lack of reimbursement models for telemedicine technologies and solutions (Boddy et al., 2009; Greenhalgh et al., 2004; Novillo-Ortiz, 2016)—a sad reality for many low- and middle-income countries. Nonetheless, even in resource-scarce settings, one could consider using algorithms for diagnosing patients as tools for clinical guidelines and syndromic management (Gao et al., 2008). For example, the use of algorithms for referral to the hospital by nurses after identifying severe disease for integrated management of childhood illness in Vietnam had shown to be 60% more sensitive and 85% more specific than a pediatrician diagnosis alone (Phuong et al., 2004).

Regardless of which individual policy option is chosen for implementation, it may face objections and rejection from major stakeholders, including specialist physicians. To prevent this, we suggest considering implementing several policy options discussed in our study simultaneously, mainly to tackle the potential drawbacks of each policy option. Implementing several policy options together can improve the quality of provided services and reduce the cost of services.

CONCLUSION

It is of course possible that implementing solutions might face resistance and even introduce new problems; however, doing business as usual is damaging to the Iranian health system, individuals, and communities. Identification of the root cause of problems before any corrective action is essential. The main problem in the Sheikh Al-Reis Clinic in Tabriz is the burden of patients' visits, whose needs can be met by referring them to a general practitioner. However, referring to specialists and subspecialists will cause overcrowding in this clinic, and in this case, doctors will not have enough time for other patients. We suggest using a range of policy options supported by the most up-to-date technologies to ensure better service provision by matching supply and demand and increasing efficiency.

Policymakers can choose the most suitable option according to the executive considerations and the advantages and disadvantages of the provided options, accounting for the facilities infrastructure of the University of Medical Sciences and Sheikh Al-Rais Clinic. We recommend considering the implementation of integrated options for the institutionalization of the referral system along with the formation of the electronic health record, the launch of a comprehensive electronic referral system, the connection of active systems in the primary and secondary healthcare levels to each other, and the distribution of clinics in the metropolitan area of Tabriz. These options seem to be effective, possible, and practical. Our recommendations could also be suitable for other hospitals in the country and hospitals in other countries.

AUTHOR CONTRIBUTIONS

Leila Doshmangir and Parinaz Doshmangir had the original idea for the study and carried out the design. Hossein Jabbari Beyrami provided valuable insight regarding the methodological approach and organization of the manuscript. Leila Doshmangir and Gisoo Alizadeh were involved in the data collection. Vladimir S. Gordeev and Gisoo Alizadeh drafted the manuscript. Hossein Jabbari Beyrami and Parinaz Doshmangir revised the manuscript. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

All ethical issues have been observed in the research and informed consent has been obtained from the participants.

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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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A narrative literature review on media and maternal health in Africa

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Abstract

Health communication is a strategy used to disseminate health information to individuals and communities to enable them to make decisions that will enhance their health and well-being. Particularly in the era of digital health, such strategies tend to emphasize health promotion and disease prevention. Access to essential health information is a fundamental aspect of an effective health-care system and is therefore crucial for achieving universal health coverage and other health-related sustainable development goals. Traditional media play a crucial role in enhancing maternal and newborn health, which remains a significant challenge in sub-Saharan Africa. This narrative literature review explores the use of mass media in disseminating maternal health-related information in Africa. Twenty-five articles were considered relevant and included in the review. The result is presented under the following themes (1) access to health information, (2) health-seeking behavior, (3) birth preparedness, and (4) challenges associated with mass media. UNICEF Strategy for Health 2016–2030, African Union agenda 2063, and sustainable development goal #3 informed this review. As a major stakeholder in the African health sectors, the media plays a critical role in tackling systemic health inequities by promoting the sharing of maternal health information with citizens. There is a need for collaboration among all health stakeholders, as well as a sustainable relationship between media practitioners and health authorities for the promotion of improved maternal health in Africa.

KEYWORDS

Africa, communication, health information, mass media, maternal health

Key points

- Access to essential health information is a fundamental aspect of an effective health-care system and is therefore crucial for achieving universal health coverage and other health-related sustainable development goals.
- Exposure to media promotes increased usage of antenatal care and skilled birth attendants, reproductive behaviors of women and their spouses, and reduced maternal morbidity and mortality in Africa.
- A major challenge associated with media intervention, advocacy, and engagement on maternal health issues is inequalities in media access with its attendant effect on maternal health service utilization.
- The media as a major stakeholder in the health sector plays a critical role in tackling the systemic health inequalities in Africa by promoting the sharing of maternal health information with citizens.
- There is the need for effective dissemination of health information and education through media advocacy amid the grime statistics of a high rate of mortality, morbidity, and undernutrition of mothers in the continent of Africa.
- There is need for synergy among all health stakeholders and a sustainable relationship between media practitioners and health authorities for the promotion of good maternal health in Africa.

INTRODUCTION

Despite interventions made by governments and nongovernmental agencies on maternal health and mortality, the current rate of maternal mortality and access to maternal health in Africa remains unacceptable. Access to traditional media has been useful in enhancing the knowledge and health behavior of women toward the reduction of the maternal mortality rate (MMR) (Achia & Mageto, 2015; Adamu, 2020; Ahinkorah et al., 2020; Ajaero et al., 2016; Birmeta et al., 2013; Etana & Gurmu, 2018; Igbinoba et al., 2020; Kim & Kim, 2019; Kreps, 2015; Machira & Palamuleni, 2017; Maryon-Davis, 2012; Rutaremwa et al., 2015; Sserwanja et al., 2022; Tekelab et al., 2019; Tsawe et al., 2015; Wang et al., 2021; Yaya & Bishwajit, 2020; C. O. F. Zamawe et al., 2016).

The United Nations International Children Emergency Fund (UNICEF) (2016a) noted that communication strategies within maternal health are essential for reducing the risk and rate of mortality, morbidity, and undernutrition of mothers by increasing their knowledge, which would lead to changes in behaviors, attitudes, and social norms at the individual, community, and societal levels. Access to essential health information is a fundamental aspect of an effective healthcare system and is therefore crucial for achieving universal health coverage and other health-related sustainable development goals (SDGs) (Royston et al., 2020).

Information provided by the media is easily accepted by communities and therefore impacts and molds how people conduct their daily activities (Nwagbara, 2017). Even though there is recorded progress in maternal health internationally, maternal mortality remains high in Africa (Tekelab et al., 2019). More than two-thirds (68%) of all global maternal deaths occur in sub-Saharan Africa (World Health Organization [WHO], 2019) due to a lack of access to quality antenatal care and skilled birth attendance during delivery (Ahinkorah et al., 2021). Sub-Saharan Africa is the only region in the world with a very high MMR, with 542 maternal deaths per 100,000 live births estimated in 2017. Comparatively, four subregions (Australia and New Zealand, Central Asia, Eastern Asia, and Western Asia) and two regions (Latin America and the Caribbean, and Europe and Northern America) have low MMR (<100 maternal deaths per 100,000 live births) (WHO, 2019).

The literature reveals the relative effectiveness of different traditional media in promoting maternal health through access to health information due to wide coverage. Classical traditional media such as print and electronic media are proven means of maternal health knowledge and awareness in sub-Saharan Africa (Ahinkorah et al., 2020; Asp et al., 2014; Atakiti & Ojomo, 2015; Gallo, 2021; Mweemba et al., 2021; Odorume, 2015; Sowa et al., 2018; United Nation Educational, Scientific and Cultural Organization [UNESCO], 2013; Waithaka, 2013; C. O. F. Zamawe et al., 2016).

UNESCO reports that more than 75% of households in developing countries have access to a radio (UNESCO, 2013), but only 42% of households in Africa having access to radio (Conroy-Krutz & Appiah-Nyamekye, 2019). Comparatively, 35% used television as a news origin in Africa every day, while barely 7% read newspapers periodically (Conroy-Krutz & Appiah-Nyamekye, 2019). Aspects of maternal health influenced by the media include the use of family planning, uptake of skilled birth attendants' services, and birth preparedness among others (Mills et al., 2008; Sserwanja et al., 2022).

However, print media coverage of maternal health news is lacking because media houses focus on issues that increase their sales and prefer sensational reports (Waithaka, 2013). The empirical literature reveals gaps in knowledge with respect to how traditional media influence MMRs through access to health information among women. By implication, this scenario has impacted the provision of informed intervention by governments and nongovernmental agencies toward maternal health in sub-Saharan Africa. To fill the identified knowledge gaps, this study seeks to investigate the role and contribution of the traditional media to maternal health management in Africa. Specifically, it aims to proffer solutions to mitigating maternal health issues, and how the media can assist in achieving better health care for women in Africa.

CONCEPTUAL FRAMEWORK

At the end of UNICEF's 2006–2015 health and nutrition strategy and the Millennium Development Goals, a fresh long-term policy was developed to assist the achievement of the SDGs. The policy consists of two main goals: (1) end preventable maternal, newborn, and child deaths and (2) promote the health and development of all children. The former goal pledges to address inequalities associated with maternal, newborn, and under-five survivals (UNICEF, 2016b)

African Union Agenda 2063 is Africa's framework for delivering on its goal of inclusive and sustainable development and is a concrete manifestation of the pan-African drive for unity, self-determination, freedom, progress, and collective prosperity pursued under Pan-Africanism and African Renaissance. The agenda focused on healthy and well-nourished citizens and prioritized healthy nutrition (African Union, 2015). The SDGs comprise 17 goals with 169 targets that all UN member countries have approved to work toward attaining by the year 2030. The SDGs established a vision for a biosphere free from hunger, disease, and poverty. Well-being has a prominent place in SDG 3, which aims to "ensure healthy lives and promote well-being for all at all ages," and is buttressed by 13 targets that cover an extensive range of WHO's work. The other 16 goals are concerned with health, as well, whether directly or indirectly. SDG 3.1 aims to “reduce the global MMR to less than 70 per 10,000 live births by 2030” (United Nations (UN), 2015). Together, the three agendas seek to end preventable maternal, newborn, and child deaths, and promote the health and development of all children.

METHODS

Literature was searched using the following electronic databases: PubMed, CINAHL, Scopus, and Embase. The search terms included “mass media,” “radio,” “television,” “newspaper,” “maternal health,” “health communication”, “pregnancy,” “perinatal,” “childbirth,” “Africa,” “sub-Saharan Africa,” and “African countries.” These terms were searched in different combinations using the Boolean Operators AND/OR. A manual search of the full-text references was also conducted. The inclusion criteria were as follows: (1) articles published in the English language in peer-reviewed journals between 2010 and 2021; (2) papers that focused on the use of radio, newspaper, and/or television; (3) articles that focused on women and their families; and (4) available full text.

Articles were excluded if they were duplicates, were not published in English, were focused exclusively on healthcare providers, or were concerned with social media. Articles that focused on the use of social media were excluded because even though its use has increased in recent years, access to social media for people in the rural areas of many African nations remains limited. A total of 200 papers were retrieved from the database search including five papers identified through other sources (reference list of retrieved articles). Fifty duplicates were also removed. The full texts of 150 papers were screened using the eligibility criteria, 125 papers that did not meet the inclusion criteria were excluded, and 25 papers met the inclusion criteria, quantitative (*n* = 14), qualitative (*n* = 3), and meta-analysis (*n* = 1), as well as mixed methods (*n* = 7) (see Figure 1).

Data extraction

E. K. S. and M. O. extracted data independently from the included studies and arrived at a decision whether to include them based on the inclusion and exclusion criteria. For each study included, we recorded the last name of author(s), year of publication, country, title, focus/aim, design/methodology, data collection method, sample size, and key findings (see Table 1).

RESULTS

After the abstract and full-text screening, 25 articles were considered relevant and included in the review. The included studies were conducted in seven countries, one in the west African region (Laouan, 2020), and two in low- and middle-income countries (LMICs) including a number of African countries (Granger et al., 2018; Gugsa et al., 2016) (Table 2). A summary of the characteristics of the included studies is shown in Table 1. The UNICEF Strategy for Health 2016–2030, African Union (AU) agenda 2063 and SDG goal 3 (African Union, 2015; UNICEF, 2016a; UN, 2015) guided the review. Specifically, all three agendas seek to end preventable maternal, newborn, and child deaths, and promote the health and development of all children. Four subthemes have been identified, such as access to health information, health-seeking behaviors, birth preparedness, and challenges associated with mass media, which are presented in Table 3.

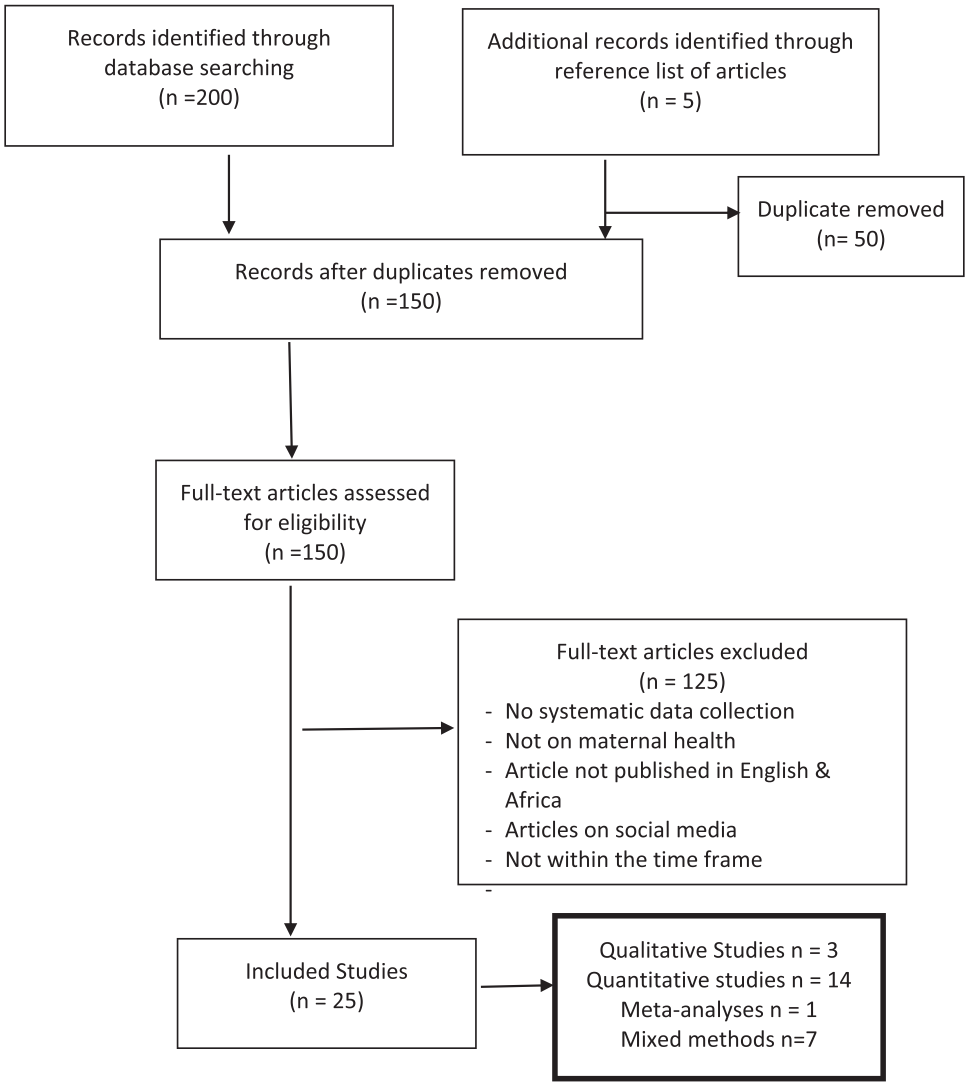

FIGURE 1 PRISMA flow

Access to health information

Among the objectives of Igbinoba et al.'s (2020) study, which comprised 100 women of reproductive age (15–49 years), is an examination of women's mode of obtaining information and the influence of mass media exposure on maternal health awareness. Their findings demonstrated a significant influence of exposure to mass media on maternal health awareness. Thus, the internet (49%) was the top source of maternal health awareness, while advertisements/campaigns (30.6%) were the most common means of obtaining maternal health information. Exposure to mass media campaigns has been associated with increased uptake of antenatal care, contraceptive usage, use of mosquito bed nets, and postnatal and delivery care services among exposed women (as compared with nonexposed women) (C. O. F. Zamawe et al., 2016). This study was a cross-sectional

TABLE 1 Summary of reviewed studies

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
Adamu (2020), Nigeria	Exposure of Hausa women to mass media messages: Health and risk perception of cultural practices affecting maternal health in rural communities of Bauchi State, Nigeria	To determine the exposure of Hausa women in rural areas of Bauchi state to health messages from the mass media, with a view to ascertaining if these messages have a bearing on their perception of risk regarding prevalent cultural practices relating to maternal health.	Qualitative design	Focus group discussion	Women of child-bearing age (14–49 years)	women encounter health messages (mostly through radio and posters) that are contextually relevant in addressing problems associated with maternal health, none of these are centered specifically on harmful cultural practices.
Ajaero et al. (2016), Nigeria	Access to mass media messages, and use of family planning in Nigeria: A spatiodemographic analysis from the 2013 DHS	To examine the relationship between access to mass media messages on family planning and the use of family planning in Nigeria. It also investigated the impacts of spatiodemographic variables on the relationship between access to mass media messages and the use of family planning.	Survey	Questionnaire	Data from the 2013 demographic and health survey of Nigeria, which was conducted in all the 36 states of Nigeria, and Abuja	Access to mass media messages increases the likelihood of the use of family planning.
Atakiti and Ojomo (2015), Nigeria	Influence of television health programs on maternal health	Examined the influence of television health programs on maternal health focusing on Badagry and Ikenne local government areas and health programs on Lagos State Television and Ogun State Television.	Descriptive statistics	Questionnaire	441 pregnant and postpartum women	Television health programs had a moderate influence on women in the two local government areas. However, the rate of exposure was low.

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
Utalor (2019), Nigeria	Influence of broadcast media messages on awareness, perception, and attitude of maternal health among reproductive women in Ilorin	(i) Find out women's level of exposure to broadcast media messages, (ii) investigate the level of awareness of women about maternal health messages on broadcast media, (iii) examine women's perception of maternal health messages on broadcast media, and (iv) and investigate the influence of maternal health messages on broadcast media on women's attitude toward maternal health.	Survey	Questionnaire	382 women	Women in Ilorin depend mostly on broadcast media as a major source of information on maternal health, but they identified radio as more effective than television in disseminating maternal health messages (58.2%). Besides talk show and health programs, maternal health messages were rarely promoted through other programs (31.4%). Women agreed to the statement that broadcast media positively change their attitude toward maternal health. Women used broadcast media as a major source of enlightenment on maternal health. Women expressed a positive perception about broadcast media messages on

(Continues)

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
						maternal health. Hypotheses confirmed that awareness of women's maternal health has a positive influence on their attitude.
Ahmed and Seid (2020), Ethiopia	Association between exposure to mass media family planning messages and utilization of modern contraceptive among urban and rural youth women in Ethiopia	To examine the association between exposure to mass media family planning messages and the utilization of modern contraceptives among urban and rural youth women in Ethiopia.	Comparative cross-sectional study	Questionnaire	6401 women age 15–24 years (4061 from rural and 2340 from the urban area)	There was no association between women exposed to mass media family planning messages and the utilization of modern contraceptives in rural areas. Surprisingly, this study showed that women exposed to mass media family planning messages in an urban area were less likely to use modern contraception by 62%.
Asp et al. (2014), Uganda	Associations between mass media exposure and birth preparedness among women in southwestern Uganda: A community-based survey	To explore the association between media exposure and birth preparedness in rural Uganda.	Community-based survey	Questionnaire	65 recently delivered women from 120 villages in the Mbarara District of southwest Uganda	Women who read newspapers were more likely to be birth prepared. High media exposure, that is, regular exposure to radio, newspaper, or television, showed no significant association with birth preparedness.

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
Igbinoba et al. (2020), Nigeria	Women's mass media exposure and maternal health awareness in Ota, Nigeria	To identify the sources of maternal health awareness. To examine means of obtaining maternal health information. To determine the frequency of mass media exposure. To analyze the influence of mass media exposure on maternal health awareness among female residents.	A descriptive (survey)	Questionnaire	100 women of reproductive age (15–49 years), resident in Ota, Ado-Odo Ota Local Government Area (LGA) in Ogun State	Mass media exposure had a significant influence on maternal health awareness.
Tekelab et al. (2019), Ethiopia	Factors affecting utilization of antenatal care in Ethiopia: A systematic review and meta-analysis	Systematically and quantitatively summarize the factors affecting utilization of antenatal care in Ethiopia	Systematic review and meta-analysis	Web search	15 observational studies were included. 20,185 Women who were pregnant or had given birth at least once preceding the survey	Exposure to mass media was strongly associated with the utilization of antenatal care.
C. Zamawe et al. (2015), Malawi	The effect of mass media campaign on men's participation in maternal health: A cross-sectional study in Malawi	To assess the effect of mass media campaign on men's involvement in maternal health.	A cross-sectional study	Face-to-face interviews using electronic structured question-naires	3825 women of childbearing age (15–49 years)	Husbands of the women who were exposed to the PLM radio program were more likely to participate in antenatal care, to be involved in childbirth and to participate in postnatal care than their counterparts.

(Continues)

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
C. O. F. Zamawe et al. (2016), Malawi	The impact of a community driven mass media campaign on the utilization of maternal health-care services in rural Malawi	To examine the impact of a community-driven mass media campaign called Phukusi la Moyo (tips of life) on the utilization of maternal health-care services.	Community-based cross-sectional study	Structured electronic questionnaires	3825 women of reproductive age (15–49 years)	The likelihood of using contraceptives, sleeping under mosquito bed nets, utilizing antenatal care services, and utilizing postnatal care service were significantly higher among women who had exposure to the PLM campaign than those who did not.
Sanda (2014), Nigeria	Media awareness and utilization of antenatal care services by pregnant women in Kano State- Nigeria	To explore pregnant women's major sources of information on antenatal care services, their media preferences of antenatal care programs, and their appropriate timing, as well as the challenges they face in use of the media in Kano state.	Qualitative method	Focus group discussion, in-depth interviewing, and document analysis.	115 participants that is, 100 pregnant women, 10 health workers and 5 media personnel. The pregnant women were between the reproductive years of 15–49 years.	Radio is the primary source of information on antenatal care services. The pregnant women in the study preferred media programs in which a health expert discusses antenatal care and maternal health issues.
Chaka (2020), Ethiopia	Examining individual- and community-level factors affecting Skilled delivery care among women who received adequate Antenatal care in Ethiopia: Using multilevel analysis	Investigating the individual- and community-level factors affecting the use of skilled delivery care among those women who had received adequate antenatal care.	Cross-sectional study	Questionnaire	957 women aged 15–49 years and gave birth within 5 years before the survey	Women who were exposed to media were more likely to use skilled delivery care.

