Perspectives in Public Health

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Editorial

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If we are truly concerned for the good health of humanity, the environment and the earth on which we depend, we need to reduce inequalities in those things which either hinder or enable us to have good health. I once thought this statement was unproblematic but it is clear that language around health inequalities becomes problematic in many ways; two of which are its politicisation and in terms of complex definitions.

One way of problematising our language is where people propose that 'variations' in health outcomes are just how things are, and seek to remove the sense of social justice from it. This often goes hand in hand with political and commercial actors seeking to frame health as primarily or solely determined by individual responsibility and 'lifestyle choice' – despite the evidence that determinants are at work which are beyond individual control, and which have profound influences on all our health.[1] This politicisation should not surprise us, because it absolves actors – governmental and commercial – of responsibility: 'It's not our fault people buy our unhealthy products. It's not our fault poor people get worse healthcare.'

A second way is how we frame and define inequalities. There are multiple definitions, terminologies and debates around inequity or inequality. The danger here is the language becomes a debate in itself which makes it difficult for allies to work with us and easier for those who would erase the social and structural aspects of inequalities to do so because a concern with terminology almost to the point of obsession makes the discussion in the field risk looking self-referential. The key point about health inequalities is that we must work to change them, not over-describe them. I choose to use the definition by McCartney et al.[2] that 'Health inequalities are the systematic, avoidable and unfair differences in health outcomes that can be observed between populations, between social groups within the same population or as a gradient across a population ranked by social position.'

A third problem with our response to health inequalities, which goes beyond language, is that we need to move beyond describing to acting and evaluating. We have strong evidence that a range of environmental, social, economic and cultural factors determine our prospects of good health and good life. We have equally strong evidence that the impacts of these fall unequally across populations – whether we segment them by poverty, educational attainment or other variables.[3] The fewer resources for good health you have – whether you define that as income or good environment – the worse your health status.[3] Resources such as social solidarity and connections between populations (4) or faith (5) can offer protection, but the fact remains that unequal distribution of the means to good health persists, harms, and kills unequally and unjustly, especially for populations which are and remain marginalised globally (6).[6] All of this should focus us on how we act to change them. And research in three key areas – commercial determinants of health, One Health and mental health –is welcome in their focus on informing action.

Colleagues in recent years have developed an increasingly sophisticated understanding of ways that commercial actors can determine health status for populations for good or ill.[1] Good employment with a fair wage and good working conditions can be a powerful creator of wealth and health.[7] But commercial self-interest can also lead to product formulation, marketing and policy advocacy inimical to good health for all. We may readily think of the tobacco industry but the harms from gambling, highly processed foods, takeaway foods, alcohol and quick, disposable fashion all have consequences for our health.[1]

The recognition that human health is inseparably linked with the flourishing of our planet and biosphere has led to the recent development of One Health[8] approaches. These approaches are proving salient in addressing the determinants of health as diverse as microbial resistance to emerging infections and climate change.[9]

We are also, belatedly, realising the fundamental importance of good mental health to human health[10] and good social and economic conditions. Addressing the multiple social determinants of mental health has significant implications for healthy life expectancy.[11]

All of this invites us to reflect again on the importance of practice which seeks to reduce health inequalities, whether at policy level or in particular settings. When we started creating this special issue, we called for papers which show that action can be taken to reduce inequalities in health. The articles in this special issue cover a gamut of issues – from urban poverty through geographies to sexual identity, from data analysis to systematic reflection on theory. They also cover a spectrum of practice from use of data to localised action, and a range of settings from local governments to communities of identity. But they have in common a focus on how to inform practice which aims at health justice. If there is a public health practice which seeks for just and equitable human flourishing, these papers in their analysis and reflection seek to serve the practice of how we achieve that and show that such practice is both vigorous and diverse.

Alongside evidence and framing of language, practice and evaluation are vital components of how we continually refresh and renew our efforts on health inequalities. Reflecting on these papers I want to offer here some waymarkers for how we practice public health which arise for me from reading them.

- ‘Complexify’ the problem enough to enable action – Swinton and Mowatt talk of reflecting on an issue in enough detail to understand the variety of dimensions which need to be taken into account for action. They advocate that we should complexify analysis of issues in order to properly understand implications for practice, not to distance ourselves from it.[12] Theory, data, experience and evidence are all part of this complexification. The papers in this issue show how varied and context-related that practice of complexification is.
- Layers and Phases. One thing we can learn from practice is that most health inequalities need us to act at multiple levels from environmental and societal (e.g. tobacco legislation) to the individual (e.g. immunisation). These interventions will take different timeframes to produce results. The greatest opportunity presented to us by complexifying the problems we seek to address is to equally complexify the response across layers of action and phases of time.
- Do we seek perfect or good enough knowledge? The complex and multi-layered nature of reality means we will never have perfect understanding. What matters is that our knowledge is *good enough* to enable practice and evaluation. Description needs to flow into delivery of change. Papers need inform practice.
- Be clear on how and why we define language – the literature sometimes shows an obsession with taxonomy, description and definition of health inequalities. How are we helping action to reduce inequalities when stakeholders may first need to work through a glossary to understand the Byzantine differences between disparities, inequities, inequalities and more?[13,14] We need to ask ourselves whether our use of terminology may create a Wittgensteinian language-game for which those who cannot play the game are excluded because they do not know the rules.
- History teaches us all disciplines have value – what matters is how we relate them in informing practice. What has distinguished public health throughout history is its willingness to use multiple disciplines, from epidemiology to water engineering, to address problems. We are in an era where data science, implementation science, systems theory and multiple social and behavioural sciences need to inform our action. Public health needs ‘a balanced epistemology’. By which, after Gattone, I mean we need to think through how to understand and relate very different ways of knowing to each other. At least one balancing factor should be informing practice.[15]

Could these waymarkers together help us become more sophisticated, and more effective in our practice? Most people I know work on public health because of values such as equity, social justice, compassion and human flourishing. In a long tradition of social analysis, Thomasset calls these social virtues and many people perceive a unity of purpose between seeking these, their philosophical worldview and the bodies of knowledge they use.[16] Public health is as much about the practice of values as it is about pursuit of knowledge.[17] Structured reflection on how we turn those values into a sufficiently ‘complexified’ or sophisticated practice remains a vita. Each of these papers, in my experience, seeks to rise to this challenge.

References

1. Petticrew M, Maani J, Van Schalkwky MC. The role of commercial influences in public understanding of harms, causes and solutions. In: Maani N, Petticrew M and Galea S (eds) *The commercial determinants of health*. Oxford: Oxford University Press; 2023. pp. 47–55.
2. McCartney G, Popham F, McMaster R *et al*. Defining health and health inequalities. *Public Health* 2019;**172**:22–30.
3. Marmot M, Allen J, Boyce T *et al*. *Health equity in England: the marmot review 10 years on*. London: Institute of Health Equity; 2020. Available online at: https://www.instituteofhealthequity.org/resources-reports
4. Firk C, Großheinrich N, Scherbaum N *et al*. The impact of social connectedness on mental health in LGBTQ+identifying individuals during the COVID-19 pandemic in Germany. *BMC Psychol* 2023;**11**(1):252.
5. Idler E, Jalloh MF, Cochrane J *et al*. Religion as a social force in health: complexities and contradictions. *BMJ* 2023;**382**:e076817.
6. Fish J, Almack K, Hafford-Letchfield T *et al*. What are LGBT+ inequalities in health and social support – why should we tackle them? *Int J Environ Res Public Health* 2021;**18**(7):3612.
7. Pförtner TK. The emergence of precarious employment as a determinant of health in Europe and the relevance of contextual factors: a critical research synthesis. *Int J Soc Determinants Health Health Serv* 2023;**53**(3):266–81.
8. World Health Organisation. One Health. Available online at: https://www.who.int/health-topics/one-health (last accessed 27 March 2024).
9. Where should ‘humans’ be in ‘One Health’? Lessons from COVID-19 for One Health. Available online at: https://pubmed.ncbi.nlm.nih.gov/38528528/ (last accessed 27 March 2024).
10. Kirkbride JB, Anglin DM, Colman I *et al*. The social determinants of mental health and disorder: evidence, prevention and recommendations. *World Psychiatry* 2024;**23**(1):58–90.
11. Alegría M, NeMoyer A, Falgas I *et al*. Social determinants of mental health: where we are and where we need to go. *Curr Psychiatry Rep* 2018;**20**(11):95.
12. Swinton J, Mowat H. *Practical theology and qualitative research*. London: SCM; 2006.
13. Braveman P. What are health disparities and health equity? We need to be clear. *Public Health Rep* 2014;**129**(suppl. 2):5–8.
14. Jung H, Davis K. Disparities and inequalities: an overview. In: *Encyclopedia of social work*. Available online at: https://oxfordre.com/socialwork/display/10.1093/acrefore/9780199975839.001.0001/acrefore-9780199975839-e-109 (2013, last accessed 27 March 2024).
15. Gattone CF. *A balanced epistemological orientation for the social sciences*. Lanham, MD: Lexington Books; 2021.
16. Thomasset A. *Les vertus sociales: justice, solidarité, compassion, hospitalité, espérance une éthique théologique* (Donner raison). Paris: Lessius diffusion Cerf; 2015.
17. Powers M, Faden RR. *Social justice: the moral foundations of public health and health policy* (Issues in biomedical ethics). Oxford; New York: Oxford University Press; 2006.

FEATURE

‘This is silent murder’ – are we medicalising human distress caused by the reality of life as an asylum seeker in the UK?

The number of displaced people, including asylum seekers and refugees, in the UK continues to rise. This article highlights findings from two participatory community listening exercises on the topic of health of displaced people.

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The number of displaced people in the UK due to war, persecution and political instability continues to increase. In 2022, there were 74,751 asylum applications made to the UK Home Office, the highest number since 2002.[1] By displaced people we here refer to asylum seekers, refugees and undocumented migrants.[2] The average waiting time for an initial decision on an asylum case is likely to be between one and three years and is increasing.[2]

In 2022, there were 74,751 asylum applications made to the UK Home Office, the highest number since 2002

Displaced people face significant trauma and adversity in their country of origin, or during their journey such as war, persecution or imprisonment. Generally, they are less likely to access health and social care and have poorer health than the general population. They are more likely to be diagnosed with mental health conditions than the general population, including higher levels of stress, depression, anxiety and post-traumatic stress disorder.[3]

Funded by the NIHR Clinical Research Network small grants programme, we ran two community engagement in health research events in conjunction with a community organisation supporting asylum seekers and refugees in the East of England. The events aimed to introduce the concept of health research, increase inclusion and remove barriers between academic research and this under-researched community. Over 70 men and women were brought together to discuss healthcare and health research in the UK, assisted by professional interpreters. Participants came from 14 different countries, at different stages of the asylum process, from newly arrived asylum seekers in initial hotel accommodation through to refugees who have established their lives in the UK.

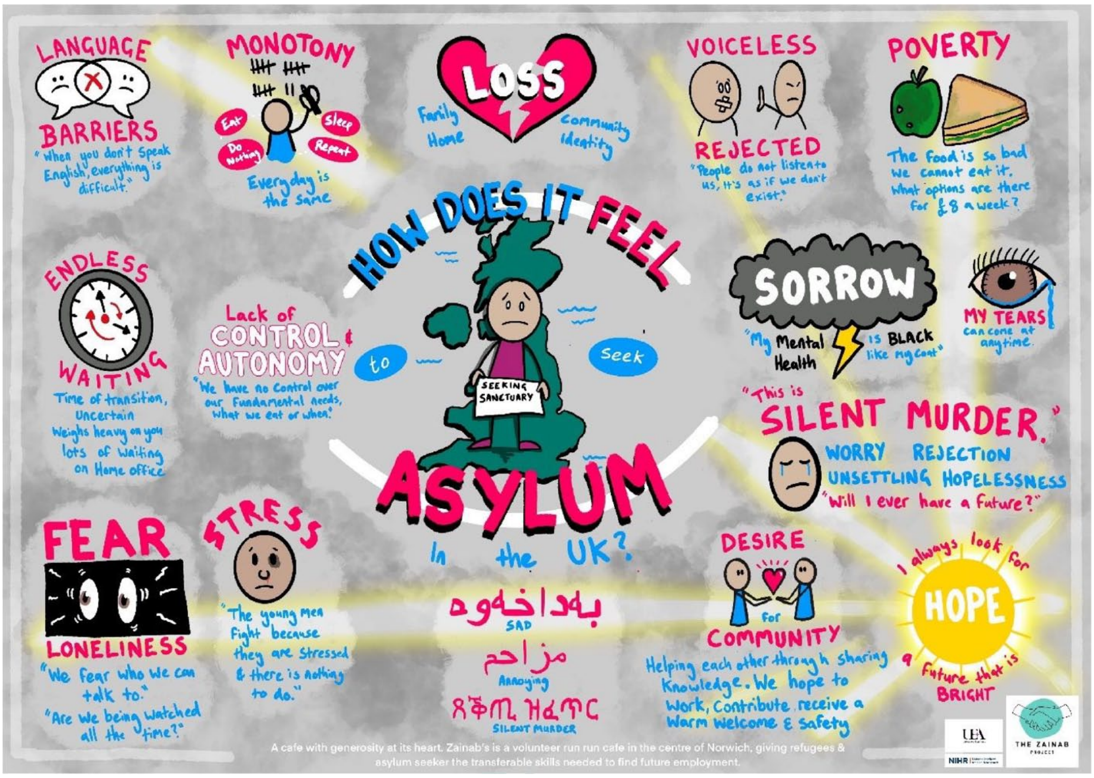
Social, environmental and political factors which were impacting on their wellbeing and how this made them feel were widely discussed (Figure 1).