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
Wittels (2016), Sierra Leone	Exploring the role of communication in community health in Sierra Leone	To explore the role that media and communication can play in improving health outcomes across communities to explore the health-seeking and information-seeking behavior of participants.	Mixed methods	Questionnaire interviews, focus group discussion	2500 Sierra Leoneans	Radio and mobile phones are the media platforms that can reach most people. Media access—in particular for radio (81%) and mobile (83%)— is high.
Mezmur et al. (2017), Ethiopia	Socioeconomic inequalities in the uptake of maternal healthcare services in Ethiopia	To examine socioeconomic inequalities in the uptake of maternal health services and to identify factors that contribute to such inequalities.	Survey	Questionnaire	7917 women in the year 2000; 7273 women in the year 2005 and 7836 women in the year 2011 who had a live birth in the 5 years preceding the surveys	Media access significantly contributes to inequalities in maternal health service utilization favouring the nonpoor.
Gebre et al. (2018), Ethiopia	Inequities in maternal health services utilization in Ethiopia 2000–2016: Magnitude, trends, and determinants	To assess the magnitude, trends, and determinants of inequities in maternal health services utilization in Ethiopia from 2000 to 2016.	Cross-sectional survey design	Questionnaire	2000–2016 DHS data set	Among the determinants of inequality is fewer access to mass media.
Oluyemi and Adejoke (2020), Nigeria	Maternal health information in Nigeria: The myth and the beliefs	Influence of cultural beliefs on maternal health information and the sources of these information on maternal health in Nigeria.	Survey	Questionnaire	1706 participants from the six geopolitical zones	The source of maternal health information was hospital (22.3%), radio (18.6%), internet (13.2%), friends (12.4%), television (12.2%), school (10.8%), and family (10.5%).

(Continues)

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
Saleh and Lasisi (2011), Nigeria	Information needs and seeking behavior of rural women in Borno State, Nigeria.	To identify the information needs of rural women. To identify their sources of information. To examine their information-seeking behavior.	Survey	Questionnaire	Women from eight local government areas	The rural woman hardly seeks information in a formal way through formal sources or channels. Watching television or listening to radio, where available, is seen as luxury only men can afford.
Owusu et al. (2011), Ghana	Sexual and reproductive health education among dressmakers and hairdressers in the Assin South district of Ghana	To identify the existing sexual and reproductive health education programs dressmakers and hairdressers in the study area were knowledgeable of.	Mixed methodology	Questionnaires, focus group discussion, and in-depth Interview guides	Female dressmakers and hairdressers as well	Respondents major sources of information on sexual and reproductive health.
		Determine the sources of information on sexual and reproductive health available to dressmakers and hairdressers in the study area, and assess the communication pattern(s) on reproductive.			Their apprentices (aged between 15 and 35 years, had attained basic education and were never married)	Were friends, mass media, health professionals, and parents.
Etana and Gurmu (2018), Ethiopia	The effect of mass media on women's reproductive health behavior in Ethiopia	This study investigates the roles of mass media in positively affecting women's reproductive health behavior.	Mixed method	Questionnaire interviews	Women of reproductive age, media, and health personnel	Exposure to mass media has significant positive effects only on a few reproductive health indicators but not on others. The insignificant role of mass media is

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
						attributable to constraints associated with reproductive health communication design, implementation, and monitoring and evaluation.
Granger et al. (2018), Burkina Faso, Ghana, Guinea, India, Kyrgyz Republic, Niger, Senegal, and Uganda	Community media for social and behavior change: Using the power of participatory storytelling to improve nutrition	To help guide program managers and other decision-makers considering the use of various types of community media. In these pages, we describe relevant experiences, tools, evidence, and lessons learned. Reflections on earlier definitions and principles of community media are also presented for readers interested in further exploring the foundations and key concepts of this approach.	Survey	Questionnaires	Women from various group	Community video and radio programs have been shown to be effective and innovative SBCC program models in the resilience context of the Sahel, changing both nutrition-specific and nutrition-sensitive behaviors.
Gugsa et al. (2016), Bangladesh, Rwanda and South Africa	Newspaper coverage of maternal health in Bangladesh, Rwanda and South Africa: A quantitative and qualitative content analysis	To examine newspaper coverage of maternal health in three countries that have made varying progress toward MDG 5	Mixed methods	Content analysis	English language newspaper published in print and online	It is possible that greater media attention toward maternal health could be linked with maternal health being positioned higher on the agenda for policy action.

(Continues)

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
Waithaka (2013), Kenya	Print media coverage of free maternal health-care issues by the daily nation	To investigate how the print media covered free maternal health-care programs in Kenya a case of the *Daily Nation* newspaper.	Mixed methods	Code sheet	180 publications	Print media coverage of maternal health news is wanting. Media houses are primarily profit-making organizations. They tend to focus on issues that will increase their sales and as a result prefer very sensational reports. Maternal health issues, by their nature, do not fall under this category they need to be given more coverage as we endeavor to attain the millennium goals.
Ukachi and Anasi (2019), Nigeria	Information and communication technologies and access to maternal and child health information: Implications for sustainable development	Aimed at ascertaining women's perception of the impact of information and communication technologies on access to maternal and child health information and its implication on sustainable development.	Descriptive research design	Questionnaire	Women of reproductive age who were patients at the University of Lagos Teaching Hospital at the time of data collection for this study	Women perceive information and communication technologies to have a positive impact on their access to maternal and child health information. It was also found that irregular power supply, poor internet access, and ignorance of the media that transmit

TABLE 1 (Continued)

Author (year), country	Title	Focus/aim	Design/ methodology	Data collection	Sample	Key findings
						maternal and child health information were the key factors that militate against effective access to maternal and child health information using communication technologies.
Agboola and Ahmed (2020), Nigeria	Rural women perceptions of digital media influence on awareness creation about maternal health information in Minna, Nigeria	Investigated the perception of digital media influence in awareness creation on maternal health amongst rural women in Minna, Nigeria.	Survey	Questionnaire	384 respondents	Lack of local content on maternal health issues and inadequate relevant maternal health information were revealed as the challenges to maternal health.
Laouan (2020), West Africa	Rapid gender analysis—COVID-19 West Africa.	To determine reduced income and access to basic needs due to government lockdowns, changing gender roles in households, and increased gender-based violence.	Qualitative	Interview	266 people across 12 countries	Women and youth have limited access to traditional channels of communication, such as TV and radio, as they are controlled by men in the household. Broadcasts sharing information about COVID-19 tend to take place at times when women are occupied with domestic chores.

Abbreviations: COVID-19, coronavirus disease 2019; MDG 5, Millennium Development Goal 5.

TABLE 2 Country/regional classification per publication

Country/region	Number of publication(s)
Ethiopia	6
Ghana	1
Kenya	1
LMICs (with a focus on Africa)	2
Malawi	2
Nigeria	10
Sierra Leone	1
Uganda	1
West Africa	1

Abbreviation: LMICs, low- and middle-income countries.

study comprising 3825 women of childbearing age (15–49 years) and conducted in rural Malawi.

Atakiti and Ojomo (2015) examined the influence of television programming on maternal health in Lagos Nigeria. Data were gathered from 300 pregnant and 161 postpartum women using a questionnaire. The study showed that programs had a moderate influence on maternal health, and the authors reported low exposure to television. Television as educational entertainment increases women's knowledge; this is particularly important as people with limited literacy can successfully access television without depending on print media (Atakiti & Ojomo, 2015). Radio has been shown to be the primary source of maternal health information in several Nigerian studies (Adamu, 2020; Oluyemi & Adejoke, 2020; Sanda, 2014; Utalor, 2019). The findings of a survey of 382 Nigerian women by Utalor (2019) demonstrated that women identified the broadcast media as the main source of information with radio being more effective than television. A focus group discussion with women of childbearing age (14–49 years), also in Nigeria, showed that radio and posters were sources of maternal health information (Adamu, 2020). Again, a qualitative study involving 100 pregnant women (15–49 years) revealed that radio is the primary source of information on antenatal care services. Moreover, radio (18.6%) was the second most important source of maternal health information, while television (12.2%) ranked fifth in a survey of 106 participants from six geopolitical zones (Oluyemi & Adejoke, 2020). In a mixed method study involving 25,000 Sierra Leoneans, the radio was among the topmost source of media access within the community (Wittels, 2016).

A study in Ghana using individualized interviews to collect data from 119 dressmakers and hairdressers with four focus group discussions ($n = 29$), and in-depth interviews with key informants ($n = 5$), showed that sources of information on sexual and reproductive health for a majority of respondents ranked mass media as the second most source of information to friends (Owusu et al., 2011). Oluyemi and Adejoke (2020) carried out a study of the sources of maternal health information in six states from the six geopolitical zones of Nigeria. The findings showed that the hospital was the main source of maternal health information (22.3%). Radio (18.6%) was recorded as the second source, followed by the internet (13.2%) and television (12.2%). Therefore, knowledge of women on maternal health has a constructive impact on their feeling (Utalor, 2019).

TABLE 3 Themes

Themes	Sources
Access to health information	Sanda (2014)
	Adamu (2020)
	Utalor (2019)
	C. O. F. Zamawe et al. (2016)
	Igbinoba et al. (2020)
	Atakiti and Ojomo (2015)
	Oluyemi and Adejoke (2020)
	Owusu et al. (2011)
	Wittels (2016)
Health-seeking behaviors	Ahmed and Seid (2020)
	Ajaero et al. (2016)
	Saleh and Lasisi (2011)
	Granger et al. (2018)
	Tekelab et al. (2019)
	Etana and Gurmu (2018)
Birth preparedness	Asp et al. (2014)
	Chaka (2020)
	C. Zamawe et al. (2015)
Challenges associated with mass media	Gugsa et al. (2016)
	Gebre et al. (2018)
	Mezmur et al. (2017)
	Waithaka (2013)
	Ukachi and Anasi (2019)
	Laouan (2020)
	Agboola and Ahmed (2020)

Health-seeking behaviors

Many countries have understood the importance of communication as an intervention needed to reduce and prevent maternal deaths, thus improving maternal health; yet, this benefit cannot materialize if the target audience does not have sufficient knowledge of the message (Sanda, 2014). According to Owusu et al. (2011), the mass media is a powerful tool not only for awareness creation about new technology but also for encouraging people's desire for information on sexual and reproductive health and facilitating their efforts to apply the information to their own behavior. Yet, in their findings, mass media did not produce any behavioral change among dressmakers and hairdressers due to their consumption of music and movies. Comparatively the findings of the Malawian community-based study (C. O. F. Zamawe et al., 2016) indicate an increased likelihood among women who had exposure to media campaigns of using contraceptives, antenatal care and utilizing postnatal care services, and sleeping under mosquito bed nets. Indistinguishably, access to radio programs increased men's participation in maternal health care (antenatal, childbirth, and postnatal care) (C. Zamawe et al., 2015). In parallel, a systematic review and meta-analysis of 15 observational studies of 20,185 women who were pregnant or had given birth at least once observed that exposure to mass media was firmly linked to the uptake of antenatal care (Tekelab et al., 2019). Ajaero et al. (2016) analyzed data from the 2013 Nigerian Demographic Health Survey of 15,859 urban and 22,663 rural women aged 15–49 years from all 36 states showed the increased likelihood of family planning due to access to mass media. Similarly, Utalor (2019) found that exposure to mass media unequivocally and positively influenced women's attitudes toward maternal health issues. In contrast, a comparative cross-sectional study by Ahmed and Seid (2020) in Ethiopia, with 6401 women aged 15–24 years (4061 from rural and 2340 from the urban area) found no association between women exposed to mass media family planning messages and the utilization of modern contraceptives in rural areas. However, those exposed to mass media were less likely to use family planning by 62%. Conversely, research that explored the role of communication in community health in Sierra Leone by BBC Media Action revealed strong health information-seeking efforts, with 86% of respondents indicating that they wanted to receive more information on health while 61% of women of reproductive age were interested in receiving more information on pregnancy (Wittels, 2016)

A mixed method study of women of reproductive age, media, and health personnel by Etana and Gurmu (2018) found that the mass media had positively affected a few reproductive health indicators. However, they reported that the insignificant role of mass media is associated with the design of reproductive health communication, and how it is implemented, monitored, and evaluated. The use of groups of women to effect community-based interventions has proven to be effective in increasing community acceptability of health-related interventions. Granger et al. (2018) carried out a multicountry study of community media's effect on social and behavior change among women from various groups in eight LMICs. They found community video and radio programs to be effective in improving nutrition and hygiene practices. However, a survey of women from eight government areas, which sought to identify the information needs, sources of information, and information-seeking behavior of rural women, revealed that this population rarely seeks information from formal sources such as radio or television. Watching television or listening to the radio, where available, is seen as a luxury only men can afford (Saleh & Lasisi, 2011).

Birth preparedness

Mass media is useful in promoting maternal health by influencing birth preparedness. Using a community-based survey, Asp et al. (2014) explored the link between birth preparedness and exposure to media among 65 postnatal women recruited from 120 villages in southwest Uganda. The study showed that 88.6% and 33.9% listened to the radio and read newspapers, respectively. The use of newspapers was more prevalent in urban areas, while radio was more common in rural areas. Factors such as saving money, identifying a skilled birth attendant, finding a blood donor, and arranging transportation for delivery and any obstetric emergencies were the birth preparedness action included.

A study by Chaka (2020) examined both community and individual-level factors that affect the utilization of skilled care delivery for women who received adequate antenatal care in Ethiopia. The study, which involved 957 women aged 15–49 years, and who gave birth within 5 years preceding the survey, showed that women who were exposed to media were more likely to attend antenatal care as well as use the services of a skilled birth attendant. A cross-sectional study of 3825 women of childbearing age in Malawi, conducted between

July and December 2013 and focused on the effect of a mass media campaign on men's participation in maternal health, revealed that when exposed to a radio programme, men were likely to participate in the antenatal care (1.5 times), childbirth (1.7 times), and the postpartum period (2 times). The researchers found a high probability of engaging in birth preparedness and postnatal care (C. Zamawe et al., 2015).

Challenges associated with mass media

Scholars have taken note of the news media's influence on public policy issues. Through the process of "agenda setting and framing," news stories are prioritized over other stories, and influence not only what issues are presented to mass audiences but also how these are perceived, and what importance the public should attach to them. These were echoed in Gugsa et al.'s (2016) mixed method content analysis study involving newspapers published in the English language.

Communication via mass media raises several challenges, such as identifying and reaching the right audience, and ensuring that the message is appropriate for that audience and the likelihood of implementing it (Adamu, 2020).

Traditional mass media campaigns typically have little room for community-level participation. Mass media for health education is also limited in that it is a one-way communication channel, with information traditionally flowing from urban centers outward and only sometimes reaching remote populations. It follows that many long-established health communication techniques enable only a limited exchange of ideas and input from and within communities (Granger et al., 2018). Thus, inequalities in media access significantly contribute to inequalities in maternal health service utilization, as indicated by two different surveys involving over 20,000 women in Ethiopia (Gebre et al., 2018; Mezmur et al., 2017). Failure to address the cultural and practical barriers to behavior change, and the use of inappropriate media platforms to reach rural target audiences, are among the challenges identified (C. O. F. Zamawe et al., 2016). Tekelab et al. (2019) and Ukachi and Anasi (2019) in their study among women of reproductive age at Lagos teaching hospital identified some challenges associated with access to health information and dissemination. These can be grouped under political, infrastructure, cost, power supply, poor internet access, funding, and inaccessibility of health information. Similarly, Waithaka (2013) investigated print media coverage of maternal healthcare programs in Kenya using a code sheet search of 180 publications. It was discovered that given the profit-making nature of media houses, the focus was on sensational issues, which increase sales. Unfortunately, maternal health is not in that category.

As indicated by a survey involving 34 women in Nigeria (Agboola & Ahmed, 2020), the lack of local focus on maternal health issues and inadequate relevant maternal health information is challenging to maternal health. A qualitative study of 266 women across 12 countries in West Africa found that women and youth have limited access to traditional channels of communication, such as TV and radio, particularly as men in the household control them (Laouan, 2020). Additionally, broadcasts sharing information tend to occur when women are occupied with domestic chores, as has been the case during coronavirus disease 2019 (Laouan, 2020). It is difficult for maternal and child health to be covered regularly when politics and other major news carry more weight (Waithaka, 2013).

DISCUSSION

Fundamental to a robust healthcare system is the effective communication of basic health information and practices for improving maternal health, as well as achieving good health and well-being for all in Africa (Royston et al., 2020; UNICEF, 2016b). The need for the effective dissemination of health information and education through media advocacy is increasingly important in view of the high rates of mortality, morbidity, and undernutrition of mothers throughout Africa (UNICEF, 2016b). There is a consensus in the literature surveyed that media intervention at the community level impacts the behaviors, health practices, and health knowledge and beliefs of African communities (Ahinkorah et al., 2020; Gallo, 2021; Mweemba et al., 2021; Nwagbara, 2017; Odorume, 2015; Sowa et al., 2018; C. O. F. Zamawe et al., 2016).

However, the preference for sensationalism in the reporting of health issues has limited the effectiveness of the community-level interventions by the mass media (Waithaka, 2013). The role of the media in improving maternal health, particularly in the information age of the 21st century, cannot be overemphasized (Fatema & Lariscy, 2020; Igbinoba et al., 2020; C. O. F. Zamawe et al., 2016). Also, the media's role in the dissemination of health information has become increasingly important considering the huge deficit of health personnel in Africa, which is precariously low. Africa has 2.3 health-care employees per 1000 people, compared with the Americas, which has 24.8 (Naicker et al., 2009). The role that the media has played so far in areas of information dissemination and advocacy, and the possible impact the media has had on maternal health in Africa, need to be examined for policy advocacy and interventions to strengthen the public health system and improve maternal health in the African continent.

Studies (Adamu, 2020; Asp et al., 2014; Igbinoba et al., 2020; C. O. F. Zamawe et al., 2016) observed that mass media is globally recognized as a cost-effective and potent approach for promoting public health, good health practices, increased awareness, and knowledge, as well as changed attitudes. Specifically, tangible achievements of increased media advocacy and campaign on good health practices and behavior include reducing the population-level use of tobacco, alcohol, and drugs; promoting cancer screenings; reducing birth and HIV infections; increasing the usage of antenatal care; improving acceptance of the female condom; promoting more involvement of men in prenatal and postnatal care; and improving the patronage of delivery care services. In exceptional cases, a few studies found no link between family-oriented media campaigns, or the utilization of modern contraceptives in rural areas (Ahmed & Seid, 2020). Some studies of urban and rural communities in Africa reported that the media, radio, television, internet, and adverts/campaigns contributed significantly to the progress achieved in more access to health information among women and their spouses (Atakiti & Ojomo, 2015; Igbinoba et al., 2020; Oluyemi & Adejoke, 2020; Owusu et al., 2011; Sanda, 2014; Utalor, 2019; Wittels, 2016; C. Zamawe et al., 2015). Also, the studies noted that effective communication strategies through media intervention and advocacy that are culture-specific and gender-centric can help create and advance positive health behavior change. Thus, exposure to mass media will ultimately promote good health and reproductive behaviors of women and their spouses in Africa (Ajaeo et al., 2016; Mutanda et al., 2016; Owusu et al., 2011; Saleh & Lasisi, 2011; Sanda, 2014). Studies also noted that exposure to media promoted increased usage of antenatal care and skilled birth attendants (Chaka, 2020; Sserwanja et al., 2022), promoted maternal health, and reduced maternal morbidity and death in Africa.

A major challenge associated with media intervention, advocacy, and engagement on maternal health issues is inequalities in media access, with its attendant effect on maternal health service utilization (Adamu, 2020; Gebre et al., 2018; Granger et al., 2018; Mezmur et al., 2017). Other challenges include cultural prejudices, social norms, inappropriate media platforms, politicization, systemic and institutional issues, poor communication strategies, poor local content on maternal health issues, and inadequate relevant maternal health information (Agboola & Ahmed, 2020; Etana & Gurmu, 2018; Laouan, 2020; Odesanya et al., 2015; Sokey et al., 2018; Tekelab et al., 2019; Ukachi & Anasi, 2019; Waithaka, 2013; C. O. F. Zamawe et al., 2016).

These challenges associated with media intervention and advocacy on maternal issues have been largely responsible for their ineffectiveness in promoting good health behavior and maternal health in Africa. The consequence of this ineffectiveness is among the causes of poor maternal health-seeking behavior and high maternal morbidity and maternal death rate in many African countries. In Africa several factors—such as family income, transportation to health centers, and the management of birth complications—influence birth preparedness according to several studies (Asp et al., 2014; Chaka, 2020; C. Zamawe et al., 2015). Also important is the role of men exposed to the mass media campaign in promoting antenatal care critical to birth preparedness. Such roles will go a long way in influencing maternal health in Africa.

There are several challenges militating against effective and timely communication of maternal health information in Africa. These challenges are many and include language barriers, health message content, channels of delivery, information perception, cultural prejudices, information source credibility, feedback mechanisms, communication techniques, literacy levels, inequalities in media access, poor community engagement, lack of social amenities, inadequate health funding, and audience identification (Adamu, 2020; Agboola & Ahmed, 2020; Gebre et al., 2018; Granger et al., 2018; Gugsa et al., 2016). However, the roles of health stakeholders (government, media practitioners, non-governmental organizations, international donors, and health personnel) are critical in mitigating these challenges.

LIMITATIONS

This review excluded studies that focus on the use of social media. This highlights the need for exploration of the impact of social media on maternal health given the surge in the uptake of social media globally. Again, the study included only peer-reviewed articles from 2010 to 2021. Therefore, older studies with significant effects of mass media on maternal health due to reduced use of social media may have been missed.