Postmigration stressors included uncertainty, frustration and hopelessness around the protracted nature of the immigration processes and fear stemming from the perception of a hostile political environment. The lack of meaningful activities due to a ban on working and limited volunteering opportunities created abundant time for rumination about the past, worry about family back home and a feeling of being in limbo. They also spoke of environmental factors such as living conditions in Home Office accommodation, poverty (an asylum seeker in initial accommodation receives £8 per week towards clothes, non-prescription medicines, sanitary products and travel), feeling isolated due to language barriers and lack of community cohesion and connection. There was a lack of control over their fundamental daily needs such as choice of food, where they live, where they can go and a feeling of monotony. There were deep-seated grief and feelings of loss over relationships, homes, identity and belonging, causing significant sadness and suffering. Overwhelmingly there was a feeling of being voiceless, with their struggles not being heard or validated, rejected from society and indeed feeling ‘silently murdered’ (this phrase was poignantly described by one participant). The distress they felt was universally felt to be an entirely natural response to their situation. Many spoke of visiting health professionals with symptoms of distress such as poor sleep, pain, headaches and feeling worried and being given anti-

Figure 1

Participant's views on how it feels to seek asylum in the UK.

Source: Illustrator credit: Chris Spalton.



depressants or strong pain medication which were neither beneficial nor wanted.

These events demonstrated some practical aspects which could offer support, hope and lower distress in this group. This included fostering a sense of agency and autonomy, a desire to recreate a sense of community, a new home and be busy with meaningful activities, such as work. There was a desire to contribute to society and support each other by sharing knowledge, a need to feel secure and safe, and to have some hope of a future to enable them to recover from their past trauma.

Distress among displaced people is very common and is not in itself necessarily a mental illness, although it can result in mental illness without timely and appropriate intervention

Postmigration stressors are well documented and compound the impact of past trauma on the mental health of displaced people.[4] Distress among displaced people is very common and is not in itself necessarily a mental illness, although it can result in mental illness without timely and appropriate intervention. Distressed displaced people need help and support but there is a gap in the literature on the most acceptable and effective treatments, and we need to move away from purely Westernised diagnoses and treatments towards culturally informed care.[5] These listening events suggested that interventions for distressed displaced people lie outside the purely medical sphere. Fear and stigma around mental health within communities of origin and diaspora communities may prevent displaced people from expressing distress and accessing care.[6] Some languages do not have the words for mental health, let alone anxiety or depression and they may be translated into words which are stigmatising, unhelpful or shameful. Culture can influence all aspects of illness and expression of distress and somatisation can be common in displaced people. Displaced people may wish to tell their story, but counselling may be unfamiliar and uncomfortable for people who may not wish to discuss feelings with a stranger.[7] In Mozambique and Ethiopia, people may use 'active forgetting' to cope with trauma[7] so the cultural framing of therapeutic interventions must be nuanced and tailored to the individual.[8]

Interventions for distressed individuals could be taken out of the healthcare sphere and placed within communities, so as not to unnecessarily stigmatise and label individuals who may feel shame at experiencing disruption in their mental health due to their culture of origin or gender norms. Social capital and connectedness to others are key resources to improve mental health of displaced people.[9] Indeed, Wenning[10] concluded that the three most common resources related to displaced people making meaning of life are work, education and religion.

The voices of the individuals involved in these community listening events clearly demonstrate that the asylum process in the UK is damaging to the health and wellbeing of displaced people. It also suggests a need to develop interventions which are evidence based and moving beyond a purely Westernised medical model to include tackling the wider social determinants of health. There is a clear willingness from these two events for under-researched groups to engage in research and provide this evidence base and to co-produce interventions.

CONFLICT OF INTEREST

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References

1. House of Commons Library. *Asylum statistics*. Available online at: https://commonslibrary.parliament.uk/research-briefings/sn01403/ (2023, last accessed 12 April 2023).
2. Refugee Council. Thousands seeking asylum face cruel wait of years for asylum decision – fresh research shows. Available online at: https://www.refugeecouncil.org.uk/latest/news/thousands-seeking-asylum-face-cruel-wait-of-years-for-asylum-decision-fresh-research-shows/ (2021, last accessed 12 April 2023).
3. Blackmore R. The prevalence of mental illness in refugees and asylum seekers: a systematic review and meta-analysis. *PLoS Med* 2021;**17**(9):e1003337.
4. Hou WK, Liu H, Liang L *et al*. Everyday life experiences and mental health among conflict-affected forced migrants: a meta-analysis. *J Affect Disord* 2020;**1**(264):50–68.
5. O'Brien CV, Charura D. Refugees, asylum seekers, and practitioners' perspectives of embodied trauma: a comprehensive scoping review. *Psyc Trauma Theory Res Prac Policy*. Epub 2022 August 1. DOI: 10.1037/tra0001342.
6. Pollard T, Howard N. Mental healthcare for asylum-seekers and refugees residing in the United Kingdom: a scoping review of policies, barriers, and enablers. *Int J Mental Health Syst* 2021;**15**:60.
7. Burnett A, Peel M. Health needs of asylum seekers and refugees. *BMJ* 2001;**322**(7285):544–7.
8. Kronick R. Mental health of refugees and asylum seekers: assessment and intervention. *Can J Psyc* 2018;**63**(5):290–6.
9. Van Sint Fiet A, De la Rie S, Van der Aa N *et al*. The relevance of social capital and sense of coherence for mental health of refugees. *SSM Popul Health* 2022;**20**:101267.
10. Wenning B. An ethnographic perspective of well-being, salutogenesis and meaning making among refugees and asylum seekers in the Gambia and the United Kingdom. *Soc Sci* 2021;**10**(9):324.

In Practice

The role of community champions in place-based early years support: how can we successfully share knowledge and build parent confidence?

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INTRODUCTION

A child's early life experiences and the relationship they have with their caregiver significantly influences the trajectory of their cognitive, emotional, behavioural and social development across the life course.[1] Supporting parents in their caregiving role during a child's early years, particularly those parents from low-income families, is crucial in addressing health inequalities.[2] Children from low-income families are at particular risk of delay and impairment and are more likely to have poorer social and emotional wellbeing than their peers.[3]

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Research has demonstrated the critical role that Early Year's intervention services can play in reducing health inequalities[2]; however, there is differential reach in the uptake of parenting programmes with poorer attendance for low-income parents, suggesting that those parents with the greatest potential to benefit may be the least likely to engage.[4] There is, therefore, a need for a new approach; one that is socially sensitive, trusted and sustainable and, crucially, able to engage parents across the socio-economic spectrum.

Research evidence supports the need for more community-centred approaches to health and wellbeing,[5] particularly for disadvantaged families, and involving volunteers as community assets has been highlighted as a key strategy.[6,7] In particular, existing work highlights the importance of trust and relationships when it comes to successful implementation of these programmes.[8] While more research is needed, the impact of community champions on behaviour is promising, such as increased accessing of services, positive lifestyle changes and improved self-management of conditions such as diabetes.[9] In this article, we present a case study of a community programme using volunteer champions to show how trust and relationships were developed with parents.

CASE STUDY: BUILDING BABIES BRAINS

Run by the charity Action for Children in Devon Children's Centres, the programme's aim is to take evidence-based neuroscience, historically held by 'professionals', and make the information and associated parenting strategies accessible to parents within the community, using community champions to disseminate this knowledge as part of their everyday interactions. Champions, working across four diverse communities across Devon, were trained to 'bridge the gap' between parents and professionals by offering reassurance, building trust, disseminating messages and signposting to professionals if needed.


credit image to Action for Children

Action for Children commissioned the University of Exeter to complete interviews with 15 community champions. Ethical approval was obtained through Devon Children's Centres, and consent was sought from each participant prior to interview. Interviews explored community champion motivations and experiences in relation to training, support and dissemination of messages. Interviews were analysed thematically using a deductive approach.[10] This article will share core relational elements that led to improved peer-to-peer knowledge exchange.

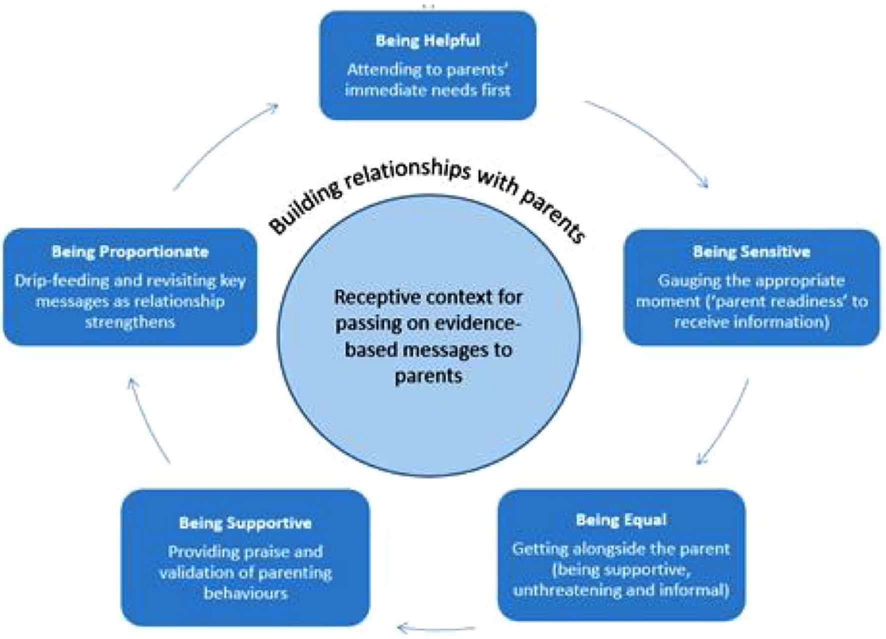
CREATING A RECEPTIVE CONTEXT FOR BUILDING TRUSTED RELATIONSHIPS

Champions described both successes and challenges in passing messages on in their community. In terms of successful experiences, champions described how their ability to pass messages on was supported by

Figure 1

Relational elements supporting peer-to-peer knowledge transfer

Source: Lloyd, Mitchell & Marks, 2020.



creating a receptive context which involved building relationships with parents through a series of phases: attending to the parents' immediate needs, gauging the right moment, getting alongside the parent, providing praise and validation, and revisiting (see Figure 1). The process of building relationships followed a similar pattern across champions. While some champions described instances of passing on messages to strangers, successful interactions were largely described as being set within the context of a friendly relationship in a setting where the parent could be revisited. Champions emphasised the importance of the relational aspect of their role, building and growing a network within which messages could be passed on.

Attending to immediate needs

Preparing the parent was seen as the first part of the process. Offering help was often used to initiate a relationship with a parent by attending to what's needed in the moment (e.g. providing practical help) and then waiting to revisit that individual on another occasion, after building the relationship further when they might be more receptive or more able to take on information.

'Gauging the moment'

Interactions were described as most challenging when family members offered conflicting and/or outdated advice and when approaching someone with a fixed mindset. Readiness to receive information was something mentioned by several champions as an important consideration when attempting to pass on messages to parents. In this situation, they acknowledged that sometimes other things needed to be attended to in the moment or that the parent simply was not yet ready and the focus needed to change to 'preparing the parent' and building a relationship.

Establishing a relationship with a parent prior to passing on knowledge was seen as key to successful interactions, although knowing exactly when to take the opportunity to 'share' was challenging. Champions described 'gauging the moment' and using non-verbal cues to inform their decision. Champions described a very gentle approach, testing the water to gauge parent receptiveness: *'You can always smile and say, "Hi", or, "Oh it looks like you are having a full-on day", or something and see how the waters lie. I mean, some people give off a very clear message that it isn't the right time to talk to them, they've got more than enough on their plate. So yes, I think you do have to gauge it'* (p. 19).

'Getting alongside'

In line with perceptions of the role of a community champion as bridging the gap between professionals and parents, champions described 'being alongside' the parent as an important strategy when they began to interact. This encompassed a variety of approaches including using empathy, qualifying statements, and being unthreatening and informal.

Offering empathy or sympathy were described as fundamental in terms of initiating a caring interaction; being sensitive to what the parent is struggling with, normalising it and getting alongside. Being supportive, unthreatening and interacting in an informal way was also highlighted as important for successful exchanges.

Champions stressed the importance of avoiding trying to 'rescue' people's parenting and ensuring that you could intervene without making the parent feel inadequate: *'If it's done appropriately, it's non-threatening, and it's just about that support really. It's very supportive, there's lots of information, but it's all supportive and none of it is critical, and I think that is really important'* (p. 1).

Praise and validation

Offering praise and validation was described as something which could help to cement and build relationships further. One champion described this as providing a *'magnifying glass to focus on the good stuff'* (p. 13).

> **Offering empathy or sympathy were described as fundamental in terms of initiating a caring interaction; being sensitive to what the parent is struggling with, normalising it and getting alongside**

Revisiting

A common approach was to drip feed information over time as the relationship was built. Settings that provided an opportunity for regular contact, such as a toddler group, were viewed as having the most potential for knowledge exchange. Not only do they provide opportunities to build on, repeat and reiterate key messages but also to strengthen relationships – essential for parent engagement.

CONCLUSION

In this article, we present what helped community champions share child development knowledge so that it was accepted and understood.

Champions described the importance of building trusting relationships through a series of phases to create the context in which messages could be successfully transferred. A relational approach was seen as key to success, particularly for those parents most in need of support. Further research is needed to explore the reach of these messages within a community and the extent to which they impact parent behaviour.

DECLARATION OF CONFLICTING INTERESTS

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SUPPLEMENTAL MATERIAL

Supplemental material for this article is available online.