CONCLUSION AND RECOMMENDATION

Africa has grappled with systemic health inequities throughout its history. These inequities continue to negatively impact many underrepresented and vulnerable groups, especially in rural areas. Historically, this population has been denied appropriate and equitable healthcare access, as well as health information. The media as a major stakeholder in the health sector plays a critical role in tackling the systemic health inequalities in Africa, especially by promoting the sharing of maternal health information with citizens. This will no doubt help to improve outcomes in women's health and pregnancy through the expansion of access and the adoption of preventive care, promotion of good health practices, and behavior. There is a need for collaboration among all health stakeholders, including a sustainable relationship between media practitioners and health authorities, for the promotion of good maternal health in Africa.

AUTHOR CONTRIBUTIONS

Conceived and designed the study: Ephraim K. Senkyire and Magdalena Ohaja. *Analysis and interpretation*: Ephraim K. Senkyire and Magdalena Ohaja. *Critical revision*: Olabanji Ewetan, Ernestina Asiedua and Dominic Azuh. *Approved the final version for* *publication*: Ephraim K. Senkyire, Magdalena Ohaja, Olabanji Ewetan, Ernestina Asiedu and Dominic Azuh. All authors agreed to be accountable for all aspects of the work.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

No approval from the ethics committee of the University or an Institutional Review Board was sought for this study.

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ORIGINAL ARTICLE

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Public trust in sources and channels on judgment accuracy in food safety misinformation with the moderation effect of self-affirmation: Evidence from the HINTS-China database

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Abstract

This paper describes the developmentand introduction of an important new international health survey research program, HINTS-China, which builds upon HINTS, the established national repeated-measure US-based survey that has been used over the past decade to inform national public health policies. The major goal of the first two administrations of the HINTS-China surveys in 2012 and 2017 was to examine health communication patterns and trends related to the access and use of relevant health information in China. The HINTS surveys, both in the United States and in China, recognize that health is a social as well as a biological phenomenon, involving communication to inform the public about healthy behaviors and lifestyles. The preliminary results of the two HINTS-China surveys have provided important insights into important health issues in China, including problems concerning food safety misinformation, the power of interpersonal communication as a major source of health information, the strong influences of television in shaping public knowledge about health issues, and about the perceived credibility and trust of different health information sources in China. The surveys found that socioeconomic status serves as a significant predictor of accurate public judgments about food safety misinformation, that the public tends to trust traditional media (print, radio, and television) for accessing health information more than they do digital media, and that self-affirmation tends to moderate access to and use of relevant health information.

KEYWORDS
food safety misinformation, HINTS-China, judgment accuracy, self-affirmation, trust

Key points

- The development and introduction of HINTS-China, an important international health survey.
- Health communication patterns and trends related to the access and use of relevant health information in China.
- Insights into important health issues in China, including food safety misinformation, the power of interpersonal communication, and the strong influences of television in shaping public knowledge.
- Socioeconomic status significantly predicts accurate public judgments about food safety misinformation, and self-affirmation tends to moderate access to and use of relevant health information.

INTRODUCTION

The Health Information National Trends Survey (HINTS) serves as a prominent source on the access to, trust in, and usage of health information in the United States. The repeat administration survey was started by the National Cancer Institute (NCI) and aims at both research and practical applications, providing important insights into the health information needs and behaviors of the public (Nelson et al., 2004; Rutten et al., 2011). The HINTS survey includes two general stages in consumer-oriented health communication. The first is building awareness, in which persuasive media actors push messages into awareness and contemplation and the second is supporting information seeking (IS) in which consumers pull information from in-person and mediated sources, to select proper channels for obtaining health information.

Health communication research through regular surveys can help reduce health risks, identify information gaps and misunderstandings, and improve the quality of public lives. In addition, the survey serves as a testbed for researchers to study new theories concerning health communication and examine changing communication patterns and trends. The HINTS-China research program was launched in 2012, adapting and modifying the latest HINTS-US questionnaire, and translating the survey into Chinese languages, while choosing similar core questions adapted to the unique health issues and communication characteristics of the Chinese public (Kreps et al., 2017; Zhao et al., 2015).

HINTS-China began as an active and innovative international collaboration between the NCI, the Chinese Ministry of Health in October 2012, and the Chinese Food and Drug Administration (CFDA) in May 2017, coupled with George Mason University, and initially with Renmin University of China, and now with Beijing Normal University. In July 2018, a summer workshop was launched at Beijing Normal University for cohorts to share data, accept professional recommendations, and hold discussions concerning the administration of the survey in China. Based on the first two cycles of HINTS-China sources of data, a series of articles were published (Kreps et al., 2017; Yu & Yang, 2018; X. Zhao et al., 2014). Some scholars have used the behavioral model of health service use to study the predictive factors of media exposure and behavior choice of Chinese and Western medicine treatment (He & Liu, 2015), the influence of multichannel media access behavior and information trust on risk assessment and self-efficacy (Liu et al., 2018), media compensation theory and public health IS (Zhang et al., 2020), construction of the health IS model based on rational behavior theory and planned behavior theory (Song & Yu, 2015), and the comparative analysis in health IS behaviors between China and the United States (Lu et al., 2020).

TWO SURVEYS CONDUCTED IN CHINA

HINTS-China survey in 2012

HINTS-China 2012 was adapted from HINTS-US in 2003, 2005, 2007, and 2012, with approximately half of the questions allocated for answering individual research hypotheses, and half used for surveillance and other applied purposes. From October 16 to November 10, 2012, the Chinese Health Education Center (an affiliate of the Chinese Ministry of Health), in collaboration with the Research Center of Journalism and Social Development, Renmin University of China, conducted a trial survey in the cities and suburban areas of Beijing and Hefei in China. On one hand, the survey helped to fully understand China's public health needs, cognition, and evaluation of the health IS; on the other hand, the research has met the great needs of evaluating Chinese health communication practices and research to provide useful guidance and support for Chinese health communication strategy and disease prevention.

The core concept of this study was IS, which means the intentional active search for deeper knowledge beyond the more casual browsing and exposure to health information. IS specifically refers to individuals' efforts to gather information through various mass and interpersonal channels or sources to achieve their personal goals. Likewise, health risk information was the focus of this study, referring to information, knowledge, and news that affect the individuals' current or potential health status, which included both health risk information such as information about air pollution, pandemics, disease prevention, diagnosis, and care strategies that can reduce health risks. In the study, two types of health risk information were addressed, one was information related to health and medical care in a general and broad sense, and the other was cancer risk information.

The study examined the source selection in health IS in terms of the media characteristics of multiple aspects of IS, such as evaluating the accessibility, credibility, and accuracy of information sources (Gray, 2005), the style of information presentation, and the understanding of the information (Szwajcer et al., 2005). The survey included media use frequency, source credibility, health Information exposure, and health IS. The questionnaire for the above variables was designed with emphasis on wording, scale levels, question order, and operational definitions of concepts, and was pretested with various age, gender, and occupational subgroups for continuous improvement. In addition, the questions and variables were modified to accommodate local situations, for instance, national or cable television news programs were modified to "CCTV and Star TV" which appears more relevant to Chinese people; alternative units of drinking and height-weight ratio were used, and questions on physician–patient relationships and the comparative analysis between traditional Chinese medicine and western medicine were examined.

HINTS-China survey in 2017

Health-related behaviors and changes are influenced by emerging media technologies and the new communication environment. In China, social media platforms such as WeChat have gained their roles as the most prominent examples of equalizers and super applications, which integrate a wide range of services and functions and now claim 1.2 billion Chinese users (Pan et al., 2021). Hence, there were multiple communication challenges to effectively disseminating required health information to key populations that must be addressed.

In this context, another cycle of the HINTS-China survey was conducted in 2017. Two cities, Beijing and Hefei, were selected for this study, including both urban and rural areas in the two regions. The target overall was the resident population of all households in Beijing and Hefei. The survey used a multistage stratified random sampling method, with district (county), street (township), residence (village) committee, and household as primary, secondary, tertiary, and quaternary sampling units, respectively. The survey administration period was from May 9, 2017 to May 24, 2017. The sampling design strategy was based on studying Beijing, as the most developed city in China, which represents the highest level (ceiling) of Chinese cities, and Hefei, as a moderately developed city, representing the second-tier of quickly developing cities in China. Both cities were used as representatives of the most developed and moderately developed cities in China.

Nearly 30 executive interviewers were recruited in each of the cities and were trained and assessed for collecting survey data. The research was conducted in the form of household visits, using one-to-one interviews and electronic filling of answers, executed in the field using tablet computers, and selected directly on the spot based on user response answers. The success rate of the household research was 64%. After data collection, 10% of the samples were taken to ensure data quality, and the field recording was compared with the recorded data.

The final valid number of survey samples of the investigation was 3090, including 1527 from Beijing (49.4%) and 1563 from Hefei (50.6%). In terms of urban–rural ratio, 50.8% were rural and 49.2% were urban residents, which is very much in line with the census data of the Chinese national rural ratio (57.35% in rural areas and 42.65% in urban areas) in 2017. In terms of gender, males accounted for 38.9% and females were 61.1%, which is slightly inconsistent with the 2017 national gender ratio of males to females (51% male, 49% female), but within the adjustable weighting scale. In terms of age, the vast majority of people surveyed were aged 18–50 years old, with an average age of 35 years old, which is more consistent with the fifth census results that state the average age of the Chinese population is 32.476 years old. In terms of education, 54.9% of the respondents had a college education or above, and 2.2% had an elementary school education or below, and the proportion of those with high education level among the researched respondents is still on the heavy side.

Compared with the research data in 2012, the demographic characteristics of this study data show two main changes. The age distribution of the respondents is younger and the income level is higher. In 2012, respondents were more evenly distributed across age groups from 25 to 64 years old, while in 2017, respondents were slightly overrepresented in the 25–34 years age group, indicating a younger trend. In addition, the occupational status and highest education distribution of the two-research samples are more consistent. The income level in 2012 was concentrated in two ranges from RMB 1500 to RMB 4999. In the

TABLE 1 Descriptive statistics of sample demographics in HINTS-China 2012 and 2017 ($N = 3090$)

Survey cycle		2012		2017	
Cities		**Beijing, *N* (%)**	**Hefei, *N* (%)**	**Beijing, *N* (%)**	**Hefei, *N* (%)**
Residential area	Urban	660 (50)	645 (52)	660 (48.2)	645 (52)
	Suburban	662 (50)	600 (48)	662 (50)	600 (48)
Gender	Male	617 (47)	616 (49)	579 (37.9)	622 (39.8)
	Female	705 (53)	629 (51)	948 (62.1)	941 (60.2)
Age	Under 18	5 (0)	0 (0)	0 (0)	0 (0)
	18–24	56 (4)	111 (9)	152 (10)	439 (28.1)
	25–34	333 (25)	250 (20)	492 (32.2)	574 (36.8)
	35–44	277 (21)	393 (32)	415 (27.1)	249 (15.9)
	45–54	365 (28)	233 (19)	296 (19.4)	232 (14.8)
	55–64	275 (21)	256 (21)	172 (11.3)	69 (4.4)
Marital status	Married	81 (10)	28 (3)	1239 (81.1)	944 (60.4)
	Cohabitation	243 (30)	173 (16)	12 (0.8)	37 (2.4)
	Divorced	113 (14)	36 (3)	14 (0.9)	29 (1.9)
	Widowhood	176 (22)	669 (63)	7 (0.5)	10 (0.6)
	Separation	3 (0)	1 (0)	0 (0)	10 (0.6)
	Single	198 (24)	160 (15)	255 (16.7)	533 (34.1)
Education	Under primary school	1069 (81)	1073 (86)	31 (2)	37 (2.4)
	Middle school	15 (1)	12 (1)	305 (20)	182 (11.6)
	High school	40 (3)	20 (2)	579 (37.9)	259 (16.6)
	Vocational school	23 (2)	23 (2)	373 (24.4)	432 (27.6)
	College degree	5 (0)	3 (0)	227 (14.9)	488 (31.2)
	Above college	169 (13)	114 (9)	12 (0.8)	165 (10.6)
Monthly income	None	62 (5)	212 (17)	79 (5.2)	302 (19.3)
	Less than ¥500	326 (25)	395 (32)	3 (0.2)	23 (1.5)
	¥500–999	381 (29)	293 (24)	13 (0.9)	14 (0.9)
	¥1000–1499	247 (19)	239 (19)	35 (2.3)	42 (2.7)
	¥1500–2499	239 (18)	87 (7)	165 (10.8)	238 (15.2)
	¥2500–4999	60 (5)	16 (1)	751 (49.2)	512 (32.8)
	¥5000–9999	190 (14)	219 (18)	430 (28.2)	306 (19.6)
	¥10000 and above	24 (2)	16 (1)	51 (3.3)	16 (1)

2017 research data, the income level shifted to two income levels from RMB 2500 to RMB 9999. The groups with income levels of RMB 5000–9999 in both Beijing and Hefei had increased in the second survey conducted in 2017 by about 10% compared to the 2012 survey (see below in Table 1).

FOOD SAFETY MISINFORMATION RESEARCH

The framework in HINTS-China 2017 was divided into seven sections: (a) searching for health information, including health IS, media contact for health information, media use frequency, and source credibility; (b) searching for cancer information, including cancer IS, knowledge and attitudes concerning cancer, and cancer risk perception; (c) food safety status awareness and IS behavior, including food safety status awareness and attitude, food safety misinformation acknowledgment and attitude, and food safety IS channels, trust, and behaviors; (d) drug safety status awareness and IS behavior, including drug safety status awareness and attitude, and drug safety IS; (e) overall health, including self-assessment health status; (f) health care, including physician-patient communication; (g) demographics.

The food safety section was a newly added and prominently focused section in HINTS-China 2017, especially focused on how food safety misinformation was disseminated. According to the "three-dimensional model" of health communication, the health demands of the audience, the communication ability of the media, and the degree of social participation jointly impact the effect of health communication (Hovick et al., 2014). Food safety is an important issue in the study of health communication, which is characterized by the path of dissemination, scope and field of influence, and the degree of significance of public health emergencies (Yan & Li, 2015). At present, food safety research has integrated communication, management, ethics, and other fields, with research methods mostly qualitative case studies, theoretical research, moral reasoning (Yin, 2013; Zheng, 2013), and quantitative questionnaire surveys (such as US-HINTS, EU-EFSA, and UK-FSA; Lai & Yang, 2014; W. Wu & Liu, 2013). As the Internet and social media are deeply involved in individuals' daily lives, the discourse on food safety issues has shifted from hygienic promotion to two-way dialogue in China (L. Wu et al., 2015). The topical field has also expanded from offline to online, and the online dissemination of food safety misinformation has become an important health research focus of attention.

Food safety issues in China

The issues involved in misinformation in the post-truth era concern worldviews (Lewandowsky et al., 2012). Food safety is concerned with individuals' health status and permeates all aspects of daily life, which makes it an important issue in the study of health communication, with good intentions, precedent, and experience more often than by strong evidence (Kreps, 2012). Likewise, food safety issues are of special importance in China and are highly valued by the central leaders of local governments. In 2015, the newly revised *Food Safety Law* was implemented; and in 2016, the *Measures for Investigation and Handling of Internet Food Safety Illegal Acts* and *Administrative Measures for Risk Management of Food Production and Operations* were promulgated. As part of this strategic dissemination, food safety was also recognized as a way to promote positive portrayal of the country's image.

At the same time, the field of food safety has also become a hard-hit area for online misinformation. According to data from the *Chinese Food Misinformation Governance Conference* in April 2017, "food safety misinformation accounts for 45% of online rumors." It is of high importance to grasp the spread and dissemination of misinformation concerning food safety issues and reduce unbalanced public exposure to food information, so as to carry out targeted interventions on health information and effectively formulate food safety information dissemination strategies.

Food misinformation generally contains four characteristics; first, disregarding facts and fabricating so-called knowledge; second, secretly changing concepts, and frequently using irritating language such as "toxic," "carcinogenic," and "lethal to death"; third, fooling the public by hyping old news, and cutting and exaggerating parts of the story; last, mocking or sneering to alter the factual description in a ridiculous manner and to form negative cognitive inertia in an imperceptible process.

Misinformation can mean factually incorrect or having details exaggerated, thus not only misleading the individuals' behaviors and decisions but also leading to misinformation acceptance (Hyman & Jalbert, 2017) that may also lead to temporary societal panic. Higher education, better health literacy, and a well-informed populace can effectively reduce the societal cost of misinformation (Kuklinski et al., 2000; Lewandowsky et al., 2012). Reliance on misinformation is rising from the absence of knowledge—holistically or specifically based on hesitation to tell rumors on a relatively low confidence basis (De Neys et al., 2011; Glöckner & Bröder, 2011). Social media is often recognized as a major contributor to spreading misinformation circling within an echo chamber, resulting in the fractionation of the information landscape by information and communications technologies and algorithms that make misinformation more resistant to being identified and corrected.

Food safety discussions in HINTS-China 2017

Overall satisfaction ratings of food safety were evaluated. On the whole, the public was not satisfied with the current state of food safety, and this dissatisfaction may stem from their daily experiences. More than half of the respondents believed that the current state of food safety needed improving, and 44.4% of the respondents admitted that they often encountered food safety problems in their daily lives. Compared to their satisfaction with the current situation, the public still has a relatively positive attitude toward the improvements in food safety in recent years. Approximately one-third of the respondents agreed that "the food safety situation had gradually improved in recent years," while another third were neutral.

Residents in more developed regions held more positive attitudes toward the current state of food safety and its improvement compared to those between regions. In terms of satisfaction with food safety, for example, 24.4% of Beijing residents hold this view compared to only about 10% of Hefei residents who agreed that the food safety situation is "very good," A higher percentage of Beijing residents also agreed with the statement that "food safety status is getting better." Similarly, urban residents were more likely to agree that food safety was improving than rural residents (with 22.7% in urban areas and 12.5% in suburban areas).

The level of public concern about each food category was found to be relatively high in general. Among the specific food sectors and food categories, meat products, infant milk powder, poultry and eggs, and aquatic products were the categories with the highest level of public concern, with nearly 60% of the respondents considering the safety of meat products to be a cause for concern in their lives. The food categories that the public is relatively less worried about are grain and cereals, white wine, and soybean products. Compared between regions, residents in more developed areas generally have higher levels of concern about various food categories.

Food safety misinformation awareness and trust

The survey selected eight related topics concerning food safety misinformation awareness, processing, attitudes, and access channels. The narratives were ranked by CFDA as the top food safety misinformation issue in 2016. Table 2 below shows the questions asked to measure food safety misinformation in the survey.

On the level of misinformation awareness, among the eight widely circulated or recent food rumors listed, each respondent had heard of 2.86 rumors on average. Among them, "instant noodles are junky and deleterious" had the highest public awareness, with more than 70% of respondents saying they had heard of such claims. "The extraordinarily large and red strawberries are modified and drugged" and "KFC uses genetically modified 'six-winged chicken'" are also two rumors with high public awareness. Three other forms of misinformation, such as "grapes without seeds are smeared with contraceptives," are relatively less known, with less than 30% of the public have heard of them.

On the level of perception of misinformation, public recognition of these food safety rumors was low. All the eight rumors received a trust level greater than the median value (median = 3, "totally distrust" = 1), that is, respondents who were aware of these rumors were biased towards believing them. The most believed misinformation was "instant noodles are junky and harmful" (mean = 3.89), and the average attitude of respondents who had heard of this misinformation was "basically believing it." Several rumors, such as "the extraordinarily large and red strawberries are drugged," also had a "mostly believe" attitude in the minds of the public. The misinformation with a relatively low level of trust is "some nori is made of black plastic sheets" (mean = 3.05) and the overall public attitude toward this rumor was mixed.

Sources and channels concerning food safety misinformation

Interpersonal communication was the main source of information, and television also had a strong influence. Interpersonal channels and mass media were the main sources of public knowledge of this food safety misinformation. Forty percent of the 8782 times that these eight rumors were spread from family, friends, or colleagues, with the most frequent being friends or colleagues (31.5%), followed by family (11.9%). Approximately 30% came from traditional mass media, including TV (19.8%) and websites (7.3%). The new media platform WeChat (6.1%) was also a channel for respondents to be exposed to these sorts of misinformation.

The extent to which the public believed these rumors was also influenced by the type of channel through which they obtained the rumor. In general, when individuals learned about

TABLE 2 Public attitudes and trust in food safety misinformation ($N = 3090$)

Food safety misinformation	Trust (mean)
Instant noodles are junky and harmful.	3.89
The extraordinarily large and red strawberries are drugged with agricultural chemicals.	3.73
Hookworm in pork can't be killed by boiled water.	3.58
Crayfish grow in sewage, with heavy metals residues exceeding the standard.	3.55
Microwave cooking is unhealthy, and sometimes, even causes cancer.	3.50
Seedless grapes are smeared with contraceptives.	3.37
KFC uses genetically modified "six-winged chicken"	3.33
Some nori is made of black plastic sheets.	3.05

Note: All the narratives above are not true. All the statement in the volume are provided by CFDA in 2016 top misinformation list.

the rumor from interpersonal sources such as family members or friends, they also tended to have a higher level of trust in the rumor. In contrast, they tended to trust the rumor less when they were informed of the rumor from Internet media such as websites or WeChat. Take “instant noodles are junky and harmful,” which was the most widely disseminated and believed by the public, as an instance; 56.4% of respondents who learned about the misinformation from interpersonal sources believed it to a degree of 3.96 (mean value), while those who learned about the misinformation from new media believed it to a degree of 3.78 (mean value). There was a significant difference between the trust levels of rumors obtained from different categories of sources.

Active food safety IS behavior and preference

The public always has search preferences on channels and sources when it comes to food safety information. Understanding their search preferences can help us target food safety information and guide us to better supply food safety information. A survey conducted in Beijing (Quan & Zeng, 2013) showed that about 43% of consumers actively searched for food safety information. Television programs were the primary source of food safety information for consumers of all ages. Likewise, there were significant differences in the channels through which consumers of different ages obtained food safety information; consumers under 40 years of age preferred the Internet as a channel for food safety information, while those over 40 years of age were relatively more likely to prefer radio and word-of-mouth.

The second wave of the HINTS-China 2017 survey also found that interpersonal channels were the primary and main source of food safety information that people relied on, including “physicians or experts” (39.2% of respondents chose this channel first), as well as family, friends, and colleagues. Sixty percent of respondents preferred interpersonal channels to obtain food information. New media was the second most common type of channel used by the public to obtain food safety information, with websites (8.2%), WeChat (3.8%), and search engines (3.1%). Traditional media lagged behind new media overall, but among them, television (9.4%) was the second most common channel after interpersonal communication for residents to obtain food safety information. Among the various types of organizations, official government agencies were the most common source of food safety information but were relatively less important (4.2%) than interpersonal communication, television, and websites.