References

1. UNICEF. *A systematic review of parenting programmes for young children*. New York: UNICEF, 2014.
2. Marmot M. Health equity in England: the Marmot review 10 years on. *BMJ* 2020;**368**:m693.
3. Chaudry A, Wimer C. Poverty is not just an indicator: the relationship between income, poverty, and child well-being. *Acad Pediatr* 2016;**16**(3):S23–9.
4. Berry V, Melendez-Torres GJ, Axford N *et al*. Does social and economic disadvantage predict lower engagement with parenting interventions? An integrative analysis using individual participant data. *Prevent Sci*. Epub 2022 July 23. DOI: 10.1007/s11121-022-01404-1.
5. Stansfield J, South J, Mapplethorpe T. What are the elements of a whole system approach to community-centred public health? A qualitative study with public health leaders in England's local authority areas. *BMJ Open* 2020;**10**(8):e036044.
6. Catt H, Waterson H, Ali O *et al*. Place-based approaches to reducing health inequalities: evaluation report. Public Health England, 2021. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1008132/PBA_final_evaluation_report.pdf
7. Royal Society for Public Health. Tackling health inequalities: the case for investment in the wider public health workforce. Report, Royal Society for Public Health, London, 2014.
8. Stone M, Slane D, Gardiner E *et al*. The power of trust and relationship in implementation: learning from the reaching out, Supporting families programme. Report, Centre for Effective Services, 2022.
9. Lofters A, Prakash V, Devotta K *et al*. The potential benefits of 'community champions' in the healthcare system. *Healthc Manage Forum*. Epub 2023 June 2. DOI: 10.1177/08404704231179911.
10. Clarke V, Braun V. Thematic analysis: a practical guide. *Thematic Anal* 2021;**22**: 132–5.

Addressing the elephant in the room: economic growth and the nation's poor health – changing the economy's goal for a healthier future

This opinion piece focuses on how in order to improve the nation's poor health, the government needs to place more value on social justice and wellbeing as well as the use of regulation to positively change culture and health behaviour.

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Life expectancy is stalling,[1] health inequalities are widening[2] and crises of obesity,[3] physical inactivity[4] and mental health are worsening in the UK.[5] Yet, there remains a reluctance by the government to discuss the threat of economic growth to health and wellbeing.

The government obsesses about growing the economy. They use the gross domestic product (GDP) – which tallies up the value of goods made and services provided over a period of time – to determine whether 'they are' making progress in this respect. But as Robert Kennedy[6] emphasised in his election speech over 50 years ago, 'it [GDP] measures everything in short, except that which makes life worthwhile'. It tells us nothing about the health of society.

For instance, what if GDP goes up because more people are consuming more ultra-processed foods more often, resulting in higher rates of obesity? What if GDP goes up because more people are purchasing larger cars and driving them more often instead of walking or cycling, resulting in higher rates of physical inactivity, air pollution and road-related deaths? What if GDP goes up because more people become alcohol dependent or take prescription drugs to deal with the psychological distress brought on by their precarious life? My point is: the economy may grow but what good is this if society becomes sicker?

Much of the preventive effort to tackle public health crises like obesity and mental health has been through the use of educational campaigns like the 'five a day' or the 'five steps to wellbeing'. These well-intentioned health messages compete against corporate advertising promoting junk foods[7] and materialistic values[8] – which nudge the publics' decision making in the opposite direction. When people are content with who they are and what they have, they do not feel the need to consume conspicuously. Advertising drives consumer demand by making people feel that they are missing something. Adverts distort our values and challenge our psychological needs. They promote status competition which drives social anxieties and nonessential material consumption.

To grow the economy each year requires goods to be manufactured faster and services to be delivered faster. Goods and services have to be consumed more often to meet supply and workers have to work faster or for longer. Not just to boost productivity, but to earn the money to meet their rising consumption patterns. Essentially, people need to live their lives faster. No matter what the cost to their health or the environment. One of the easiest ways to feel less stressed is to slow down but slowing down is not an option when the ultimate goal is to grow the economy. Slowing down is a cancer to capitalism.

Capitalism is deliberately destructive. It has to be to create the new tastes and new desires to boost consumption, spur on higher rates of production and achieve growth. But to achieve this requires constant innovation and new technology. The social costs of the drive for higher production can be seen in the workplace, with many workers either overworked, losing their jobs to more productive technology, or underemployed – engaged in precarious work.[9,10] 'Creative destruction', which is fundamental to capitalism, not only challenges people's psychological need for security,[11] it results in inequality and real hardship for millions.[12]

Capitalism's thirst for innovation takes the focus away from where it ought to be – solving long-standing societal challenges

What is more, capitalism's thirst for innovation takes the focus away from where it ought to be – solving long-standing societal

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challenges. In his 1943 seminal paper: *A Theory of Human Motivation*, Abraham Maslow[11] highlighted how human survival is dependent on satisfying basic needs: clean air and water, nutritious food and adequate shelter. Sure, progress has been made since the work of Maslow but the fact remains: every year millions of people die prematurely from exposure to dirty air and dirty water. Even in the UK – one of the richest nations on the planet – millions lack sufficient nutritious food and rely on food charity.[13] Millions do not have a stable, decent home, and thousands sleep rough.[14]

The government fixate on sticking plaster approaches to rectify the social and health costs of their growing economy. These treatment approaches are favoured because they align with short-term electoral cycles, vested commercial interests and capitalism's profit motive. Yet, the solution to poor health is to prevent it from happening in the first place. A long-term vision is needed. Poor health cannot be solved by medicine alone. It is social medicine that people need – proper conditions of life and proper food. Achieving health for all as outlined in the United Nations'[15] Sustainable Development Goals will take more than baking a bigger cake (i.e. world economy). It will depend on the slices of cake (i.e. wealth and resources) being shared more equally.

The government needs to ensure that everyone has the opportunity to be active, play, connect and feel safe in their community

Two policy actions could have a big impact on improving population health and wellbeing. The first involves reprogramming the economy by changing its goal.[16] Social justice and wellbeing have to be valued more than money. It is time to measure health and wellbeing indicators alongside economic targets.

The second involves regulation. Regulation is our country's most powerful mechanism to tame the impacts of capitalism and positively change culture and health behaviour at scale. Restricting corporate advertisements that challenge health and wellbeing is one option. Another option is to design our streets not for cars but people. Streets are for everyone. They are public spaces. The government needs to ensure that everyone has the opportunity to be active, play, connect and feel safe in their community.

The point of uneconomic growth has been reached – where the social costs of growth are outweighing production benefits. It is time for the Government to consider: what is the purpose of economic growth if millions of citizens still face destitution and do not achieve healthy lives?[2]

CONFLICT OF INTEREST

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References

1. Walsh D, McCartney G. *Changing Mortality Rates in Scotland and the UK: An Updated Summary*, 2023. Available online at: https://www.gcph.co.uk/assets/0000/9349/Changing_mortality_rates_in_Scotland_and_the_UK_-_an_updated_summary.pdf
2. Marmot M. *Health Inequalities, Lives Cut Short*, 2024. Available online at: https://www.instituteofhealthequity.org/resources-reports/health-inequalities-lives-cut-short
3. World Obesity Federation. *World Obesity Atlas*, 2023. Available online at: https://data.worldobesity.org/publications/?cat=19
4. World Health Organization. *Global Status Report on Physical Activity*, 2022. Available online at: https://www.who.int/teams/health-promotion/physical-activity/global-status-report-on-physical-activity-2022
5. GBD 2019 Mental Disorders Collaborators. Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *Lancet Psychiat* 2022;**9**:137–50.
6. Kennedy RF. *Remarks at the University Of Kansas, March 18, 1968*, 2023. Available online at: https://www.jfklibrary.org/learn/about-jfk/the-kennedy-family/robert-f-kennedy/robert-f-kennedy-speeches/remarks-at-the-university-of-kansas-march-18-1968
7. O'Dowd A. Spending on junk food advertising is nearly 30 times what government spends on promoting healthy eating. *BMJ* 2017;**359**:j4677.
8. Kasser T. Materialistic values and goals. *Annu Rev Psychol* 2016;**67**:489–514.
9. World Health Organization. *Long Working Hours Increasing Deaths From Heart Disease and Stroke: WHO, ILO*, 2021. Available online at: https://www.who.int/news/item/17-05-2021-long-working-hours-increasing-deaths-from-heart-disease-and-stroke-who-ilo
10. Benach J, Vives A, Amable M *et al*. Precarious employment: understanding an emerging social determinant of health. *Annu Rev Public Health* 2014;**35**:229–53.
11. Maslow AH. A theory of human motivation. *Psychol Rev* 1943;**50**(4):370–96.
12. Blundell R, Jaravel X, Toivanen O. Inequality and *Creative Destruction*, 2022. Available online at: https://ifs.org.uk/publications/inequality-and-creative-destruction
13. The Trussell Trust. *Hunger in the UK*, 2023. Available online at: https://www.trusselltrust.org/wp-content/uploads/sites/2/2023/08/2023-The-Trussell-Trust-Hunger-in-the-UK-report-web-updated-10Aug23.pdf
14. Office for National Statistics. *'Hidden' Homelessness in the UK: Evidence Review*, 2023. Available online at: https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/hiddenhomelessnessintheukevidencereview/2023-03-29
15. United Nations. *The 17 Goals*, 2023. Available online at: https://sdgs.un.org/goals
16. Noonan R. *Capitalism, Health and Wellbeing: Rethinking Economic Growth for a Healthier, Sustainable Future*, 2024. Available online at: https://books.emeraldinsight.com/book/detail/capitalism-health-and-wellbeing/?k=9781837978984

Challenges of determining the relative contribution of determinants of health on population health: a Canadian perspective

This article investigates the source of frequently cited data regarding the relative contribution of determinants of health to population health in Canada. It critically discusses the imperative for such national or regional data in policymaking, and the challenges and limitations of this approach.

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The use of evidence in public health decision-making is intended to increase the likelihood of achieving better health outcomes and reducing unintended negative consequences on health. The currency of evidence is also critical because constructs and indicators can change over time. Using outdated or inaccurate information can lead to inappropriate or ineffective interventions, exacerbating the situation. Previously, it has been found that errors in the literature can be perpetuated over time.[1] Therefore, critical appraisal and periodic review of evidence are essential to ensure that public health decisions are informed by timely and reliable evidence.

The COVID-19 pandemic has highlighted the importance of relying on current evidence in making public health decisions. For instance, it has been observed that Black communities have been disproportionately affected by COVID-19. In Canada, COVID-19-related mortality among Black people was 2.2 times higher than that of White and non-Indigenous people.[2] In addition, individuals from Black communities exhibited a lower vaccination rate (56.4%) compared to non-visible minority individuals (77.7%) and the South Asian population (82.5%).[3] In response, public health agencies have taken steps to encourage vaccination in Black communities.[4] However, recent evidence showed that vaccine hesitancy in Black communities stems from mistrust and structural racism, beyond just misinformation or health literacy gaps.[5]

Recently, we investigated the source of frequently cited estimates regarding the relative contribution of determinants of health on Canadians' health. The estimates show that health in Canada is affected by social determinants of health (50%), healthcare (25%), biology (15%), and the environment (10%).[6] These estimates have been cited broadly in the international public health community and used in many presentations, theses, manuscripts,[7–9] reports,[6,10–12] and World Health Organization documents.[13] Several of these documents cited a 2012 document from the Canadian Institute of Advanced Research (CIAR),[7,9,13] a Canadian Medical Association report from 2013,[8] a report from a Canadian Senate committee from 2008,[11] and a CIAR document from 2002.[10] The oldest document we discovered contained estimates published in 2001 and referred to a CIAR document.[6] Despite further investigation, we could not locate any document authored by CIAR containing these estimates and could not find information on the methodology for estimate calculations. Given the lack of transparency in sources and methods, we believe these estimates should no longer be cited or used as a source of evidence.

Estimates show that health in Canada is affected by social determinants of health (50%), healthcare (25%), biology (15%), and the environment (10%)

Addressing the absence of national estimates, exploring estimates of the relative contribution of determinants of health from other countries could seem

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to be a viable approach. Nonetheless, there is a scarcity of publications that delve into the relative impact of determinants of health on overarching health outcomes despite existing literature highlighting the significance of individual determinants of health.[14] Even if an estimate were available, numerous challenges would still need to be navigated. First, the context of countries, such as their healthcare system structure and funding, differs, making it difficult to compare the contribution of healthcare to overall population health. Second, there are variations in the understanding of determinants of health and different categories of social determinants of health are defined differently in published reports. Third, the specific measures or indicators used within each category of determinants of health can vary significantly.[15] That said, adopting the estimates of the relative contribution of determinants of health on health from another nation is not feasible.

Furthermore, additional complexities exist in relation to the use of a numerical estimate of the effect of determinants of health on health. Nonetheless, a more nuanced understanding of the determinants of health acknowledges that health is a product of multiple factors that interact in dynamic ways. An intersectional approach considers the interaction between various social identities and their associated determinants. It highlights the need to address the interconnected nature of social inequalities to achieve meaningful improvements in public health and health equity. This perspective challenges the idea of partitioning health outcomes and attributing them to a single determinant. Instead, it acknowledges that health disparities and outcomes emerge from a web of interconnected factors within a larger societal context.[16]

Intersectionality emphasizes that individuals have multiple social identities (e.g. race, gender, class, and sexuality) that intersect and interact to shape their experiences and opportunities. Each of these identities can impact health outcomes independently and in combination with others (e.g. being Black, a woman and transgender) with complex interactions which can also be cumulative.[17] The impact of determinants can change over time and in different contexts. What affects one's health at a particular point in life or in a place may differ from other times and places. An intersectoral approach provides a more holistic understanding of health disparities by recognizing that inequities result from systemic and structural factors.

Understanding the relative contribution of determinants of health on overall health outcomes is essential for informing public health policies and interventions across diverse populations and contexts

Despite the limitations of the data and methods, understanding the relative contribution of determinants of health on overall health outcomes is essential for informing public health policies and interventions across diverse populations and contexts. While there are commonalities in the determinants that influence health outcomes globally, the specific contributions of each determinant can vary significantly based on social, economic, cultural, environmental, and healthcare factors unique to each country or region. Knowing which determinants of health have the most significant impact on health outcomes can help prioritize and allocate resources for the most effective interventions to improve health.[18] Such a model satisfies policymakers' need for benchmarks for prioritization and measuring progression toward defined goals.