Level of trust in channels and sources

The degree of public trust in government agencies and in the various types of mass media affect the effectiveness of information dissemination. Understanding the public's level of trust in various information channels and sources of information, in general, can also help to regulate the distribution of food safety information supply among different channels. Table 3 shows the level of public trust in different channels and sources in this survey. In general, the public tended to trust at higher levels information obtained from interpersonal sources, such as family, physicians or experts, friends, and colleagues. Among them, family members were the sources people trusted most in terms of food safety information, followed by physicians or experts, and then by friends and colleagues. Government and academic institutions and the mass media, such as television, were also more trusted.

Factor analysis was used to downscale the data, and the 24 categories of channels and sources were further refined into five main factors based on the public's trust level. The first

TABLE 3 Residents' trust in different types of food safety information sources and channels

Categories	Factors	Trust (mean)
Interpersonal sources	Physicians and experts, family members, friends, and colleagues	3.90
Authoritative institutions	Government agencies, academic institutions	3.21
Mass media channels	Newspapers, Televisions, magazines, radios, and books	3.02
New media channels	Websites, blogs, Weibo, WeChat, and search engines	2.78
Nonauthoritative institutions	Commercial organizations and public welfare organizations	2.66

category was interpersonal channels such as family, friends, and physicians, and the public had the highest level of trust in this category (mean = 3.90). The second category was the more professional and authoritative institutions including government agencies, academic institutions, and international institutions, and the public trusted these types of sources at the next highest level (mean = 3.21). The third category was traditional mass media such as newspapers, television, magazines, radios, and books and public trust in these channels was slightly lower than the previous category (mean = 3.02). New media channels, including websites, blogs, Weibo, WeChat, and search engines, were the second category to which the public turned after interpersonal channels, but trust was relatively low (mean = 2.78). The category with the lowest level of public trust was that of commercial organizations and public welfare organizations, which were relatively nonauthoritative (mean = 2.66).

SELF-AFFIRMATION AND FOOD SAFETY MISINFORMATION

According to the HINTS-China 2017 database, cases were selected with individuals who responded “yes” to all the eight food safety misinformation (as shown in Table 3), when they were asked whether they had ever heard of it (“yes” or “no”), and defined as individuals with high-awareness of food safety misinformation, with the sample size of 95, and the demographic approach concerning residential area (rural = 50.8%, urban = 49.2%), gender (male = 38.9%, female = 61.1%).

The study applied hierarchical regression to examine how the *trust in media channels or sources* affects the public's accuracy of food safety misinformation judgment (i.e., whether they evaluate the eight narratives in Table 3 as rumors or distrustful). Besides, *self-affirmation* also plays a moderator variable in this model. Self-affirmation enables people to view threatening or negative health information as less threatening and could also reduce evaluative stress and self-doubt, and perceived self-integrity (Sherman & Cohen, 2006). Accordingly, the research recoded the fixed-distance variables as the measurement fell into three categories of self-affirmation; low (“half-trust and half-doubt”), moderate (“basically trust” and “basically distrust”), and high level (“totally trust” and “totally distrust”). Demographic variables were included in the regression equation as *control variables*, including age, gender (male/female), urban–rural differences (Beijing/Hefei), monthly income, and education status.

As shown in Table 4, gender, education level, monthly income, development degree (Beijing as developed city/Hefei as underdeveloped city), residential areas (urban/rural), and age group were used as control variables. Among them, gender, development level, and residential areas were used as dummy variables, while women, less developed areas (Hefei), and rural areas were used as reference groups. Trust in sources or channels

TABLE 4 Hierarchical regression model (predicting judgment and processing of food safety misinformation)

Variables	Model 1 (β)	Model 2 (β)	Model 3 (β)	Model 4 (β)
Demographics				
Gender (Female)	–0.234	–0.216	–0.09	–0.065
Education	–0.027*	–0.028*	–0.111	–0.155
Monthly income	0.319	0.322	0.313	0.36
City (undeveloped)	0.213	0.27	0.259	0.29
Residential areas (rural)	–0.118	–0.087	–0.06	**–0.051**
Age	0.092	0.065	0.088	0.039*
R^2 (%)	17.3			
Trust in sources/channels				
Interpersonal sources		–0.003**	0.022*	**0.054**
Organization				
Authorized organization		–0.014*	0.041	0.018*
Nonauthorized organization		–0.140	–0.118	–0.147
Media channels				
Mass media		0.061	–0.026*	0.006**
Informational new media		–0.225	–0.148	–0.115
Social media		0.175	0.071	**0.054**
R_1^2 (%)		43.0		
Self-affirmation (SA)				
SA			0.567	0.516
R_2^2 (%)			46.336	
Interpersonal*SA				–0.154
Authorized org*SA				0.083
Nonauthorized org*SA				0.084
Mass media*SA				–0.11
Informational media*SA				–0.372
Social media*SA				0.4
R_3^2 (%)				0.873
Total R^2 (%)				53.3

Note: β coefficients are standardized regression coefficients. The bold values indicate the marginal significance (p = 0.05).
*$p < 0.05$; **$p < 0.01$.

(including interpersonal sources, organizations, and media channels), and self-affirmation were set as independent variables, and trust in sources/channels∗self-affirmation as interactive variables, for the prediction of food safety misinformation judgment accuracy.

Model 1 examined the effects of demographics on judgment accuracy. The control variable explained 17.3% of the total variation of the dependent variable. There was a significant negative relationship between education and judgment accuracy ($\beta = -0.027$, $p < 0.05$), suggesting that even with improved education, the public still could not effectively evaluate the authenticity of food safety information as was predicted.

Model 2 entered the variable of trust in sources or channels, including interpersonal sources, organizational sources (authorized and nonauthorized organizations), and media channels (traditional mass media, informational new media, and social media). After controlling demographic variables and trust in channels, independent variables can account for 43% of the total variation of dependent variables, in which interpersonal sources were the strongest predictors ($\beta = -0.003$, $p < 0.01$), followed by authorized organizations ($\beta = -0.014$, $p < 0.05$). Education was still significant ($\beta = -0.028$, $p < 0.05$). However, the trust in media channels had no significant effect on the judgment of food safety information.

Model 3 entered the variable of self-affirmation. It was found that after controlling demographic variables, trust sources, or channels, and self-affirmation, the independent variable can explain 46.336% of the total variation of the dependent variable, which was a slight improvement. At this time, the trust in mass media channels had a significant impact on the judgment of food safety misinformation ($\beta = -0.026$, $p < 0.05$), and interpersonal channels were still significant ($\beta = 0.022$, $p < 0.05$).

Model 4 showed that the interaction effect between self-affirmation and trust in sources or channels was not significant. Besides, the power of the model has been improving ($R_3^2 = 0.873 > R_2^2 > R_1^2$), which indicated the moderation effect of self-affirmation was significant. Residential areas (rural) can be used to predict judgment accuracy with significance at a subliminal population level, where local residents appear to accept normative information ($\beta = -0.051$, $p = 0.05$). Interpersonal sources and social media channels ($\beta = 0.054$, $p = 0.05$), and age group were also found to be significant predictors of judgment accuracy ($\beta = 0.039$, $p < 0.05$). In the trust in channels variables, mass media was the strongest predictor of judgment accuracy ($\beta = 0.006$, $p < 0.01$), followed by official organizations ($\beta = 0.018$, $p < 0.05$). The independent variables in model 4 provided high explanatory power concerning judgment accuracy of food safety misinformation, accounting for 53.3% of the total variation of the dependent variable.

Collectively, first, in terms of socioeconomic status, education, age, and residential area were significant predictors of accurate judgments about food safety misinformation. Education level was an important index to measure the social and economic status, but education does not equal media literacy, and traditional education will not be enough to dispel beliefs in conspiracy theories or "epistemic beliefs" (Scheufele & Krause, 2019). Younger respondents and those respondents who live in urban areas were found to judge food safety information accurately. Hence, social and economic status can significantly predict judgment accuracy in food safety misinformation, and more attention and help should be given to helping older people and rural residents to lift their media literacy for evaluating misinformation.

Second, the trust in traditional media to predict the accuracy of judgment was stronger than that in new media, in which trust in social new media was a better predictor than informational new media, while official organizations were better than nonauthorized organizations. This suggests that the spread of new media may affect the awareness of food safety misinformation, while the trust in traditional mass media may affect individuals' processing and judgment of food safety misinformation. Furthermore, these findings reminded us to carefully examine the issue of rumor refutation, whether to choose traditional mass media to refute misinformation from top-down or disseminate it through social media to gradually gain impact from bottom-top in the public opinion market.

Overall, health is a social as well as a biological phenomenon, involving societal systems as well as individual behaviors and lifestyles. Human beings are the most valuable resources of society. Public health is not only related to individual quality of life and the family happiness index, but also related to the resource allocation of the whole society, and many of the health problems were identified as national priorities and goals encompassing these social components. Therefore, obtaining timely, relevant, and effective health information is very important for health policymakers and health information consumers. With the help of scientific surveys, such as HINTS-China, we hope to help solve serious public health problems related to communication, ultimately reducing major health concerns, improving quality of life, and reducing societal health costs.

ETHICS STATEMENT

Approval was obtained for this study from the Ethics Review Committee of the School of Journalism and Communications, Beijing Normal University, Beijing, China.

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Partisan polarization, historical heritage, and public health: Exploring COVID-19 outcomes

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Abstract

When the COVID-19 virus first arrived in the United States in early 2020, many epidemiologists and public health officers counseled for shutdowns and advised policymakers to prepare for a major pandemic. In 2020, though, US society was rife with major political and cultural divides. Some elected leaders promoted policies at odds with the experts, and many people refused to heed the public health-based communications about the coming pandemic. Additionally, the capacity to respond to a pandemic was distributed in the country in a highly unequal fashion. This paper analyzes the noteworthy geopolitical patterns of COVID-19 illnesses, subsequent demands on hospitals, and resulting deaths. This description is based on a snapshot of archival data gathered in the midst of the pandemic during late January and early February of 2021. Demographic data, indicators of political party support, indicators of citizen attitudes, and public health compliance behaviors are combined in a multivariate analysis to explain COVID-19 outcomes at the local government (county) level. The analysis suggests strongly that regional political culture and local demographics played a substantial role in determining the severity of the public health impact of the COVID-19 pandemic.

KEYWORDS

COVID-19, pandemic, political culture, race, state and local government

Key Points

- During the early stages of the COVID Pandemic, regional political culture and local demographics played a substantial role in determining the severity of the public health impact of the COVID-19 pandemic.

- Race, as measured by the percent white of a county, was the single strongest predictor of COVID outcomes.
- Preparing for future pandemics requires us to address social and economic inequality in our society.

INTRODUCTION

Early in 2020 in Wuhan, China, a new virus apparently made the jump from animals to humans (Kelly & Cahlan, 2020). This novel coronavirus causes a potentially deadly disease called COVID-19. Symptoms of the disease include respiratory distress, as is the case with most coronaviruses; however, persons infected with COVID-19 have exhibited a variety of additional adverse health conditions, including intestinal distress, blood clotting, fever, severe headaches, extreme inflammatory response, and profound fatigue. While some promising therapeutics have been developed, at that time there were no vaccines and no universally effective treatments available to treat seriously ill COVID-19 patients. Several efficacious vaccines have been developed, and mass vaccination is now recommended as the principal public health countermeasure to battle the pandemic, although public resistance to vaccination remains a problem in some segments of the population. At the end of 2020, none of these vaccines had been administered to the general public. Worldwide, as of mid-January 2021, there were approximately 95,000,000 documented cases of infection (Statista, 2021) and over 2,000,000 resulting deaths (Bloomberg News, 2021). The global economy was disrupted, and normal commerce and travel patterns were interrupted.

In January 2020, with more than 25,000,000 cases worldwide (Johncox, 2021), no country had been hit harder by the virus than the United States. As of April 2021, the United States had more than 31,000,000 documented cases of the disease, had seen over 550,000 deaths (World Health Organization, 2021), and had experienced massive economic disruption (Center on Budget and Policy Priorities, 2021). The death toll in the United States from COVID-19 passed the one million mark in May of 2022 (Stein, 2022).

The impact of the pandemic was likely made worse by preexisting inequities in American society (Kaufman, 2021). Citizens in both rural and economically disadvantaged sections in urban areas suffer from less access to health care; likewise, they are also disproportionately prone to engage in unhealthy behaviors. Additionally, morbidity and mortality outcomes are differentially distributed based on race.

This paper explores the partisan and regional differences in the approach Americans took to their COVID-19 pandemic response. Using COVID-19 outcomes data, it documents the political, demographic, attitudinal, and behavioral factors associated with outcomes in terms of deaths, cases of infection, and hospital usage. Groups commonly supportive of the Republican Party and groups in rural areas were resistant to official messages about the need for mask wearing and social distancing and less supportive of business and school shutdowns. As a result, these areas suffered worse outcomes. Additionally, some groups, especially people of color, that have traditionally had poor health outcomes saw this trend exacerbated by the pandemic, regardless of the political control in the areas where they live.

PARTISANSHIP, REGIONALISM, AND THE CORONAVIRUS

Once COVID-19 was identified as a potential source of a pandemic in the United States, there were major response differences between the dominant political parties and among the diverse regions of the country (Gusmano et al., 2020). Elected leaders and local citizens in typically Republican-dominated areas, taking the lead from the then-President Donald Trump, dismissed the seriousness of the threat and downplayed the dire warnings voiced by experts (Gao & Radford, 2021; Gusmano et al., 2020; McDonald, 2020). Public health officials, and many Democratic elected and appointed leaders, advised that mask wearing be mandated, social distances be maintained, people stay at home, and many public activities be suspended for the duration of the pandemic. Where this advice was followed, there were varying degrees of success in slowing the spread of infection (Doherty et al., 2020; Gusmano et al., 2020; Ivory et al., 2021; Pei et al., 2020). Many observers argued that the vast majority of serious illnesses and deaths would have been preventable had early federal government action been taken (Brown, 2021; Haeder & Gollust, 2020; Kim & Kreps, 2020; Stolberg, 2020; Woolhandler et al., 2021).

As with most democratic societies, the United States has deep partisan differences of long-standing and ongoing significance (Deane & Gramlich, 2020; Finkel et al., 2020). Republicans and Democrats tend to see policy issues from different perspectives, and they tend to rely on different sources of information (Jurkowitz et al., 2020). Democrats tend to place trust in science-based technocratic expertise (e.g., on global climate change) while Republicans tend to distrust such expertise, viewing most career bureaucrats claiming such expertise as the "deep state" devoted to opposing the will of Republican elected officials. This difference in trust of expertise is quite longstanding (Lovrich, 1985; Meier, 1997) and is illustrated by recent antibureaucratic Republican presidents, including Nixon (Editors, 1976), Reagan (NPR Staff, 2012), and Trump. Democrats and Republicans also pay attention to the content of very different sets of broadcast, print, and social media (Pew Research Center, 2020b, January 24).

As with many major policy decisions, the two parties differed on how to respond to the COVID-19 pandemic (Gao & Radford, 2021; Gusmano et al., 2020). Most Democratic leaders urged Americans to heed the warnings of epidemiologists and public health experts. Republican leaders, in contrast, emphasized intrusions on economic freedom associated with the public health measures advocated by experts. Scientifically incorrect information was received and acted upon by supporters of the Trump Administration (Kim & Kreps, 2020). Indeed, areas that were most resistant to public health advisories were often those with a reputation for voting Republican (Gao & Radford, 2021; Johns Hopkins University, 2021; Pew Research Center, 2020a, June 23).

In addition to these partisan divisions, the United States is also a federal nation with major regional differences in prevailing political cultures. There is also a large urban–rural divide, with significant differences in levels of social trust and compliance with governmental directives and recommendations across the landscape of American society (Kaufman, 2021). Matters of history, patterns of immigration (recent and historical), economic factors, and religious affiliation and practice all play a role in these distinctions going beyond partisanship (Elazar, 1994; Lovrich et al., 2021; Putnam, 2000; Woodard, 2011).

The most widely accepted measure of state and local political culture was developed by Daniel Elazar (1966), who identified *traditionalistic*, *moralistic*, and *individualistic* cultures. For Elazar, the political culture of a society derives from the historical traditions of a foundational settlement group and persists even across substantial subsequent migrations (Elazar, 1994). Colin Woodard (2011) and Lovrich et al. (2021) make similar claims regarding the persistence of local political culture. Elazar's cultures have been linked to county-level governmental boundaries (Lovrich et al., 2021), which make them well-suited to the study of county-level COVID-19 outcomes.

Profound differences exist both within and among American communities in the ways citizens respond to guidance from authorities of the federal, state, and local governments (Jacobsen & Jacobsen, 2020). These differences are likely determined by family socialization, economic status, level of formal education, religious affiliation, and other factors unique to individuals (Kim & Kreps, 2020). Moreover, trust in public bureaucracies generally is influenced by one's partisan leanings and ideology (Gao & Radford, 2021; Robinson et al., 2013). These differences result in very different understandings of the collective good and in different responses to public pleas for collective action in a pandemic.

RATIONALISM, COLLECTIVISM, AND COMPLIANCE BEHAVIOR

The term *rational* here refers to "a policy decision that is based on a systematic attempt to engage in probabilistic analysis of the most likely behavioral outcomes to be expected" (Reed et al., 2020, p. 317). Numerous critics of Donald Trump argued that his presidential administration posed a threat to rationalism itself (Goodsell, 2019; Reed et al., 2020). Many Democrats like to think of their call for rational decision making in government as an inherent part of the founding ethos. However, human beings are not entirely rational in the way they come to their decisions (Bowman, 2018; Hertwig, 2012). People become fearful in the presence of a pandemic, and fear has a known powerful effect on human reasoning (Jost et al., 2017; Kim & Kreps, 2020; Pei et al., 2020).

Agencies providing "logically persuasive explanations for their policies" may enhance public trust in those same bureaucracies (Alon-Barkat, 2020, p. 78). American society has become more polarized in the last decade, with a substantial faction equating rationalism with support for the Democratic Party (Deane & Gramlich, 2020; Finkel et al., 2020; Pew Research Center, 2017). This partisan divide resulted in a tendency for supporters of Donald Trump to distrust governmental communication about the pandemic in much of the country and to increased polarization on key pandemic-related issues (Kim & Kreps, 2020).

Utilizing the best available science and data to make and implement public policy would seem important in devising and implementing effective public policy (Ventriss, 2012); however, in 2020, the heightened level of partisan division present in the United States raised the danger that even otherwise rational people may be subject to what Finkel et al. (2020, p. 535) have labeled "motivated partisan cognition." Many Republican public figures have argued that the economic damage to the country from a shutdown was worse than the harm that could come from the spread of the virus itself. In response, many of their Democratic counterparts argued that, over the course of the pandemic, the economic damage from a shutdown was less costly than the damage from the long-term disruption of the economy that would accompany allowing the pandemic to spread unchecked. In this case, what would be viewed as rational depends on starting assumptions about what factors are to be considered and how they are to be weighted.

The intentional spread of scientifically fallacious misinformation via social media has become a common phenomenon around the world (Freelon & Wells, 2020; Swetland et al., 2021). Austin et al. (2021, p. 11) documented the positive impact that greater media literacy has had on compliance with COVID-19 mitigation recommendations, arguing that "Individuals with more media literacy are better prepared and willing to take experts' recommended preventive actions." Many observers argue that the national response to COVID-19 in the United States has been harmed by the systemic spreading of misinformation (e.g., Abrams, 2021; Austin et al., 2021; Barnes & Sanger, 2020; Kim & Kreps, 2020; Scheufele et al., 2021; Swetland et al., 2021).

Early data showed significant state and regional variations in the impact of the pandemic (Doherty et al., 2020; KFF, 2020). Large cities with higher population concentrations were most adversely affected, as were those places where the virus first appeared in the country (Owens & Baker, 2020). Areas with more ideologically conservative politics were more likely than others to experience greater COVID-19 infection rates as the pandemic gained steam

(Gao & Radford, 2021). The fact that disproportionate numbers of Black people are poor and rely on Medicaid and that the states who have refused to expand Medicaid as part of the implementation of the Affordable Care Act are concentrated in the South (Taylor, 2019) is strong evidence that regional differences are important considerations if we are to understand differential outcomes from a pandemic.

Lower income people and people of color were disproportionately affected by COVID-19 (Centers for Disease Control and Prevention, 2021; McNeely et al., 2020; Rogers et al., 2020; Udalova, 2021). Some of this disparity stems from employment patterns in that many occupations cannot be performed remotely, and some jobs require close interactions with others (McNeely et al., 2020; Rogers et al., 2020). Two such examples were the meat packing industry (Treisman, 2021) and healthcare workers providing direct patient care (Kambhampati et al., 2020). Given that people of color are overrepresented in such occupations, many of which are not well compensated, it is essential to explore in this analysis the economic and demographic data on family income, race, and employment.

Persons of color in the United States generally have worse health outcomes in terms of morbidity and mortality than do Whites. Among Black Americans, the reasons include lower access to health care (Taylor, 2019), considerable distrust of the medical establishment (Kennedy et al., 2007), and greater likelihood of living and working in high-risk environments, such as exposure to environmental pollution and/or violent crime (Kambhampati et al., 2020; Treisman, 2021). People of color have historical reasons to distrust the American government (Rosenthal, 2020), and a solid argument has been made that the American healthcare system as a whole is plagued by systemic racism (Krieger, 2021). All of these factors signal to the need to include some measure of the racial makeup of the counties in the analysis.

Early in the pandemic, anecdotal evidence also indicated that certain groups of people were resistant to the public health advisories being disseminated about hand hygiene, social distancing, and mask wearing (Honeycutt, 2020; Stanley-Becker, 2020). A lack of trust in the recommendations of experts and widespread misinformation on social media hinder the ability to enhance scientific literacy regarding COVID-19 (Scheufele et al., 2021). Thus, one would expect that the level of educational attainment in a county would be associated with variations in compliance behavior in the face of a pandemic.