Overall, the social determinants of the health framework remains relevant to how we conceptualize fairness and health.[19] To enable action, we advocate for a comprehensive understanding of the relative contribution of determinants of health to broad health outcomes, specific to a country or region. This understanding can enable the development of effective interventions, resource allocation, and reducing health disparities. At the same time, it is essential to acknowledge the limitations of this approach. As George Box described, 'all models are wrong, some are useful'.[20]

AUTHOR CONTRIBUTIONS

M.A. and J.H. contributed to conceptualizing the work, M.A. in the data acquisition, M.A. drafted the manuscript, and M.A. and J.H. revised the paper.

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AVAILABILITY OF DATA AND MATERIAL

This is an investigation of published documents thus data are available online.

References

1. Mogull SA. Accuracy of cited 'facts' in medical research articles: a review of study methodology and recalculation of quotation error rate. *PLoS ONE* 2017;**12**(9):e0184727.
2. Gupta S, Aitken N. *COVID-19 mortality among racialized populations in Canada and its association with income*. Ottawa, ON, Canada: Statistics Canada = Statistique Canada; 2022.
3. Statistics_Canada. *COVID-19 vaccine willingness among Canadian population groups*, 2021. Available online at: https://www150.statcan.gc.ca/n1/pub/45-28-

0001/2021001/article/00011-eng.htm

4. Cenat JM, Noorishad PG, Bakombo SM *et al*. A systematic review on vaccine hesitancy in Black Communities in Canada: critical issues and research failures. *Vaccines (Basel)* 2022;**10**(11):1937.
5. Eissa A, Lofters A, Akor N *et al*. Increasing SARS-CoV-2 vaccination rates among Black people in Canada. *CMAJ* 2021;**193**(31):E1220–1.
6. Kirby MJL, LeBreton M. Interim report on the state of health care system in Canada: the health of Canadians – the federal role. In: *The story so far*, **vol. 1**. Available online at: https://publications.gc.ca/Collection/YC17-371-1-01E.pdf (2001, last accessed 6 October 2023).
7. Donkin A, Goldblatt P, Allen J *et al*. Global action on the social determinants of health. *BMJ Glob Health* 2018;**3**(suppl. 1):e000603.
8. Hunter K, Thomson B. A scoping review of social determinants of health curricula in post-graduate medical education. *Can Med Educ J* 2019;**10**(3):e61–71.
9. Marmot M, Allen JJ. Social determinants of health equity. *Am J Public Health* 2014;**104**(suppl. 4):S517–9.
10. The_Parliamentary_Under_Secretary_of_State_for_Public_Health_and_Primary_Care. Advancing our health: prevention in the 2020s – consultation document. Available online at: https://www.gov.uk/government/consultations/advancing-our-health-prevention-in-the-2020s/advancing-our-health-prevention-in-the-2020s-consultation-document#fn:31 (2019, accessed 6 October 2023).
11. CMA. Health care in Canada, What makes us sick? Canadian Medical Association Town Hall report, July 2013. Available online at: https://live-cma-ca.pantheonsite.io/sites/default/files/pdf/Activities/What-makes-us-sick_en.pdf
12. Keon WJ, Lucie P. A healthy, productive canada: a determinant of health approach. The Standing Senate Committee on Social Affairs, Science and Technology, final report of Senate Subcommittee on Population Health. Available online at: https://sencanada.ca/content/sen/Committee/402/popu/rep/rephealthjun09-e.pdf (2009, accessed 15 September 2023).
13. WHO_team. Social determinants of health, module 1 (part 2): the determinants of health. In: *Health in All Policies (HiAP) training slides: companion material to support HiAP training activities*. Available online at: https://cdn.who.int/media/docs/default-source/documents/social-determinants-of-health/hiap-ppt-module-1-part-2.pptx?sfvrsn=56a92e43_52
14. McGovern L, Miller G, Hughes-Cromwick P. The relative contribution of multiple determinants to health. *Health Affairs Health Policy* Brief, 21 August 2014, p. 10.
15. Booske B, Athens J, Kindig D *et al*. *County Health Rankings working paper: different perspectives for assigning weights to determinants of health*. Madison, WI: University of Wisconsin, Population Health Institute; 2010.
16. Hankivsky O, Christoffersen A. Intersectionality and the determinants of health: a Canadian perspective. *Crit Public Health* 2008;**18**(3):271–83.
17. Harris A, Leonardo Z. Intersectionality, race-gender subordination, and education. *Rev Res Educ* 2018;**42**(1):1–27.
18. Marmot M. Public health and health inequalities: a half century of personal involvement. *J Public Health* 2022;**44**(suppl. 1):i23–7.
19. Frank J, Abel T, Campostrini S *et al*. The social determinants of health: time to re-think? *Int J Environ Res Public Health* 2020;**17**(16):5856.
20. Box G. All models are wrong, but some are useful. *Robust Stat* 1979;**202**(1979):549.

Addressing health inequalities in times of austerity: implementation of a place-based approach in multitiered local government

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Keywords

place-based; asset-based; realist theory; inequalities; system-change

Abstract

Aims: This article focuses on how local authorities in England are tackling wider determinants of health and inequalities in their population's outcomes while budgets for public services are diminishing.

Methods: It reports the experience from one case study engaged in rolling out a devolved, place- and asset-based strategy over multiple tiers of local government. Relating these findings to relevant social theory, we draw out aspects of context and mechanisms of change. We offer plausible hypotheses for the experiences observed, which supports transferability and implementation of place-based strategies in other local authority areas struggling with similar challenges.

Results: Findings highlight the importance of high-level and political buy-in, as well as the role of the COVID-19 pandemic as a potential catalyst to rollout. Creating the foundations for a new, place-based working was important for achieving coherence among partners around what local government was trying to achieve. These included investment in infrastructure, both relational and tangible inputs such as organisational and human resources, to establish the conditions for systemic change towards early intervention and prevention.

Conclusion: This study identified clear foundations for place-based action, plus enablers and barriers to significant transformation of practice towards asset-based approaches between local authorities, partners and the public.

INTRODUCTION

Many English Local Authorities (LAs) have adopted place-based strategies to tackle wider determinants and health inequalities in recent years. Several factors limit the potential for effective action, particularly limited resources, with LAs operating under increased financial constraints and uncertainty,[1–3] compounded by lack of evidence on the most effective allocation of resources.

A resilience-building strategy (henceforth the Strategy) is strongly grounded in asset-based approaches (ABAs), including Asset-Based Community Development (ABCD),[4,5] whose rationale includes the potential to mediate spatial inequalities. Several have sprung up across England (and globally) in recent years.[6–8] ABAs take a 'strengths-based' rather than 'deficit' approach to health, building on resources available within local communities, with

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central concepts including the empowerment of marginalised groups, community capacity, connectedness, and social capital.[9–11] Nonetheless, as popularity has grown, they have also come in for criticism, particularly for a lack of attention to power and equity.[12,13]

This article aims to share insights on how one LA developed a place-based strategy to tackling poverty and health inequalities, since in the United Kingdom 'Most LAs are embracing community-centred ways of working'.[14] It recognises the legitimacy of such criticisms as well as the importance of scholarship and reflective practice in resolving implementation weaknesses, to bring about meaningful change within a context of constrained public finances.[14–16] The Strategy began in 2018 as a partnership between component upper tier and 5 lower tier LAs to transform service delivery towards objectives of being: people-centred, place-based and solutions-focussed,[17] and comprised the following key elements: decentralising and building place-based partnership working; focusing on community engagement; identifying assets and local priorities; investing in new staff roles; working closely with communities; and supporting local action.