MATERIALS AND METHODS

The data examined here consist of a multifaceted snapshot taken during a discrete time period in the midst of the pandemic, from January 21 through February 13, 2021. A total of 3142 unique governments of last resort (e.g., counties or their equivalent) exist in the United States. Most are counties, but there are 64 *parishes* in Louisiana and 29 *organized boroughs or towns* in Alaska. Adding in the District of Columbia and autonomous municipal units in Virginia and several other states yields the total of 3142 units for which political and demographic data can be gathered. Throughout this paper, the word "county" will be used to refer to the jurisdictions in our analysis.

COVID-19 outcomes data

Four dependent variables are used in this study: (1) COVID-19 cases per 100,000; (2) COVID-19 deaths per 100,000; (3) percentage of hospital beds occupied by COVID-19 patients; and (4) percentage of ICU beds occupied by COVID-19 patients. Data on the COVID-19 cases and deaths per 100,000 were obtained on January 26, 2021 from the website USAFACTS, which compiles such data at the county level on an ongoing basis. Hospitalization usage reports were obtained online, on January 29, 2021, from the University of Minnesota's COVID-19 Hospitalization Tracking Project.

Demographic data

Online Census and Bureau of Labor Statistics archives (United States Bureau of Labor Statistics, 2019; United States Census Bureau, 2019) were used to gather information for all government units in the study. Median age, population estimates (as of 2019), the percent of persons in poverty, the median household income, the unemployment rate, the percent white population, and the percent of the population with a college degree were collected for the period in question. Census classifications for each governmental unit, from “large center metropolitan” as the largest classification to “noncore” as the smallest, were recorded.

Political data

Election results from National Public Radio were used to record the 2020 presidential vote in all 3142 counties. The margin for the Biden/Harris ticket was the variable used in each of the models. Thus, a negative parameter estimate for the “margin” variable would indicate that government units where Biden enjoyed political support had “better” outcomes.

The political party of the state executive also was recorded. An interactive map published by the *New York Times* was used to gather information about mask mandates as of February 4, 2021. The *New York Times* classified states as having a mandatory mask requirement, having one in place some of the time, or having enacted no masking policy.

Behavioral data

Unacast gathers information based on metadata from cell phone usage in Europe and North America. The *Unacast* dashboard grades the compliance of people with social distancing and stay-at-home orders on a letter grade scale ranging from A to F. These cell phone-generated data have the advantage of being nonintrusive measures of individual-level compliance with social distancing recommendations. County-level aggregate data on changes in overall mobility and changes in encounter density are recorded on the dashboard. *Unacast* also includes data measuring changes in nonessential visits; however, because there are no data available for a great many small counties this variable was not included in the analysis. Ratings for all of the units of government in our study were gathered between February 9 and February 13, 2021.

Political culture data

Data on state or local political culture based on Elazar's classifications are available for interested researchers (Lovrich et al., 2021). The moralistic culture has received by far the most attention by social scientists, in good measure because it has a strong connection (empirical and conceptual) to “social capital”—the key concept at the core of Robert Putnam's (2000) *Bowling Alone*. At the core of both Elazar's work and Putnam's scholarship are the shared major themes of interpersonal trust and devotion to communitarian values, with a strong sense of commitment to the pursuit of the public interest by government and duty to contribute to the collective good on the part of individual citizens.

The models

Table 1 summarizes all of the variables included in the analysis. Ordinary least-squares regression models were used to analyze the effects of the political, demographic, attitudinal, behavioral, and political culture variables on the various COVID outcome variables. Combining all predictor variables into a single model allows for the effects of each to be estimated while simultaneously controlling for the effects of all others.

A total of six multivariate models were estimated. Four models were estimated, each with one of the COVID-19 outcome variables and all of the predictor variables. Two additional models with hospital usage outcomes were run with only the larger jurisdictions included, based on the fact that the smallest jurisdictions typically have limited hospital resources. For those two models, the combined total of jurisdictions classified as large center metropolitan, large fringe metropolitan, medium-sized metropolitan, or small metropolitan is 1166.

RESULTS

The results of these regression models are shown in Table 2. The results of all of the six models are shown in a single table as a way to generate a better view of the effects of the individual predictor variables across all of the dependent variables. The authors are aware that these data are a snapshot and that detailed analysis over time might reveal a more complete picture of the predictors for each individual outcome variable. However, the advantage of this approach is to focus the reader's attention to the effects of predictor variables across outcomes.

The models in which the smaller jurisdictions were removed from the analysis included only two of the outcome variables, hospital usage and ICU bed usage. Removing the smaller jurisdictions from the analysis of hospital bed usage by COVID-19 patients does produce some results that are different than the models including all jurisdictions. Even so, the persistent significance of several variables, including percent White, the urban/rural nature of the jurisdiction, the margin for the Biden/Harris ticket, and the moralistic culture rating of the county is notable.

It is not wealth or income driving these outcomes. It is race, political values and attitudes, and the urban/rural divide that are predictive of the impact of a pandemic. These data are a snapshot from just one brief period early in the pandemic, but subsequent analysis bears out the importance of race and partisan control at the state level as the pandemic matured. For example, the states with the worst outcomes in 2022, in terms of deaths and illnesses, are states that have Republican governors (Milbank, 2022). Later analysis of COVID outcomes a year after our data were collected show a persistent negative effect for people of color (Hill & Artiga, 2022).

DISCUSSION

The data collected for this paper provide a snapshot of the underlying factors that affected COVID-19 outcomes in America in the middle of the pandemic before vaccines were available for broad use. What is most striking is the consistent effect of race. COVID-19 has hit members of minority groups the hardest in the United States (Centers for Disease Control

TABLE 1 Variables

	Operationalization	Categorical percentages/ medians
Demographic variables		
Urban/Rural	1 = large center metropolitan, 2 = large fringe metropolitan, 3 = medium metropolitan, 4 = small metropolitan, 5 = micropolitan, 6 = noncore	1—2%, 2—12%, 3—12%, 4—11%, 5—20%, 6—42%
Median age		41.6
Percent in poverty		13.4%
Median household income		$53,341
Percent white		83%
Unemployment rate		5%
Percent with college degree		19.6
Political variables		
Political Culture: Moralistic rating	0–6, total of county and state ratings for moralistic political culture. 6 = most moralistic	0—54%, 1—8%, 2—9%, 3—6%, 4—11%, 5—10%, 6—10%
Political Party of State Executive	1 = GOP, 2 = Dem	GOP—57%, DEM—43%
Margin	Percentage of votes for Biden minus percentage of votes for Trump	−3.85%
Mask mandate	1 = mandatory, 2 = sometimes, 3 = none	1—64%, 2—-11%, 3— 25%
Behavioral variables		
Changes in mobility	0;= F, 1 = D, 2 = C, 3 = B, 4 = A	A—0.1%, B—1%, C—10%, D—38%, F—51%
Changes in encounters density	0 = F, 1 = D, 2 = C, 3 = B, 4 = A	A—55%, B—19%, C—5%, D—8%, F—13%
Outcome variables		
Cases	Number of reported COVID-19 cases per 100,000 inhabitants	7921
Deaths	Number of reported COVID-19 deaths per 100,000 inhabitants	124
Hospital bed usage	Percentage of available beds occupied by COVID-19 patients	15%
ICU usage	Percentage of available ICU beds occupied by COVID-19 patients	32%

and Prevention, 2021; Hill & Artiga, 2022), and percent white emerged as a strong predictor of county-level COVID-19 outcomes in all models. The classification of the county on the urban/rural criterion also showed a strong effect on the outcome variables. There were more cases and deaths in rural areas, but more hospital usage in urban areas.

TABLE 2 Results of regression models

	Cases per 100,000	Deaths per 100,000	% hospital beds occupied by COVID patients	% hospital beds occupied by COVID patients, larger jurisdictions	% ICU beds occupied by COVID patients	% ICU beds occupied by COVID patients, larger jurisdictions
Median age	**–153.39*****	**1.16*****	0.0006	0.0001	**0.004***	0.001
	10.51	**0.36**	0.0007	0.001	**0.002**	0.002
Urban/rural	**257.02*****	**8.11*****	**–0.01****	–0.008	**–0.04*****	**–0.03****
	44.55	**1.54**	**0.003**	0.006	**0.008**	**0.009**
Percent in poverty	10.73	**1.17***	0.002	–0.002	**0.01*****	0.006
	16.31	**0.56**	0.001	0.002	**0.003**	0.003
Median income	0.0006	–0.0002	**0.000001****	0.0000008	**0.000003*****	**0.000003****
	0.007	0.0002	**0.0000005**	0.0000006	**0.000001**	**0.000001**
Percent White	**–3009.31*****	**–135.89*****	**–0.095*****	**–0.23*****	**–0.50*****	**–0.47*****
	387.78	**13.39**	**0.028**	**0.04**	**0.07**	**0.07**
Unemployment rate	**–152.79*****	0.15	–0.0009	–0.004	–0.008	**–0.01***
	28.67	0.99	0.002	0.003	0.005	**0.005**
Pol party of state exec	**–311.49****	**–25.90*****	–0.014	–0.006	**–0.06*****	**–0.06****
	114.51	**3.95**	0.008	0.01	**0.02**	**0.02**
Mask mandate	**298.47*****	–4.38	0.004	–0.002	–0.004	–0.02
	66.16	2.28	0.005	0.006	0.01	0.01
Margin for Biden	**–2078.03*****	**–36.01*****	0.02	**–0.08****	**–0.29*****	**–0.25*****
	253.19	**8.74**	0.02	**0.03**	**0.05**	**0.05**
Mobility change	4.34	**–10.11*****	–0.004	0.009	–0.02	0.003
	72.18	**2.49**	0.005	0.007	0.01	0.01
Encounters density change	**–217.80*****	**–5.90*****	**–0.007***	–0.001	**0.02****	**0.03*****
	45.92	**1.59**	**0.003**	0.003	**0.007**	**0.007**
Percent with College Degree	**–47.15*****	**–1.05*****	**–0.002*****	**–0.002***	–0.0005	–0.002
	8.84	**0.31**	**0.0006**	**0.0008**	0.001	0.001
Moralistic Rating	**217.92*****	**4.09*****	**–0.016*****	**-0.01*****	**–0.013****	**–0.01***
	25.66	**0.89**	**0.002**	**0.002**	**0.004**	**0.004**
Constant	16744.52	224.53	0.29	0.42	0.45	0.65
	846.06	29.22	0.06	0.08	0.13	0.14
Adjusted R^2	0.25	0.18	0.19	0.17	0.25	0.24

Note: Bold values indicate the variable is statistically significant.

*significant at the 0.05 level.

**significant at the 0.01 level.

***significant at or above the 0.001 level.

TABLE 3 Summary of significant predictors variables, by model

	Cases per 100,000	Deaths per 100,000	% hospital beds occupied by COVID patients	% hospital beds occupied by COVID patients, larger jurisdictions	% ICU beds occupied by COVID patients	% ICU beds occupied by COVID patients, larger jurisdictions
Median age	Negative	Positive			Positive	
Urban/rural	Positive	Positive	Negative		Negative	Negative
Percent in poverty		Positive			Positive	
Median income			Positive		Positive	Positive
Percent White	Negative	Negative	Negative	Negative	Negative	Negative
Unemployment rate	Negative					Negative
Pol party of state exec	Negative	Negative			Negative	Negative
Mask mandate	Positive					
Margin for Biden	Negative	Negative		Negative	Negative	Negative
Mobility change		Negative				
Encounters density change	Negative	Negative	Negative		Positive	Positive
Percent with college degree	Negative	Negative	Negative	Negative		
Moralistic rating	Positive	Positive	Negative	Negative	Negative	Negative

Note: Empty cells designate variable as not statistically significant.

Full cell contents are statistically significant; contents indicate the direction of the parameter.

Political factors also were shown to be meaningful in most of the models. Support for the Republican Party is associated with worse outcomes. Furthermore, lower levels of educational attainment are associated with worse outcomes. While the emergence of the Omicron variant provided evidence that the vaccine's protective effects wane over time and with the development of new strains of the virus (Andrews et al., 2022), the fact is that the probability of serious illness and death from COVID is much higher for the unvaccinated (Kekatos, 2022). Given the strong relationship between vaccine compliance and party preference (Ivory et al., 2021), it is important to see these significant associations between political and attitudinal factors in the early stages of the pandemic.

Table 3 makes it easier to see what variables were significant and in what direction. Seeing this view, without the magnitude of the parameter estimates, is helpful in visualizing the overall patterns. The consistent strength of the percent white in a county is striking. The greater the percent of the population that identifies as white, the better the outcomes, across the board. Poverty, income levels, and unemployment had a much smaller effect on COVID outcomes. Even where these variables were significant, the magnitudes of the parameter estimates were small and the estimated substantive impacts relatively weak. An effect based on race appears to exist independently of economic factors.

As expected, the political party of the state executive and the margin for the Biden/Harris ticket proved to be significant predictors, with those people living in areas with more support for Democratic elected officials experiencing fewer cases and deaths per 100,000. This is consistent with research conducted by other researchers (Gao & Radford, 2021; Johns Hopkins University, 2021) and reinforces the importance of understanding local political culture in designing responses to public health crises (Kaufman, 2021). Indeed, our primary measure of political culture shows consistent affects across all models as well.

The measures of educational attainment and measures of behavioral change from the *Unacast* data were expected to be powerful predictors of COVID-19 outcomes, but they were not consistently significant across models. In jurisdictions in which a larger proportion of residents have college degrees, we did see better outcomes with regard to cases and deaths. We did see a positive effect for jurisdictions for which we measured better scores on the Unacast data for changes in encounter density in response to the pandemic. Unexpectedly, improvements in encounters density, a measure of how effectively people avoided contact with other people during the pandemic, were associated with an increase in ICU bed usage.

CONCLUSIONS AND POLICY IMPLICATIONS

In preparing for the next pandemic, this study shows that society must do a better job of providing for equity in terms of racial justice. The consistent predictive power of one statistic, the percent of the population in a jurisdiction that identifies as white, is telling. Unfortunately, in many areas of the country the prevailing political winds blow against any efforts to work toward this goal. The political and social cultures of an area are difficult to shift. Patterns of belief, distributions of wealth and privilege, and acceptance of science persist over generations, even when such patterns are demonstratively maladaptive.

The predictive power of the urban/rural classification of the county is very important. Unfortunately, the urban–rural divide in American has widened over the last decade and shows no current sign of weakening. The emergence of the Delta and Omicron variants, with their increases in disease and death, did nothing to weaken the resolve of those who doubted the validity of the science in rural areas. News reports indicate that the areas hit hardest by these variants are the same areas that voted for Donald Trump in 2020 (Wood & Brumfiel, 2021). There are documented cases of people on their deathbed, dying from

COVID-19, insisting that it is all a hoax (Miranda, 2021). Public health officials must learn how to communicate more effectively with a group of people in rural areas who are naturally resistant to messaging that they perceive as coming from remote, largely untrusted official sources.

In those analyses, counties in a state with a high level of moralistic culture had poor COVID-19 outcomes with regard to cases and deaths, controlling for the effects of the other independent variables. This observation provides further support for the idea that readiness for the next pandemic must take into account regional and local variations in political culture.

Public health researchers must do more to analyze the connections between public health outcomes and the political and social culture at the local government level. Austin et al. (2021) found that increases in scientific literacy are associated with greater acceptance of public health recommendations. More research is required on the correlates of public cooperation with government-recommended strategies for reducing communicable diseases. This can be done now, before the next pandemic, by working on other common social and medical maladies that affect the poor more than the rich, such as diabetes, heart disease, and stroke. One of those tactics should include increasing media and scientific literacy in rural communities and less-advantaged inner-city populations because “the same social pathology that exacerbates the pandemic also debilitates our scientific response to it” (Kaufman, 2021, para 14).

Building the capacity of local areas to respond in times of rapid spread of a pathogen will take attention to the building of trust between public health officials and local policymakers. It will also require increasing attention to the spread of misinformation on social media. The very nature of social media is that it is easy to start a rumor or spread a lie but very difficult to correct the problem after the fact. Many governmental units do use social media already, and they will have to become even more nimble in their use (Hu & Lovrich, 2020). They must counter misinformation as soon as possible once predictions about the spread of a pathogen can be made with a reasonable degree of medical certainty.

Another pandemic will come. When it comes, it will exacerbate the existing inequities in human society. It will cause unnecessary death and suffering. The fabric that holds society together is frail. We must strengthen that fabric overall if we are to limit the damage from coming pandemics.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

All data used in the analysis are publicly available.

ETHICS STATEMENT

The data, models, and methodology used in this research are not proprietary.

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ORIGINAL ARTICLE

Attributes of funding flows and quality of maternal health services in a mixed provider payment system: A cross-sectional survey of 108 healthcare providers in Indonesia

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Abstract

Strategic purchasing of health services requires developing a coherent set of incentives across financing sources. In many countries, including Indonesia, healthcare providers engage with multiple financing sources. It is not well known how multiple funding flows in these mixed provider payment systems may interact at the facility level to influence provider behavior, quality of care, and ultimately health outcomes. Our study explored the association between facility capacity to provide high-quality maternal and newborn care at delivery and various attributes of facility funding, including funding flexibility, sufficiency of funds to cover direct costs, predictability of funds in timing and amount, and facility autonomy to make management decisions (decision space). We used survey data collected from primary and secondary maternal healthcare providers ($n = 108$) across eight provinces in Indonesia. We constructed a technical quality index that measures facility capacity to provide high-quality delivery care and several financing measures that summarize provider perceptions of flexibility, sufficiency, predictability of fund flows, and provider decision space. We found a statistically significant association between the decision space index score and the technical quality index score among hospitals and public primary care providers. One additional point on the decision space index was associated with an additional 0.15 ($p = 0.021$; 95% confidence interval: 0.024–0.275) on the quality index score after controlling for provider characteristics and geographic location. Our findings suggest that increasing facility autonomy to make management decisions may be one avenue for improving facility capacity to provide high-quality care in systems where providers deal with multiple fund flows with varying attributes. Design of strategic purchasing reforms must consider the full context in which providers operate to streamline incentives and ensure providers have the capacity to respond to those incentives appropriately.

KEYWORDS

healthcare quality, maternal health, provider payment, strategic purchasing

Key points

- Healthcare providers in mixed provider payment systems like Indonesia receive funding from many funding sources with varying attributes and requirements that may interact at the facility level to influence provider behavior and quality of care.
- We found that increased facility independence in making administrative, management, and service delivery decisions was associated with higher capacity to manage obstetric and neonatal complications and provide high-quality delivery care among a sample of maternal healthcare providers in Indonesia.
- Design of strategic purchasing reforms in mixed provider payment systems must consider the full context in which providers operate in order to streamline incentives and ensure providers have the capacity to respond to those incentives appropriately.

Improved maternal and neonatal health (MNH) outcomes are a priority in the Government of Indonesia's medium-term health sector development plans, given that mortality rates remain higher than those in comparable countries in the region. Indonesia's rate of 305 maternal deaths per 100,000 live births has shown only slow improvement over the past two decades despite more women delivering in facilities with skilled birth attendants (Agustina et al., 2019). Reform of payment systems with a strategic purchasing lens can contribute to the country's MNH goals by improving the quality of care provided to women and newborns at the facility level.

Strategic purchasing of health services is a tool used to influence the efficiency and quality of health service delivery (Busse et al., 2007; World Health Organization, 2010). This includes designing payment systems that purposefully purchase a mix of services from selected health providers via payment mechanisms and contractual arrangements that are designed to encourage efficient and effective service delivery, based on a coherent set of provider performance incentives. Although strategic purchasing is usually discussed in the context of a single purchaser or payment mechanism, in many countries, providers are required to engage with multiple purchasers and funding flows that may employ different payment mechanisms, and that may be governed by different laws and regulations (Busse et al., 2007; World Health Organization, 2010; World Health Organization, 2017). The combination of all provider payment mechanisms constitutes a mixed provider payment system (World Health Organization, 2010).

In Indonesia, the use of multiple, nonaligned funding flows with multiple payment methods to purchase health services can make strategic purchasing complex, leading to unpredictable or unintended effects on provider behavior and ultimately health outcomes (Cashin et al., 2015; Feldhaus & Mathauer, 2018; Langenbrunner et al., 2009). MNH providers in Indonesia engage with multiple financing sources, with only the National Health Insurance Scheme (Jaminan Kesehatan Nasional [JKN]) conducting some active purchasing of services, and the other sources providing passive funding. JKN payments to providers, however, were estimated to represent only 21% of total health expenditure in 2017 and the scheme's share of provider income, although growing, is similarly estimated to be low (Dutta et al., 2020). Effective strategic purchasing for MNH services through JKN will therefore require more than an understanding of how providers respond to JKN payments in isolation. It will require a holistic assessment of the complex funding landscape for health services that comprises most provider income in the country. Proposed frameworks based on qualitative evidence have described the potential influence of varying fund flow attributes on provider behavior (Mbau et al., 2018). However, there is limited quantitative evidence on how funds flowing to facilities in multiple revenue streams with varying attributes may interact at the facility-level to influence quality of care.

Evidence on how Indonesia's multiple fund flows for MNH services may—or may not—enable delivery of high-quality care is essential to inform the design of strategic purchasing reforms that the Ministry of Health is considering. To generate this evidence, we collected data from a sample of healthcare facilities in Indonesia to assess the relationship between a facility's capacity to provide high-quality delivery care and various attributes of facility funding—including the perceived sufficiency, flexibility, and predictability of overall provider funding, as well as provider autonomy to make management and service delivery decisions. The findings of our study can be used to inform strategic purchasing reforms aimed at MNH services. The findings also contribute to greater understanding of how multiple funding flows in mixed provider payment systems can influence provider behavior, the quality of care, and, ultimately, health outcomes.

METHODS

Analytical framework

For this study, we relied on a multiple funding flow framework proposed by Mbau et al. (2018), which suggests the possible attributes of funding flows that can influence provider behavior—including how much each fund flow contributes to total provider revenue, the adequacy of the fund flow to cover costs of providing services, the level of managerial

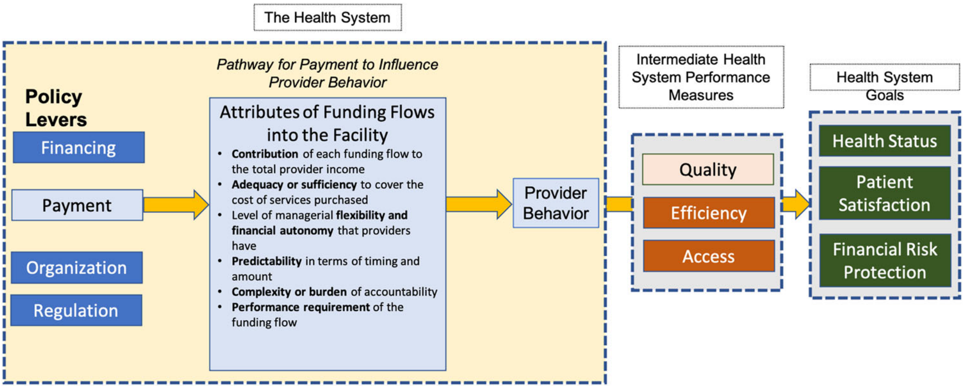

FIGURE 1 Analytical framework. Framework adapted from Roberts et al. (2008) and Mbau et al. (2018).

flexibility and financial autonomy that facilities have, the predictability of funding, and the complexity of accountability and performance requirements. Figure 1 illustrates how attributes of multiple funding streams may influence provider behavior, the quality of care, and health system goals, additionally drawing on a broader health systems framework proposed by Roberts et al. (2008). In this study, we aimed to measure these fund flow attributes and assess their association with facility capacity to provide high-quality delivery care.

Study setting

Several elements of the Indonesian health financing and delivery system are relevant for understanding the strategic purchasing context for this study, including decentralized governance of the health sector and the mixed provider payment system for MNH services.

Decentralization

Indonesia's health system is decentralized with local governments (districts and provinces) playing a substantial role in health financing and service delivery through investments in supply-side service readiness. More than half (65%) of public health spending in Indonesia is from subnational government budgets (Pinto et al., 2016). Even though subnational budgets are mostly funded by fiscal transfers from the central government, most transfers are unconditional with only one fund—the health special allocation fund—being earmarked for health spending, allowing subnational governments to allocate flexible transfers based on their own priorities (Dutta et al., 2020). In practice, this means there can be significant variation in the level of total health spending at the local level that compounds geographic inequities in supply-side service readiness (World Bank Group, 2018). In addition to budget allocations, local governments are responsible for ensuring minimum service standards are met, which are detailed technical standards for quality provision of mandatory health services including MNH services (Teplitskaya et al., 2021).

Mixed provider payment for MNH services

In Indonesia, MNH services provided in public facilities are financed by funding flows from various purchasers that employ different payment mechanisms (Figure 2). JKN pays primary healthcare providers through capitation for most primary care services but pays for MNH services through fee-for-service. Hospitals are paid for maternal health services through Indonesia case-based groups, a form of diagnosis-related group payments. Public healthcare providers additionally receive funding through budget allocations from local government, which are mostly fiscal transfers from central government earmarked for health but also from local (own-source) revenues and block grants for specific district programs. Public and private providers also collect revenue through patient out-of-pocket payments (Stein & Dewi, 2020). Private midwife practices can contract with JKN only through already empaneled primary healthcare facilities. Payments from JKN to midwives are thus first sent to the primary healthcare facility and then forwarded to the midwife who provided the services.

Some government-owned hospitals and primary healthcare facilities in Indonesia can be designated as local community service agencies (Badan Layanan Umum Daerah [BLUD]). BLUDs are granted considerable autonomy and flexibility in financially managing the facility

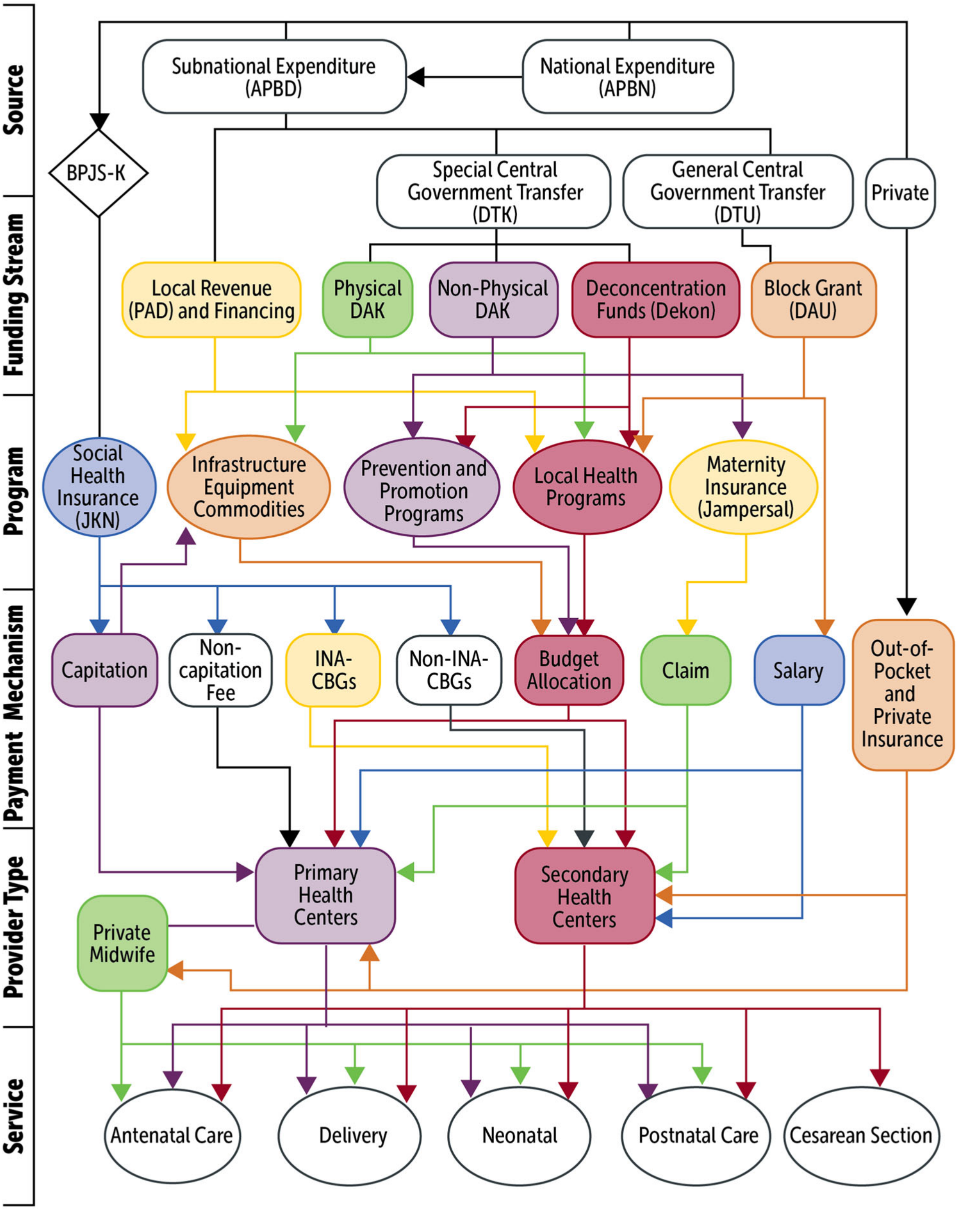

FIGURE 2 Funding flows from source to service for maternal and neonatal health service delivery in Indonesia, among public providers. This funding flow diagram is only applicable to public primary and secondary healthcare providers and does not include village-level financing (i.e., the Dana Desa village fund) or providers below the primary healthcare level, including puskesmas pembantu, posyandu, polindes, and others. APBD, Anggaran Pendapatan dan Belanja Daerah; APBN, Anggaran Pendapatan dan Belanja Negara; BPJS-K, Badan Pelaksana Jaminan Sosial Kesehatan; DTK, Dana Transfer Khusus; DTU, Dana Transfer Umum; PAD, Pendapatan Asli Daetah; DAK, Dana Alokasi Khusus; DAU, Dana Alokasi Umum; Jampersal, Jaminan Persalinan; JKN, Jaminan Kesehatan Nasional; INA-CBGs, Indonesian Case-Based Groups.Source: Figure from Stein & Dewi, 2020

(Harmadi & Irwandy, 2018). In the context of MNH payments, among other management benefits, BLUDs can directly receive payment from JKN and keep revenue from user fees, whereas payments to non-BLUDs must be routed through local governments (via district treasury offices) that then pool and reallocate facility revenue through the local budgeting process. This can result in delays and potential reprioritization of facility funding (Kolaborasi Masyarakat dan Pelayanan untuk Kesejahteraan [KOMPAK], 2017).

Study design and sample

We collected data from multiple types of facilities across a sample of provinces and districts in Indonesia. We used a multiple-stage mixed sampling strategy, combining both purposive and random sampling methods. First, a total of 8 provinces out of 34 were purposively sampled, considering that these provinces were identified as priority areas for MNH services by the Directorate of Family Health and Sub-Directorate of MNH. Within each province, we selected two rural and one urban district for a total of 24 districts by simple random sampling. Supporting Information: Appendix Table A shows the final provinces and districts selected for the study. Supporting Information: Appendix Table B displays the number of each type of facility in the final sample ($n = 108$) for this study.

Within each of the 24 districts, we sampled five facilities: two public primary care facilities (Puskesmas) with basic emergency obstetric and neonatal care capacity, one public primary care facility without inpatient services, one private primary care facility (a nonspecialist joint practice private clinic called Klinik Pratama), one private or public hospital (Rumah Sakit), and one private midwife practice (Bidan Praktek Mandiri). We selected the primary care facilities using stratified random sampling by facility type using master facility lists and included only facilities that were empaneled into JKN and that reported providing at least one of antenatal care, delivery, or postnatal care services.

As there was no sampling frame available and we wanted to survey private midwife practices that contract with JKN through our sampled primary care facilities, we selected private midwife practices using snowball sampling: we asked the sampled primary care facilities to identify and share contact information from one private midwife practice in their district that contracted with JKN and we selected the most-mentioned private midwife to be interviewed. We also used snowball sampling to identify and select one referral hospital per district. To ensure we sampled the most likely hospitals that maternity patients would be referred to for higher-level care, we asked the sampled primary care facilities in each district to inform us which hospital—public or private—they most referred to for MNH complications.

Data were collected on tablets using the Computer-Assisted Personal Interviewing program in the CS-Pro data entry software system. Interviews were recorded for quality checks. The survey instrument was translated from English to Bahasa Indonesia and back into English, to ensure a proper and effective translation. The survey instrument was also piloted before being deployed by trained data collectors in all sampled districts.

Measures

Dependent variable

Our main dependent variable was facility capacity to handle obstetric and newborn complications and thus provide high-quality delivery care. We measured this by constructing a 16-item technical quality index using previously validated process of care measures (Gabrysch et al., 2012; Tripathi et al., 2015). The index measures the reported performance of signal functions in the last three months that are essential for preventing maternal and newborn mortality during delivery (signal functions included in the index are listed in Supporting Information: Appendix Table C). By definition, the index ranges between 0 (when no signal functions were reported performed) and 1 (when all 16 signal functions were reported performed). Survey questions measuring performance of signal functions were adapted from Columbia's Averting Maternal Death and Disability Toolkit (Columbia University Mailman School of Public Health, 2010).

Independent variables

Guided by the analytical framework (Figure 1), we constructed and included measures to represent provider perceptions of funding flow attributes that may influence provider behavior and quality of care. First, we calculated the contribution of each fund flow to overall facility revenue using reported facility revenues from 2018. Next, for each facility we assessed the perceived flexibility of its total revenue by creating a flexibility score. This score represents the proportion of facility revenue that was rated as being "very limiting" when trying to spend it (compared to "somewhat limiting," "not limiting at all," and "not having any earmarks or restrictions"). Respondents rated the flexibility of each revenue stream and we weighted the ratings by the proportion of facility revenue coming from that revenue stream. This flexibility score thus represents providers' perception of how limiting or inflexible their revenue is to use. Facilities with higher flexibility scores are operating under a perceived scenario of more restrictive—less flexible—funding.

We also calculated a sufficiency score for JKN payments for MNH services (Supporting Information: Appendix Table D). This score represents the proportion of MNH services provided by the facility whose costs were reported either as always or often fully covered by JKN. If providers said that JKN payments for services "always" or "often" covered direct costs (compared with "sometimes" or "never"), we assigned that service a value of 1. We then divided the sum by the number of MNH services the facility reported providing. Thus, the sufficiency score represents provider perceptions of the proportion of MNH services provided for which JKN payments were deemed to sufficiently cover the service provision costs.

We calculated a decision space score that represents the independence of facilities to make administrative, financing, and service delivery decisions. This decision space measure was based on the decision space framework proposed by Bossert (1998). We used survey questions adapted from the decision-making section of the healthcare facility instrument from the Indonesia Family Life Survey (Strauss et al., 2016) (Supporting Information: Appendix Table E includes the list of decisions considered). We assigned each facility a score of one when it reported making a decision independently; facilities with other responses (such as "the facility makes a recommendation to a higher authority" and "facility mainly follows the decision/order of a higher authority") were given a score of 0. Using the scores for nine types of decisions, we built an overall decision space score that represented the proportion of the nine decisions that each facility reported making independently.

Lastly, we calculated predictability scores. For this, we measured providers' perceptions of the predictability—in terms of both timing and amount—of their revenue streams. We calculated the proportion of each facility's revenue that was reported as "predictable" or "somewhat predictable" in timing (when the funding will be available) and amount (how much funding will be disbursed). The predictability scores thus represent the proportion of each facility's revenue that facilities considered certain or predictable.

We included in the analysis other control variables that may be related to provider capacity to provide high-quality delivery care. These include dummy variables for facility type (primary or secondary care facility, or private midwife practice), ownership (public or private facility), and local community service agency status (BLUD or non-BLUD). Only hospitals and public primary care facilities can be classified as BLUD or non-BLUD and, as explained above, BLUD facilities have more financial autonomy compared to non-BLUD facilities.

Statistical analysis

For our analysis, we first described the reported contribution of each funding flow to overall provider income by provider type. Next, we described key variables included in the analysis, including capacity to provide high-quality delivery care, flexibility, sufficiency, decision space, and predictability scores to assess measure variation by facility type, ownership status, and BLUD status.

We ran multivariable linear regression models to assess the association between facility capacity to provide high-quality delivery care and each of the financing measures (flexibility, sufficiency, decision space, and predictability scores). The regression models included province-level fixed effects to control for geographic distribution of facilities and time-invariant health system differences across provinces. We also included dummy variables for facility type (primary care, secondary care, or midwife practice) and ownership status (public or private). SEs were clustered at the district level in all regression models. Lastly, we ran the same models but restricted the sample to hospitals and public primary care providers (i.e., excluding private clinics and midwives) to additionally control for facility BLUD status that is only applicable to those two facility types. All analyses were conducted in Stata v16.1.

RESULTS

Of the 108 healthcare facilities surveyed for this study, we retained 87 for this analysis (Table 1), as 21 facilities reported not providing delivery services and thus a technical quality index could not be constructed. Almost 60% (52) of the facilities were public, and among hospitals and puskesmas, 43.9% (25) were BLUD. Table 1 also shows the mean number of ANC visits, live births, and prenatal care visits and facility infrastructure variables among facilities in the analytical sample.

The contribution of JKN to total provider revenue was highest among private providers. JKN payments accounted for 67% of private clinic revenue, 48% of private midwife revenue, 43% of puskesmas revenue, and 31% of hospital revenue in 2018 (Figure 3). All provider types received revenue from client out-of-pocket payments, donors, and/or private sources, with private midwife practices relying mostly on "other" funding (accounting for 51% of overall revenue). Puskesmas and hospitals also received national government funding (11% of puskesmas revenue and 10% of hospital revenue) and subnational government funding (27% of puskesmas revenue and 35% of hospital revenue).

TABLE 1 Facility sample characteristics ($N = 87$)

	***n* (%)/Mean (SD)**
Facility type	
Hospital	22 (25.3)
Puskesmas with inpatient	23 (26.4)
Puskesmas without inpatient	12 (13.8)
Private clinic	12 (13.8)
Private midwife practice	18 (20.7)
Facility ownership status	
Public	52 (59.8)
Private	35 (40.2)
BLUD status[a] ($N = 57$)	
BLUD	25 (43.9)
Non-BLUD	32 (56.1)
Service delivery volume (Year 2019)	
Antenatal care visits ($N = 81$)	788.3 (945.9)
Live births ($N = 83$)	379.0 (706.0)
Postnatal care visits ($N = 76$)	308.9 (624.5)
Facility infrastructure	
Inpatient beds ($N = 54$)	61.7 (81.9)
Inpatient maternity beds ($N = 64$)	7.2 (8.7)
Functional blood bank ($N = 69$)	12 (17.4)

Abbreviation: BLUD, Badan Layanan Umum Daerah.

[a] Only applicable among hospitals and public primary care providers.

Table 2 shows the average quality and financing measures by facility type, ownership status (public and private), and BLUD status. The average technical quality index is significantly higher among hospitals compared with primary care facilities (which includes puskesmas, private clinics, and private midwife practices; $p < 0.001$), higher among public facilities compared with private ($p = 0.050$), and higher among BLUD facilities compared to non-BLUD facilities ($p = 0.016$). Flexibility scores were higher among public facilities compared to private ($p < 0.001$), meaning public facilities judged that a higher proportion of facility revenue (56%) was very limiting when trying to spend compared with private facilities (7%). There were no differences in flexibility scores comparing hospitals with primary care providers ($p = 0.358$) or comparing BLUD and non-BLUD facilities ($p = 0.824$).

By facility type, on average, hospitals reported higher levels of sufficiency for JKN payments to cover direct costs of the MNH services than did primary care providers ($p = 0.025$). Likewise, public providers reported higher levels of JKN payment sufficiency compared with private providers ($p = 0.003$) and BLUD rated sufficiency higher than did

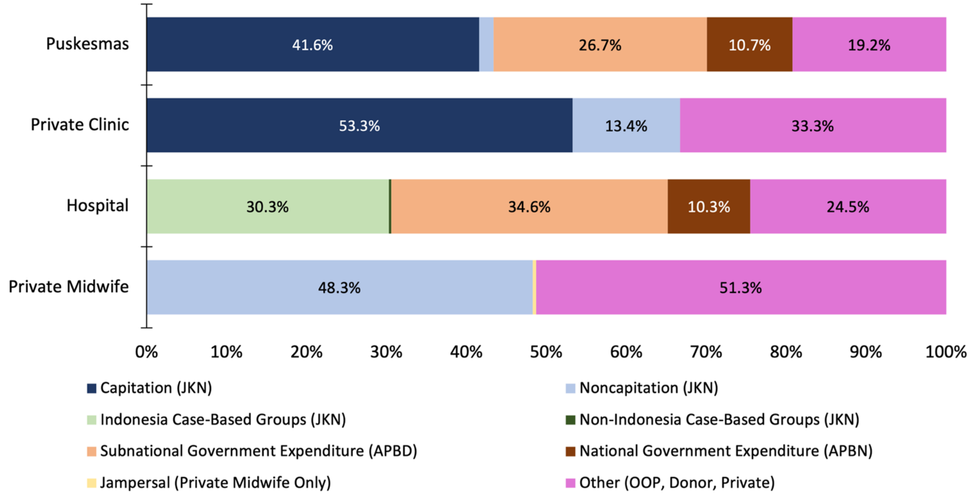

FIGURE 3 Proportion contribution of revenue sources to total revenue, by provider type. Jampersal refers to Jaminan Persalinan or childbirth services guarantee/insurance. Capitation payments are only relevant for public primary healthcare facilities (Puskesmas), whereas noncapitation payments are only relevant for primary healthcare facilities (Puskesmas, private clinics, and private midwife practices). Indonesia Case-Based Groups and Non-Indonesia Case-based Group payments are only relevant for hospitals.

non-BLUD facilities ($p = 0.042$). In terms of autonomy to make management decisions, hospitals, on average, reported a greater degree of autonomy to make decisions independently (see decision space) compared with primary care facilities ($p = 0.017$). Private facilities reported significantly higher decision space scores compared with public facilities ($p < 0.001$), whereas there was no difference in decision space between BLUD and non-BLUD facilities ($p = 0.148$). Public facilities rated a higher proportion of their revenue as predictable in timeliness ($p < 0.001$) and amount ($p < 0.001$) compared with private facilities. BLUD facilities reported lower scores in terms of predictability of their revenue amount compared with non-BLUD facilities ($p = 0.034$) but there were no differences in predictability scores in terms of timing ($p = 0.662$). There were no significant differences between hospitals and primary care providers on the predictability scores ($p = 0.401$ for timing and $p = 0.248$ for amount).

Among BLUD-eligible facilities, we found a statistically significant association between the decision space index and the technical quality index score (Figure 4). According to our estimates, one additional point on the decision space index was associated with an additional 0.15 ($p = 0.021$; 95% confidence interval: 0.024–0.275) on the quality index score after controlling for provider characteristics and geographic distribution. This translates to an additional 2.4 signal functions being performed for every additional point on the decision space index. The association between decision space and the technical quality index almost reached significance in the full sample ($p = 0.076$). There were no significant associations between the sufficiency, flexibility, and predictability scores and the capacity to provide high-quality delivery care in the full sample or in the sub-sample of BLUD-eligible facilities (hospitals and puskesmas only). Coefficients and 95% confidence intervals for all the regressions can be found in Supporting Information: Appendix Table F.

TABLE 2 Mean quality index and financing measures by facility type, ownership status, and BLUD status

	Quality index, mean (SD)	Financing measures, mean (SD) Flexibility	Sufficiency	Decision space	Predictability (timing)	Predictability (amount)
Facility type						
Hospital, $N = 22$	0.88^{*+} (0.11)	0.52 (0.45)	0.63^{*+} (0.40)	0.52^{*+} (0.28)	0.55 (0.37)	0.52 (0.41)
Puskesmas, $N = 35$	0.51 (0.09)	0.51 (0.41)	0.49 (0.40)	0.24 (0.23)	0.67 (0.31)	0.62 (0.36)
Private clinic, $N = 12$	0.45 (0.17)	0.09 (0.30)	0.45 (0.33)	0.62 (0.33)	0.60 (0.41)	0.32 (0.39)
Private midwife, $N = 18$	0.49 (0.08)	-	0.21 (0.23)	-	-	-
Ownership status						
Public, $N = 52$	0.62* (0.19)	0.56* (0.41)	0.57* (0.40)	0.30* (0.24)	0.62* (0.33)	0.58* (0.38)
Private, $N = 35$	0.54 (0.20)	0.07 (0.26)	0.29 (0.29)	0.66 (0.32)	0.27 (0.41)	0.19 (0.35)
BLUD status						
BLUD, $N = 25$	0.72* (0.21)	0.50 (0.44)	0.66* (0.35)	0.41 (0.27)	0.60 (0.36)	0.46* (0.40)
Non-BLUD, $N = 32$	0.59 (0.19)	0.53 (0.42)	0.45 (0.42)	0.30 (0.29)	0.64 (0.33)	0.68 (0.33)
Overall						
	0.59 (0.20)	0.45 (0.43)	0.46 (0.38)	0.39 (0.31)	0.49 (0.40	0.43 (0.41)
	$N = 87$	$N = 67$	$N = 87$	$N = 69$	$N = 85$	$N = 85$

Note: Mean values are reported in the table and SDs are in parantheses. BLUD (local community service agency) is only applicable to hospitals and public primary care providers. Among the financing measures, only sufficiency was measured for private midwife practices.

Abbreviation: BLUD, Badan Layanan Umum Daerah.

*Statistically significant ($p < 0.05$) difference between groups.

$^{+}$For comparison between hospitals and primary care facilities (which includes puskesmas, private clinics, and private midwife practices).

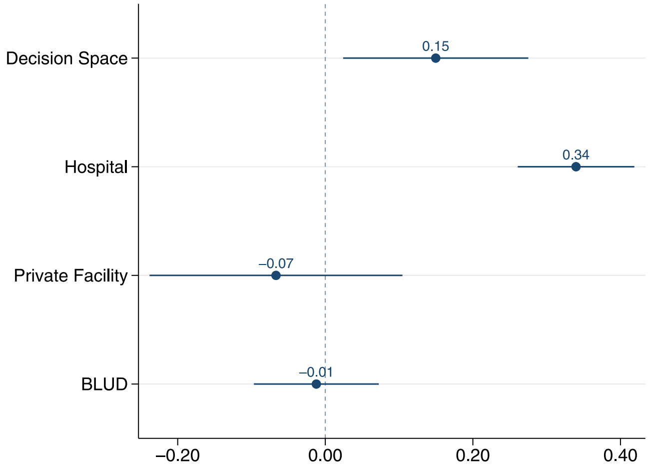

FIGURE 4 Coefficient plot from linear regressions to assess association between technical quality index and decision space, among BLUD-eligible facilities (*N* = 57). Horizontal bars represent 95% confidence intervals (CIs). Model included indicators for facility type (primary care or hospital), ownership status (private or public), BLUD status, and province fixed effects with SEs clustered at the district level. Regression coefficient values and 95% CIs can be found in the Supporting Information: Appendix Table F.

DISCUSSION

Overall, the mechanics of resource flows and extent of decentralization in Indonesia have led to an increasing yet variable degree of autonomy for facilities to make management decisions and flexibility in use of their revenue (World Bank Group, 2018). The impact of this autonomy and flexibility on the quality of healthcare delivered is hence of interest. In our study, we found that increased facility independence in making administrative, management, and service delivery decisions was associated with higher capacity to manage obstetric and neonatal complications. Each additional decision that facilities can make independently was associated with an additional 2.4 signal functions essential for preventing maternal and newborn mortality being performed in the last three months, after controlling for relevant covariates. Albeit this finding does not imply causality and is mainly descriptive, our findings support the claim that increasing facility autonomy to make decisions may be one avenue for improving facility capacity to provide high-quality delivery care. Across several settings, decision space has been found to be associated with improved facility performance and response to incentives, and many performance-based financing programs also prioritize improvements in facility managerial autonomy (de Walque et al., 2017; Duran et al., 2020; Friedman et al., 2016). Strategic purchasing reforms that aim to influence provider behavior as a means to improve the quality of services should then be cognizant of facility autonomy to adapt to incentives. Facilities need to be empowered and must have the managerial autonomy to use resources to solve problems with local strategies and to respond to the needs of the populations they serve (Cashin et al., 2017).

We also found important differences in the perceived flexibility of facility funding by ownership status. Private facilities in our sample rated 7% of their overall facility revenue as limiting to use compared with public facilities, which rated 56% of their revenues as limiting to use. Public facilities receive a higher proportion of their overall revenue from government sources (i.e., central and subnational government budgets) and these government funding sources were rated more limiting to use on average compared with JKN funding and private funding (which account for the majority of private facility revenue). It is likely that the lack of flexibility of input-based, noninsurance government revenue and the potential delays in receiving facility funding that must be routed through local governments, will limit facilities' ability to respond to incentives that JKN or other payers provide in their purchasing schemes. This finding is consistent with the finding of the Ministry of Health-led Strategic Health Purchasing Working Group for MNH that the lack of flexibility of facility revenue may be a greater barrier for improving quality of MNH services than is budget insufficiency (Indonesia Ministry of Health, n.d.). As a side effect of this inflexibility, facilities' dependence on more stable and flexible sources of funds, such as capitation payments from JKN, has risen over time (KOMPAK, 2017). This premise is associated with a broader issue of alignment between health finance policy and public financial management systems (Cashin et al., 2017).

Our study has several limitations. First, we collected data across a small sample of facilities that may not be generalizable to all facilities in Indonesia. The purposive, nonrandom, sampling of provinces may also bias our findings. Our analysis may have also been limited by low statistical power to detect associations between our outcomes and covariates of interest. Second, the technical quality index was based on the performance of signal functions as reported by facility staff; we did not observe performance of these signal functions. The technical quality index thus may not represent the actual quality of care provided by sampled facilities. Third, the financing measures were constructed based on perceptions as reported by facility staff; their perceptions and, thus, the financing measures may vary depending on which facility staff answered the survey questions. Lastly, we did not conduct a robust causal inference study and we therefore caution against any interpretation of our findings as causal.

Our findings have several implications for policymaking in countries with mixed-provider payment systems, which is the case for most countries (Feldhaus & Mathauer, 2018). Countries attempting to implement strategic purchasing reforms in such systems must consider the full health financing, payment, and regulatory context in which facilities operate. Our results imply that efforts to improve the quality of MNH care provided in Indonesia through strategic purchasing reforms may be hampered by limited facility autonomy to make management decisions and inflexibility of the majority of facility funding, even when national health insurance payments are perceived to be flexible.

AUTHOR CONTRIBUTIONS

Dorit T. Stein and Mukhammad F. Rakhmadi implemented the data analysis. Dorit T. Stein wrote the first draft of the manuscript. Mukhammad F. Rakhmadi, Jorge I. Ugaz, and Arin Dutta edited the manuscript. Jorge I. Ugaz and Arin Dutta oversaw data collection and analysis, and contributed to conceptual development of the research question with Dorit T. Stein.

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ETHICS STATEMENT

The University of Gadjah Mada, Yogyakarta, granted ethical clearance for this study (reference number: 6476/UN1.P.III/DIT-LIT/LT/2019). We obtained U.S.-based IRB approval from Health Media Lab. We also received permission from the respective Provincial Health Offices and from all participating facilities and respondents.

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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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Does the evidence base on social determinants of health cross disciplinary boundaries? A review of reviews

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Abstract

Social determinants of health (SDH) have emerged as a major area of emphasis in medicine over the last 30 years. While increasing interest in SDH has led to a proliferation of literature on this topic, it is unclear whether the medical evidence base on SDH has assimilated contributions from other disciplines. We analyzed interdisciplinary contributions to the medical evidence base on SDH, using a bibliographic analysis of highly cited literature reviews. Medical review articles from 1990 to 2020 were queried using the Scopus database, with a keyword search in the title and abstract for "social determinants of health." The top 100 most highly cited articles were sampled for inclusion, and references in each review were screened to identify journal articles published in other disciplines. An initial Scopus search identified 502 eligible reviews. After reviewing the top 100 most highly cited articles, 40 articles published between 2000 and 2017 met our inclusion criteria. and received between 33 and 940 citations. These reviews included references to a median of 41 journal articles (interquartile range [IQR]: 25, 67), of which a median of 11 was from public health journals (IQR: 6, 18) and 4 were from other social science fields (IQR: 1, 11). On multivariable analysis, more recent reviews incorporated more sources from public health but not from other social science fields. Relevant SDH scholarship from sociology and related fields is not being integrated into the evidence base directed at clinician audiences and may be underutilized in shaping policy and practice in these areas.

KEYWORDS
references, review, Scopus, social determinants of health, social science

Highlights

- Social determinants of health (SDH) are a multidisciplinary concept with relevancy and applications to clinical practice and health policy.
- The multidisciplinary evidence base on SDH is underrepresented in the most influential medical literature on this concept.
- Increased incorporation of the social science perspective on SDH and the formation of multidisciplinary research teams may enhance the study of this concept and further its utility in informing medical practice.

INTRODUCTION

Social determinants of health (SDH) address the socioeconomic, educational, and cultural factors impacting health outcomes. It conceptualizes the additive properties of these social forces and their role in shaping public health (World Health Organization, 2008, 2022). However, social scientists have investigated these research questions for well over a century, theorizing about the relationships between society and health that biomedicine's individualistic explanations failed to address (Azetsop & Rennie, 2010; Du Bois, 1899; Engels, 1892). For example, contemporary social science scholars have advanced the weathering hypothesis to explain high infant mortality as the result of cumulative racial inequality in African American women (Geronimus, 1992). Furthermore, fundamental cause theory has been used to demonstrate that socioeconomic status itself, and not simply its association with health-enhancing resources, causes poorer health outcomes and both maintains and exacerbates health disparities (Phelan et al., 2010).

The longstanding evidence base from the social sciences regarding SDH has direct relevance to clinician audiences and applications to the practice of medicine. The Liaison Committee on Medical Education (LCME, 2022), the accrediting body for US allopathic medical schools, mandates that " … the medical curriculum includes content from the biomedical, behavioral, and socioeconomic sciences to support medical students' mastery of contemporary medical science knowledge and concepts and the methods fundamental to applying them to the health of individuals and populations." The decision by the LCME to incorporate social science education into physician training underscores the value of these disciplines in informing modern medical practice and patient care (Bann et al., 2022). For instance, patient screening for social conditions such as food insecurity, improper living conditions, and lack of finances to pay for medicine, is useful in addressing patient needs (O'Reilly, 2019). Assessing patients for these concerns increase the accuracy and quality of the documentation required for the patient to receive risk adjustment (Jones & Muller, 2018). In this way, applying the concept of SDH in clinical practice allows for enhanced patient advocacy, having addressed the social conditions experienced by the patient that impact their health quality. In their practice, clinicians treat the health consequences of structural disadvantages experienced by their patients, thus placing clinician audiences at the center of attention for SDH research. It is the ethical responsibility of physicians to be cognizant of health disparities and prepared to address them (Bann et al., 2022; Bostick et al., 2006).

Failure of clinicians to understand the social nature of health inequities may lead to negative patient outcomes as a result of unidentified implicit biases (Bostick et al., 2006). Additional consequences include ineffective approaches to measuring SDH, missed opportunities to avert negative impacts of SDH, and inefficient use of resources dedicated to improving patient outcomes and health equity.

The concept of SDH and its applications draw on an interdisciplinary evidence base, including contributions from sociology, anthropology, social epidemiology, and others (Benach et al., 2014; Dressler et al., 2005; Elo, 2009; Farrer et al., 2015; Pampel et al., 2010; Phelan & Link, 2015; Read & Gorman, 2010; Smith & Christakis, 2008). These disciplines have sought to study this complex topic and postulate a means by which health equity may be achieved. Increasing collaboration between these disciplines poses benefits to the study of SDH through an enhanced understanding of causal mechanisms, identification of relevant constructs to be measured, and the refining of operationalization methods. However, barriers exist in integrating the insights from these various fields. Potential explanations for these barriers may be the lack of familiarity with other disciplines or deficient exposure to social science. Due to these factors, interdisciplinary sources receive little recognition or incorporation in medical literature, thus limiting the utility of the research base on SDH. The objective of this study is to review through bibliographical analysis highly cited articles on SDH from medical literature, examining the frequency and context by which other disciplines are referenced.

METHODS

Articles were selected for this review through a query of the Scopus (2020) database, which allowed both identifying relevant articles and determining which articles have been the most highly cited. We searched for articles with “social determinants of health” in either the title or abstract, which were published between 1990 and 2020. We restricted search results to review articles published in English and in the subject area of “medicine.” Eligible articles were sorted by citation count, and the top 100 most cited articles were sampled for further review, to ensure the most influential literature on SDH was included. The study team manually checked these 100 articles to exclude any articles that were not a review of evidence regarding SDH, did not address applications of the concept in medical practice (e.g., patient screening for social conditions, risk adjustment, health services analysis, or patient advocacy), or were not published in a clinical medical journal. The Scopus database search was completed on February 24, 2020. The study was not subject to Institutional Review Board approval as it was a bibliographic analysis and did not include human subjects research.

Data collected from each article included the year of publication, journal title, journal area (based on the subject area classification in the Clarivate Journal Citation Reports [JCR; Web of Science Journal Citation Reports, 2020], Journal 2018 Impact Factor (IF; 2020) the topic being reviewed in the article, the number of sources cited in the reference list, and the authors' departmental affiliation, if known. For journals not indexed in the JCR, we manually reviewed journal titles to determine the most appropriate subject area. For each review article, we examined references to articles appearing in other peer-reviewed journals, to determine which disciplines contributed to the evidence base being cited. Because the disciplinary affiliation of other sources (e.g., books, reports, websites) could not be definitively ascertained, these sources were excluded from our analysis. For each reference to a peer-reviewed journal article, we identified the year of publication, the journal title, and the journal area. Among articles including a high number of sources from social science disciplines, we reviewed article texts to qualitatively assess how these sources were used (e.g., providing a rationale for SDH measurement, explaining the causal relationship between SDH and patient outcomes, providing descriptive or retrospective data, providing data on completed trials or interventions, and so on).

Articles were screened for inclusion by the lead author and any ambiguity about inclusion criteria was resolved through discussion with the senior author. The lead author completed data collection of quantitative measures for each article, resolving any ambiguity with the senior author, and, if consensus could not be reached, with all coauthors. The authors further evaluated the 10 reviews with the highest proportion of social science citations to qualitatively describe how these sources were used. Quantitative data were summarized using medians with interquartile ranges (IQRs) for continuous variables and counts with percentages for categorical variables. Citations to public health and other social science sources among medical reviews of SDH were further evaluated using Poisson regression models of citation count, with independent variables including the year of publication, article topic, journal IF (divided into tertiles), and affiliations of the review's authors. Data analysis was completed in Stata/SE 16.0 (StataCorp, LP).

RESULTS

The initial Scopus query identified 502 review articles. We selected the top 100 articles by citation count for manual eligibility review. We excluded 28 articles where SDH was not a topic of the review, and 32 articles that addressed SDH but were not published in clinical medicine journals, according to the JCR area classification. The final 40 reviews included in the analysis were published between 2000 and 2017, and received between 33 and 940 citations. Characteristics of included reviews are summarized in Table 1. The median number of references was 41 (IQR: 25, 67), while the median number of references to public health articles was 11 (IQR: 6, 18), and the median number of references to other social science articles was 4 (IQR: 1, 11). As a proportion of total references, public health sources accounted for 29% of references in the median article (IQR: 20%, 47%), while other social science sources accounted for only 9% (IQR: 2%, 22%). In order of frequency, the most commonly cited social science fields (other than public health) were psychology, economics, sociology, demography, and education.

On multivariable analysis (Table 2), the number of public health citations tended to increase in more recently published reviews (incidence rate ratio [IRR]: 1.04; 95% confidence interval [CI]: 1.02, 1.06; $p = 0.001$). The highest number of references to public health articles was found among reviews on public health, health policy, and advocacy; and among reviews published in journals with IF between 5 and 10. However, the inclusion of coauthors with a public health affiliation did not increase the number of references to public health sources (IRR: 0.84; 95% CI: 0.70, 0.998; $p = 0.047$). When considering the number of references to other social science sources (Table 3), the multivariable analysis found no trend over time in citation count (IRR: 1.03; 95% CI: 0.99, 1.06; $p = 0.152$). Reviews in the highest-impact journals tended to include fewer citations to social science articles, as did reviews with a public health coauthor. However, reviews that included social scientists from other disciplines tended to include nearly three times the number of references to social science sources outside of public health (IRR: 2.84; 95% CI: 2.18, 3.70, $p < 0.001$).

In further analysis, we evaluated the use of public health and social science citations in the 10 reviews that made the greatest use of these sources (accounting for 67%–87% of the total journal articles referenced in each publication; Table 4). In four reviews, citations from social science fields outside of public health accounted for the plurality of the cited journal articles and, as such, comprehensively informed all aspects of the review. These included an article on stigma and minority stress among lesbian, gay, bisexual, and transgender

TABLE 1 Characteristics of review articles included in the analysis ($N = 40$)

Variable	N (%)	Median (IQR)
Year of publication		2013 (2010, 2015)
Topic of review		
Public health, policy, and advocacy	9 (23%)	
Global health	7 (18%)	
Pediatrics	5 (13%)	
Infectious disease	4 (10%)	
Cardiology	3 (8%)	
Other	12 (30%)	
Coauthor with public health affiliation	23 (58%)	
Coauthor with other social science affiliation	8 (20%)	
Citations received		77 (50, 135)
Journal 2018 IF[a]		4.6 (2.4, 59.1)
IF < 5 or no IF	14 (35%)	
IF between 5 and 10	13 (33%)	
IF greater than 10	13 (33%)	
Total references		41 (25, 67)
References to public health articles		11 (6, 18)
References to other social science articles		4 (1, 11)
References by subject area (% of total)		
Medicine		58% (44%, 80%)
Public health		29% (20%, 47%)
Other social science fields		2% (0, 9%)
Science and engineering		4% (0, 9%)

Abbreviations: IF, impact factor; IQR, interquartile range.

[a] IF unavailable for one case.

youth (Hatzenbuehler & Pachankis, 2016); an article on the connections between education policy and health policy (Low et al., 2005); a review of universal health coverage in Bangladesh (Adams et al., 2013); and an article on economic trade and SDH (Blouin et al., 2009). Psychology was the most cited field in the first two of these articles, while the other two primarily referenced sources from demography and economics journals, respectively.

In the remaining six articles, public health citations accounted for the plurality or majority of the evidence base (47%–64% of cited journal articles), while contributions from other fields were cited more selectively. Two articles used sources from other social sciences primarily to provide empirical data (e.g., the impact of social class on health, the prevalence of stigma towards people living with human immunodeficiency virus), (Poteat et al., 2014; Raphael, 2006) while two other articles primarily referenced such sources when discussing methodological approaches (e.g., quantifying residential segregation; developing systems science models) (Carey et al., 2015; Diez Roux et al., 2016). One review primarily used

TABLE 2 Multivariable Poisson regression of references to public health sources

Independent variable	IRR	95% CI	*p*
Year of publication	1.04	1.02, 1.06	0.001
Topic of review			
Public health, policy, and advocacy	Ref.		
Global health	0.55	0.35, 0.89	0.014
Pediatrics	0.36	0.25, 0.51	<0.001
Infectious disease	0.65	0.49, 0.87	0.003
Cardiology	0.78	0.57, 1.06	0.107
Other	0.55	0.44, 0.70	<0.001
Coauthor with public health affiliation	0.84	0.70, 0.998	0.047
Coauthor with other social science affiliation	1.03	0.82, 1.30	0.790
Journal 2018 IF			
IF < 5 or no IF	Ref.		
IF between 5 and 10	1.45	1.18, 1.79	<0.001
IF greater than 10	0.53	0.37, 0.78	0.001

Abbreviations: CI, confidence interval; IF, impact factor; IRR, incidence rate ratio.

TABLE 3 Multivariable Poisson regression of references to social science sources from disciplines other than public health

Independent variable	IRR	95% CI	*p*
Year of publication	1.03	0.99, 1.06	0.152
Topic of review			
Public health, policy, and advocacy	Ref.		
Global health	0.49	0.26, 0.94	0.030
Pediatrics	0.93	0.64, 1.35	0.702
Infectious disease	0.25	0.14, 0.42	<0.001
Cardiology	0.28	0.13, 0.57	0.001
Other	0.58	0.41, 0.81	0.002
Coauthor with public health affiliation	0.48	0.37, 0.63	<0.001
Coauthor with other social science affiliation	2.84	2.18, 3.70	<0.001
Journal 2018 IF			
IF < 5 or no IF	Ref.		
IF between 5 and 10	1.01	0.74, 1.37	0.951
IF greater than 10	0.45	0.28, 0.73	0.001

Abbreviations: CI, confidence interval; IF, impact factor; IRR, incidence rate ratio.

TABLE 4 Reviews addressing social determinants of health with the highest percent of references to public health and other social science journal articles

Authors	Title	Journal	Year	Number of articles referenced	% Public health articles	% Other social science articles
Adams AM et al.	Bangladesh: Innovation for universal health coverage 4: explaining equity gains in child survival in Bangladesh: Scale, speed, and selectivity in health and development	*Lancet*	2013	22	27%	50%
Blouin C et al.	Trade and social determinants of health	*Lancet*	2009	39	21%	54%
Carey G et al.	Systems science and systems thinking for public health: a systematic review of the field	*BMJ Open*	2015	72	50%	22%
Diez Roux AV et al.	The impact of neighborhoods on cardiovascular risk	*Global Heart*	2016	86	64%	7%
Farrer L et al.	Advocacy for health equity; a synthesis review	*The Milbank Quarterly*	2015	136	53%	23%
Hatzenbuehler ML et al.	Stigma and minority stress as social determinants of health among lesbian, gay, bisexual, and transgender youth: research evidence and clinical implications	*Pediatric Clinics of North America*	2016	67	16%	70%
Low MD et al.	Can education policy be health policy? Implications of research on the social determinants of health	*Journal of Health Politics, Policy and Law*	2005	54	30%	48%
Poteat T et al.	HIV epidemics among transgender women	*Current Opinion in HIV and AIDS*	2014	38	47%	26%
Raphael D	Social determinants of health: present status, unanswered questions, and future directions	*International Journal of Health Services*	2006	51	51%	16%
Watt RG	Emerging theories into the social determinants of health: Implications for oral health promotion	*Community Dentistry and Oral Epidemiology*	2002	31	48%	23%

social science references to develop theoretical concepts of social class and critique the absence of class in psychological theories of human behavior (Watt, 2002). Finally, one review focused on the recommendations for action in the social science literature, specifically recommendations around translating evidence on SDH into health advocacy (Farrer et al., 2015).

DISCUSSION

In contemporary research and practice, there is a cross-disciplinary consensus that social factors influence both individual and population health. Although recognition of “social determinants of health” as a singular concept emerged only within the last few decades, sociologists have explored the roles of poverty, segregation, gender inequality, and housing as causes of health disparities since Engels' (1892) and Du Bois' (1899). Since then, the weathering hypothesis and fundamental cause theory have described how social inequalities maintain and recreate health disparities over the life course and across generations (Geronimus, 1992; Link & Phelan, 1995). In this study, we examined reviews of SDH published in medical journals to determine how historical and contemporary social science contributions have been used in compiling the evidence base on SDH for clinician audiences. We found that relatively few of the citations in these articles were from social science journals, with a large and increasing majority of these referencing only the public health literature, but not other social science fields such as sociology, economics, and psychology. Among reviews of SDH that cited literature in social science fields apart from public health, having a coauthor of the review affiliated with one of these disciplines was the strongest predictor of citing these areas, highlighting the value of multidisciplinary collaborations for understanding and addressing SDH.

Our results suggest that clinicians and biomedical scientists do not often consult and cite the social sciences. This may be in part due to a lack of familiarity with these disciplines as medicine prioritizes education in the natural sciences, and clinicians' knowledge of SDH comes from their training and the literature they are exposed to. However, recent reform in medical curricula to include social science education signifies a change in the landscape of physician training. The decision by the Association of American Medical Colleges (AAMC) in 2015 to add the psychological, social, and biological foundations of behavior section to the Medical College Admission Test (MCAT) exemplifies this shift (Warshaw, 2017). The chair of the AAMC's MCAT validity research committee states, “To be successful [as a physician] in this era requires mastery of core scientific principles in psychology and social sciences” (Warshaw, 2017). Furthermore, many medical schools now implement courses and programs that encourage interdisciplinary awareness and research (Bann et al., 2022; Northwestern Medicine, Department of Medical Social Sciences, 2022; The University of Chicago, Pritzker School of Medicine, 2022; UCLA-Caltech Medical Scientist Training Program, 2022). Continued expansion of these educational endeavors in physician training may grow clinician awareness of SDH and further collaboration between biomedical and social scientists.

Our review of reviews uses a focused approach to investigate the evidence base developed around SDH in medical fields. Based on our results, existing scholarship in sociology and related fields that are relevant to SDH is not being integrated into syntheses of this literature, and presumably is not being applied to influence policy or practice in these areas. This contributes to an overemphasis on individual behaviors without fully considering the role of social causes of disease. Scholars of the weathering hypothesis, for example, have demonstrated that black women have shorter telomeres than same-age white women, making them “biologically older,” in part due to increased stress exposure (Geronimus et al., 2010).

Accelerated aging among black women has consequences for their birth outcomes and comorbidities that develop at midlife, especially when black women develop these outcomes at younger ages than white women (Shoemaker et al., 2018; Stapleton et al., 2018). Furthermore, sociological studies using a fundamental cause perspective have shown several ways that access to newer technologies, early screening, and newer pharmaceuticals are first made accessible to healthier and more socially advantaged patients, increasing disparities between the rich and poor (Chang & Lauderdale, 2009; Clouston et al., 2016; Masters et al., 2015). An individualistic focus on proximal causes of poor health, such as health behaviors and treatment adherence, cannot narrow disparities without considering the role of social position in access to these resources in the first place.

Incorporating evidence on SDH from other fields requires addressing not only the quantity of citations but also the ways in which they are used. Among several reviews identified in our study, social science sources were used primarily to provide empirical data or to provide background information on a particular methodology but were generally not used to develop the conceptual model of how SDH impacts clinical outcomes, or to formulate recommendations for practice or policy change. Furthermore, the use of social science sources outside of public health was generally rare and variable by topic; for example, some reviews cited primarily to research in psychology, others only research in economics, and so on. One way to incorporate the contributions of multiple fields to understanding SDH is to form multidisciplinary research teams that include social scientists from a range of disciplines. Our findings show that social science studies were cited more often in reviews of SDH when a scholar in one of these departments (e.g., sociology, psychology, economics, and so on) was listed as the author of the review. Including researchers from these disciplines in teams that study health disparities can further advance research by accounting for the knowledge gained in each field and the methodological expertise that is cultivated by each discipline.

However, several barriers hinder the formation and integration of multidisciplinary teams in clinical research. These barriers exist, in part, due to the prevailing culture within biomedicine, one that prefers to explain health in terms of individual factors and behaviors rather than social ones (Azetsop & Rennie, 2010). Medicine's deep-rooted tradition in the basic sciences and its related research practices may be resistors to change in the field. For instance, evidence-based medicine and clinical research rely heavily on the use of randomized controlled trials (Kabisch et al., 2011); however, this methodology is not effective in establishing causality between social influences and health outcomes due to the complex nature of these relationships (Yao et al., 2019). Additionally, researchers who lack familiarity with the social sciences may have difficulty utilizing constructs like ethnicity, race, and gender as their meanings vary across time and context (Bachrach & Abeles, 2004). Discrepancies such as these between social science and clinical research practices may be barriers discouraging collaboration between disciplines but further, exemplify the need for multidisciplinary teams. Furthermore, the predominance of evidence-based medicine, a scientific/intellectual movement prioritizing the application of both clinical experience and scientific evidence, may de-emphasize larger theoretical frameworks, and thus disincentivize collaboration between the basic and social sciences (Au, 2021).

Although there are known barriers to create multidisciplinary research teams, they are likely to play an important role in narrowing health disparities, (Gehlert et al., 2010) and existing initiatives have already started to move in this direction. In particular, the National Institute on Minority Health and Health Disparities is developing a strategic plan to "advance minority health and health disparities research" from 2021 to 2025 (National Institute on Minority Health and Health Disparities). While still in development, this plan aims to promote research that addresses the causes of health disparities, tests interventions to reduce health disparities, and improves the methods, measurements, and metrics used to understand health disparities. To meaningfully advance the evidence base in a way that more accurately affects what we already know about health inequalities, we recommend (1) better crossover in searching the existing evidence base, (2) multidisciplinary research teams that can build on shared knowledge and unique findings from specific fields, and (3) for public health and medical scholars to integrate the full range of variables described in the WHO SDH framework into their studies, not only as control variables or as a measure of risk, but rather as variables fundamental to the persistence of health disparities across outcomes and over time.

While our recommendations are based on a systematized review of reviews addressing SDH, our conclusions are limited by some aspects of the study design and available data. First, we used the Scopus database as a source of both articles and citation counts, where the latter are known to vary across sources due to differences in the material that is indexed. Furthermore, the "medicine" area classification used by Scopus included a significant number of public health journals (as classified by JCR), which were manually excluded from the review as they were not considered to reach a primarily clinical audience. We also did not attempt to search for reviews of individual components of SDH (e.g., reviews on the health effects of poverty), since we were interested in articles specifically using the SDH label as a cohesive grouping for such factors. While we used the number of citations as a measure of article impact, we were not able to determine how much each article individually contributed to changes in practice or policy. Thus, future research should examine more closely how evidence from various disciplines is used by clinical practices seeking to address SDH in their patient population, or in policy efforts addressing SDH that is led by healthcare providers or their professional organizations.

CONCLUSION

The relevance of SDH is widely accepted among scholars, policymakers, and clinicians, and both the NIH and WHO have made this framework central to the advancement of health disparities research. Yet, the multidisciplinary nature of the evidence base on SDH is not reflected in journals aimed at clinician audiences. As a result, longstanding findings from the social sciences, particularly from sociology, economics, psychology, and education, have not been integrated into medical policy or practice. The exclusion of these findings contributes to an overreliance on modifying individual behaviors at the expense of understanding the roles of social structure and social inequality in health, as described in the social science literature. Moving forward, multidisciplinary research teams with social scientists as primary investigators may aid in a better understanding of the breadth of the SDH evidence base.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

No ethical review was required for the work reported in this manuscript.

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Vaccine rhetorics

Heidi Yosten Lawrence

The Ohio State University Press, 2020. ISBN: 9780814255704.

The emergence of a louder American antivaccination movement in the last 20 years and the resurgence of diseases once thought to be on their way to eradication suggest that the scholarly worlds of health communication and the rhetoric of health and medicine have their work cut out for themselves. In *Vaccine Rhetorics*, Heidi Yoston Lawrence, Associate Professor of Rhetoric at George Mason University, brings together her experience as a mother, interviews with physicians, a reading of news coverage of vaccination, and an analysis of online discussion boards to chart the rise of antivaccination rhetoric. Adding to the evolving set of rhetorical tools used by antivaccine advocates, she points to a set of very specific rhetorical tools that are used to complicate vaccine mandates across the country. It is likely, of course, that much has changed in the short years since this book was published in 2020, especially since it was written before the COVID19 pandemic arrived. Nonetheless, I shall examine this book within the context it was written.

OVERVIEW

Lawrence divides the book into seven chapters. The introduction provides a brief overview of the rise in antivaccination discourse in the United States over the last several decades. Utilizing what Lawrence calls *material exigence,* or material conditions that create opportunities for communication about antivaccination to occur. Building on this notion, the first five chapters examine various material exigencies that shape discourse surrounding vaccines in the United States.

In the first chapter, Lawrence presents the first material exigence in vaccine discourse, namely that vaccines offer a way for physicians to "ontologize illness" through preventive practices. In examining the historical and biomedical developments that have occurred since the creation of the first vaccine, vaccines have served as part of a strategy for physicians to approach treating disease. Contrasting the approach often taken to conditions such as heart disease and cancer, vaccines offer a distinct approach to illness that focuses on prevention. For Lawrence, vaccination has become such an integral piece of the ontology of illness that immunization itself has become the sole way in which most Americans interact with certain diseases. Vaccines are so integral to our understanding of illness, in fact, that many parents and young physicians cannot identify symptoms of certain viruses or diseases. Lawrence argues that vaccination is the key strategy for physicians to "modify diseases" in their work. Disease here is cast as the material exigence through which physicians work and discourse responds to.

Chapter 2 goes beyond this individual notion of vaccination as a preventive strategy to the broader community and societal level to examine disease eradication as a material exigence for vaccination discourse. In this chapter, Lawrence examines the notion of "medico-legal rhetorics" or rhetoric in which medical and legal discourses work together. She uses medico-legal rhetorics as an entry point into examining the tension that emerges between policy-level decision-making regarding vaccines and the eradication of the disease. Lawrence discusses the complexity of discourses surrounding vaccine mandates, pointing to how this seemingly straightforward policy decision is not universally implemented across the United States. Additionally, Lawrence complicates the notion of disease eradication by pointing to the competing discourses that construct eradication. Eradication functions as a material exigence by creating the expectation that if we can prevent a disease we must do so. Lawrence argues that this exigence functionally removes the rhetoricity from vaccination discourses and instead replaces it with "compulsory measures as the only path to eradication if people will not electively comply with recommendations" (p. 73).

Through an examination of how injury functions as a material exigence for vaccination, Chapter 3 addresses the counter-rhetorics of antivaccination, paying specific attention to evidence of the harms of vaccines. In examining how antivaccination rhetoric emerges, particular attention is given to the embodied experience of individuals, and injury provides evidence for arguments against vaccines. In this chapter, Lawrence examines online discourses in which individuals write about their experiences with vaccines to counter narratives presented by science and medicine. In this regard, online spaces become a location for antivaccination discourse to be generated through sharing experiences of vaccines.

Chapter 4 centers on the relationship between uncertainty and *vaccine rhetorics*. This conversation centers on a set of interviews regarding the influenza vaccine and adults' decisions whether to receive one. By centering her discussion on the flu vaccine, the author pieces apart how vaccination decisions are situated in a binary paradigm of certainty and uncertainty. Vaccination then becomes constituted as a decision through a network of risk. The unknown is thus theorized as a material exigence through its way of constraining discourse surrounding vaccination.

In the conclusion, Lawrence describes a material-rhetorical approach to vaccine persuasion. Persuasion, she argues, needs to be rooted in and respond to the material exigencies that surround vaccination discourse. Here, Lawrence helpfully offers readers a sketch of future directions in vaccination research and persuasion. While this book speaks to the specific issues of vaccine rhetoric, there are a couple of directions in which future research might build on this study. Given the author's focus on the United States, further research should examine how these material exigencies shape vaccine discourse on a global level. Additionally, while this book readily examines the material exigencies in the United States, it is important to consider how these *vaccine rhetorics* shape public health policy and health outcomes in developing countries, in particular.

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BOOK REVIEW

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Malignant: How bad policy and bad evidence harm people with cancer

Vinayak Prasad

Baltimore, Maryland: John Hopkins University Press, 2020. $32.00. pp. 246. Hardcover. ISBN: 97814214376441421437643.

Cancer plagues individuals of all ages and walks of life and has therefore quickly risen to be one of the most heavily researched areas in medicine today. In *Malignant,* Dr. Vinayak Prasad addresses how policy, science, and media impact cancer treatment. Prasad also offers a cautionary tale of the harm this industry has caused and can further cause patients.

Intertwining evidence from multiple research trials, as well as his own data analyses, Prasad's initial explanation of how a drug comes to market lays the foundation for his perspective on pharmaceutical companies, oncologic drug regulation, and the policies behind them. In one instance, he calls into question how 71 cancer drugs improved survival outcomes by an average of 2.1 months in clinical trials with healthy controls, while the benefits almost completely dissipated when administered to the treated patient population. He emphasizes the process of how drugs with less impressive results are allowed to come to market. His critiques are well-founded, as he points to evidence and anticipates counterarguments. Of particular note is that while Prasad acknowledges that cancer is dense with technical terminology, he provides a thorough explanation of this jargon for the lay reader, such as how he explains the differences between cytotoxic, targeted, and immunotherapy drugs (pp. 50–51). Nonetheless, Prasad's book will be best understood by trainees and practitioners in medicine, pharmacy, and policy, and those engaging specifically with cancer research and treatment.

Prasad takes a critical dive into the hype surrounding cancer treatment and demystifies what he sees as disingenuous terminology that amounts to a form of distortion. Superlatives such as “unprecedented,” “game changer,” “miracle,” “breakthrough,” and “cure,” are utilized by media, pharmaceutical companies, government officials, and physicians to sway public perception of the success of drugs or treatment regimens. Prasad underscores the danger this may pose for those who may be moved to choose one drug over another because of this terminology. Additionally, he highlights the significance of financial conflicts of interest in medicine and proposes six solutions to address this problem including encouraging the end of financial associations between pharmaceutical companies and patient advocacy organizations, professional organizations, physicians, and analysts. His solutions are thorough and specific, with examples from his own personal experience within oncology and academic medicine. Prasad's recognition of the difficult and convoluted nature of these relationships, as well as his genuine desire to create an objective landscape for cancer treatment that will benefit patients, are commendable.

Another section assesses cancer therapy study design options. Prasad dives into one specific observational study suggesting the potential cancer mortality benefits of tree nuts. Ultimately, Prasad's main point in this chapter makes readers ask: “how do we know how accurate a given argument or research finding is regarding my cancer?” Prasad reiterates the importance of taking a critical eye toward sample size, number of comparable trials, and the need to take a critical look at evidence. Readers with a research background and understanding of interpreting research findings, as well as patients seeking more information on cancer, can truly benefit from the informative viewpoints of the author.

As medical students, we seek out books that engage public health in practical ways. At multiple times, Prasad cautions his audience to be wary and to not get lost in what he calls the "unspoken rules" of cancer medicine (pp. 137, 148). One of the unspoken rules he highlights is that the goal of any treatment in medicine remains constant: to ensure patients live longer or better lives. This is especially important because Prasad keeps this goal in mind when proposing his solutions, which include minimizing the adverse effects of drugs while also maximizing their pharmacologic benefit.

In his closing thoughts, the author describes a multifactorial action plan. He illustrates different steps that the Food and Drug Administration, the Centers for Medicare and Medicaid Services, and the National Institutes of Health can work towards. However, his intended audience includes not just administration and researchers, but also cancer patients themselves. We get the chance to ask, "What should I do if I have cancer?" "Should I participate in these clinical trials?" The text is a thorough compilation of answers to these questions that empowers readers and patients to think critically about the data, identify actionable components, and immerse themselves in the complex issues surrounding cancer. For this reason, we would highly recommend the book to any reader interested in cancer, be they a patient or a researcher.

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BOOK REVIEW

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

All creatures safe and sound: The social landscape of pets in disasters

Sarah E. DeYoung and Ashley K. Farmer

Philadelphia, PA: Temple University Press, 2021. pp. 210. Kindle Edition. LCCN: 2020045466.

Amidst August 2021's Hurricane Ida, with much of New Orleans lacking power and parts of the Mid-Atlantic states flooded, pets were evacuated to foster and adoptee homes throughout the nation. In fact, even in advance of the storm trained animal rescuers converged on affected areas to provide assistance in evacuating pets (Beveridge, 2021; Overdeep, 2021). Though a welcome change from Hurricane Katrina in 2006 (pp. 8, 10), when numerous pet deaths, abandoned pets, and owners refusing to evacuate New Orleans garnered national media attention, there is much for the general public, pet owners, emergency responders, and volunteers to learn. Sarah E. DeYoung and Ashley Farmer underscore the importance of improved disaster planning and response for pets in their recently published book, *All Creatures Safe and Sound*.

DeYoung is an assistant professor of sociology and criminal justice at the University of Delaware and a faculty member of its Disaster Research Center. Farmer is an assistant professor of criminal justice sciences at Illinois State University. Both authors are among the 60%–70% of the nation's households (p.x) that include pets (Pet Industry Market Size, 2020; p. 6).

The book includes data analysis from online surveys and groups and detailed interviews with volunteers, emergency responders, pet owners, and staff from large and small animal welfare organizations, including those newly established or expanded in response to disasters (pp. 25, 74, 83, 183). DeYoung and Farmer show how pet owners, rescuers, and communities were affected by recent hurricanes (Florence, 2018; Harvey, 2017; Irma, 2017), wildfires (2017 Carr Fire and 2018 Camp Fire and Tubbs Fire in California), and the 2018 Hawaii Lava Flow incident. The authors analyze how to better ensure that pets and other animals can be protected or safely evacuated within disaster areas. Importantly, DeYoung and Farmer discuss not only cats and dogs but also challenges associated with caring for larger animals, such as horses, during disasters (p. 152).

The Pets Evacuation and Transportation Standards (PETS) Act of 2006 (Public Law 109-308) requires states and localities seeking federal assistance under the Robert T. Stafford Disaster Relief and Emergency Assistance Act to plan for the disaster and emergency needs of individuals with household pets and services animals. The bill was signed into law by President George W. Bush during Hurricane Katrina's aftermath. The PETS Act also helped encourage similar or even more comprehensive state laws (Map of States, 2016). However, DeYoung and Farmer discuss several limitations of current policies that may be overlooked by pet owners and policymakers. For instance, the PETS Act:

- Does not require shelters, hotels, or privately rented facilities to accept pets evacuated by their owners during emergencies (pp. 7, 26);

- Emphasizes response during disasters but is less focused on pre-disaster preparedness or the extensive resources needed for post-disaster recoveries, such as the need for stable housing following a disaster (pp. 17, 95, 108);
- Sometimes conflicts with breed restrictions established by municipalities or by shelters which create difficulties for pet owners trying to evacuate during disasters (e.g., shelters or cities banning pit bulls) (p. 60); and
- Emphasizes disasters, such as hurricanes, that typically allow for more time for preparation; by contrast, wildfires and earthquakes may be associated with less time for preparation, making it harder for households with pets to acquire needed supplies or leave the area before it becomes unsafe (pp. 21–22, 28).

The authors' analysis of the PETS Act is echoed by others who have examined these issues (LaVoy, 2019).

The authors explain in detail the critical importance of social media in helping with disaster planning, support for fostering animals, reuniting pets with their families, and helping with fundraising (pp. 73–75, 85–87). Some of the drawbacks of social media are also described and include misinformation and fraud (pp. 88–89).

DeYoung and Farmer discuss the psychological trauma and guilt associated with pet death, loss or abandonment, and the need for responders and volunteers to have appropriate training (p. 175). The Substance Abuse and Mental Health Services Administration (SAMHSA) offers resources that may be helpful (https://www.samhsa.gov/disaster-preparedness). DeYoung and Farmer also counsel pet owners to individually prepare for future emergencies and disasters. For instance, pet owners can upload a high-quality recent photo of their pets, ensure their ready access to vaccination and other records, and purchase supplies such as blankets and extra cat litter (pp. 167, 179–180).

DeYoung and Farmer identify policy changes that may help to improve disaster planning and response for pets. Incentives to encourage hotels and rentals to accept pets can provide more flexibility to pet owners fleeing a disaster area or in the process of seeking longer-term housing (p. 24). Community spay-and-neuter programs can help reduce animal shelter overcrowding (pp. 50, 178–180). Communities can provide leashes and animal carriers before a disaster to aid in evacuation (p. 96) and distribute food to poorer pet owners with limited transportation (p. 103). Moreover, the colocation of human and animal shelters may be helpful (pp. 125–126).

While overall an excellent read and an important tool for planners and policymakers, some remaining future areas of research are evident. The authors, for example, emphasize weather and climate disasters rather than the impact of other types of emergencies such as communicable disease outbreaks that could affect animals, humans, or both. Though the authors do note the impact of social distancing and COVID-19 on spay-and-neuter programs, given the timeline of their research, COVID-19 is not emphasized (p. 187). In some ways, COVID may lead to outcomes similar to the foreclosure crisis that started in 2007 and resulted in pet abandonment due to its economic impact (Applebaum, 2020; Nowicki, 2011). Likewise, while COVID has not led to widespread animal infections, the impact of animal disease outbreaks, such as the 2001 United Kingdom foot-and-mouth disease outbreak, would be an interesting topic for future research (Bates, 2016). The authors note examples of communities with innovative practices, such as Delaware's spay-and-neuter voucher programs (p. 188). In addition, a more in-depth exploration of specific communities with best practices might be helpful. Learning from Hurricane Katrina, for instance, animal welfare groups and emergency managers in New Orleans and Louisiana at large have worked with shelters, trained volunteers, and publicly shared the city's pet preparedness plan (Babcock & Smith, 2020).

Note: The opinions expressed above are solely those of the author and should not be imputed to any public or private entity.

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