The estimated population was 653,537 (2019), characterised by a slightly higher proportion of older adults aged over 65 and ethnically less diverse than the national average (92.6% white vs 85.4%). Geographical 'pockets' consistently had considerably poorer health and wellbeing outcomes than the majority of the LA population, sometimes worse also than national averages, most notably a largely rural District and the main city centres, aligning with priorities for tackling spatial health inequalities.

AIMS AND OBJECTIVES

This was a realist-informed study of the early implementation of the strategy. The study began in late 2019 and continued 'light touch' during the global pandemic (2020), picked up in 2021 (pandemic recovery), and completed in early 2022.[18] At this time, key concepts had been introduced to link across, and to better connect, the upper and lower tiers. Some community engagement had been initiated and a core team of place-based staff were being recruited (one coordinator and up to two 'community connectors' per District). When the COVID-19 pandemic hit, the strategy workforce was redeployed to outbreak management and support to communities. The study sought to make the theory and change mechanisms underpinning the pathway between strategy implementation and impact on wider determinants of health explicit, while drawing out evidence of change, contextual barriers and enablers, emergent practice, and transferable learning.

The questions we aimed to answer were as follows:

1. How does this place-based strategy intend to address public heath priorities while operating within constrained budgets? (What is the underlying hypothesis?)
2. What can we learn from those professionally engaged in the strategy about the mechanisms of change to support future implementation and generate positive public health outcomes?

METHODS

Two stages of data collection took place (Figure 1):

1. Review of documentary evidence and population health data.
2. Interviews with key stakeholders.

Stage 1 focused on the origins of the strategy, uncovering the underlying theoretical basis adopted, plus key features of context in terms of population health, wider determinants and inequalities. The resulting overview steered selection of informants for stage 2 and guides for discussion. Stage 2 data collection began at the strategic level of LA decision-making and followed its implementation over the study period.

Fieldwork

From April 2021 to February 2022, 15 online interviews were recorded with the LA's strategic leads and strategy staff, followed by staff working directly in local communities for other organisations.

Analysis

In keeping with realist analysis, we developed and refined programme theories detailing Context, Mechanism (resource and response), Outcome configurations.[19] Applying Wiltshire's approach to identifying data themes,[20] we examined the change pathways and mechanisms leveraged through the strategy, additionally identifying barriers and facilitators in the operating context.[21] Documentary analysis focused on identifying Initial Programme Theories (IPTs), that is initial thoughts, formulated in programme theories, about how the strategy may be leading to desired outcomes in this particular context. Those were tested and refined through the phase 2 interviews. Interviews were deductively coded to a Nvivo framework intended to test and refine the IPTs developed in phase 1, followed by inductive reasoning to generate alternative or more nuanced explanations. We then identified plausible connections and theories with greater explanatory potential to support learning and transferability.[21] Five interviews were double-coded, with all interviews sense-checked according to a sample of coding nodes.

RESULTS

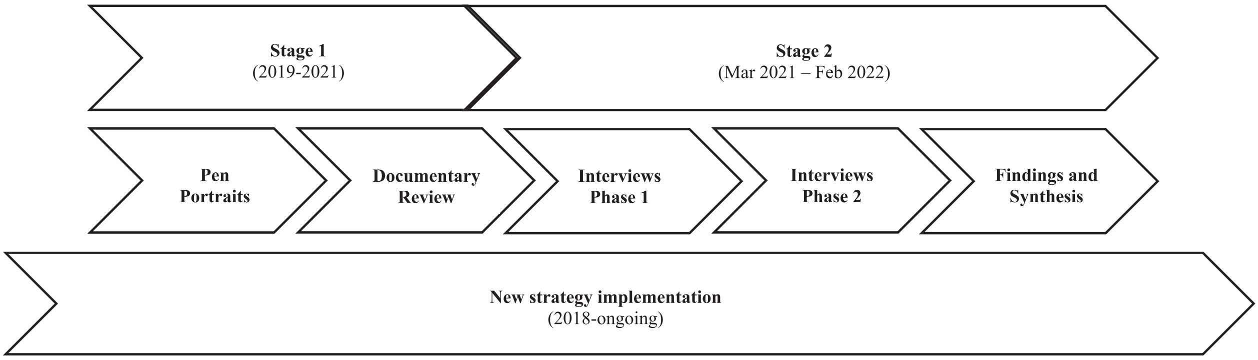
Foundations for change

Interviews indicated an evolution of place-based working over time, involving LA staff with 'community' portfolios, community-engagement teams and public health, in different community-focused pilots.[22,23] Concurrent to the strategy rollout, 21 Primary Care Networks (PCNs) and 7 Integrated Neighbourhood Teams (bringing together health, social and community care professionals) were also developing to facilitate the development of locally responsive integrated care to address wider health and wellbeing issues.

A consensus emerged among participants that the LA needed to change the way it worked, against a backdrop of inequalities, growing need among residents, and financial

Figure 1

Study process



constraints threatening service cuts and rising thresholds of access to care. The LA narrative also reflected ideas of enabling people to do more for themselves. A central tenet was the move to a more proactive approach, enabling the support of people 'prethreshold' before they need more costly services. One LA participant described the challenge as finding,

> *'the most appropriate and most local way of delivering services and addressing social immobility and inequality'* (Interviewee 1).

This change was primarily represented by a shift from an acute, demand-driven approach to service provision to a decentralised, placed-based *preventive* approach, focusing on the strengths and 'assets' present in communities. While the strategy articulated broad outcomes, such as 'resilience', and service avoidance or delay, specific population health goals were largely absent, although broad priority areas were later identified (e.g. food security, older adult services).

A strategy of resilience building

Outcomes typically anticipated through adoption of ABAs are thought to arise as a result of better mobilisation of assets and community engagement, as illustrated in the theory of change (Figure 2) adapted from Blickem et al.[24]

The Strategy was insufficiently mature to capture even intermediate population health outcomes within the study period, just as the 'Wigan Deal' and 'Compassionate Frome' models that inspired it only started reporting public health impact a decade after their introduction.[25–27] Participants expected this,

> *You really need a decade, especially when you are trying to do work that's around prevention and trying to show that actually if you do things well at a community and place-based level then people won't need help [. . .] it's going to come big and bold in a decade or two decades or three decades.* (Interviewee 3)

That said, strong themes emerged that reflected important aspects of upstream organisational change and partnership working: triggers in the operating context; shared narrative; new ways of working, joint working and relational infrastructure; trust and relationships; physical and operational infrastructure. We explore these themes below, illustrating the process of shifting to place-based action on health and wellbeing and translation of theory into practice alongside evidence of any intermediate outcomes associated with introducing the Strategy.

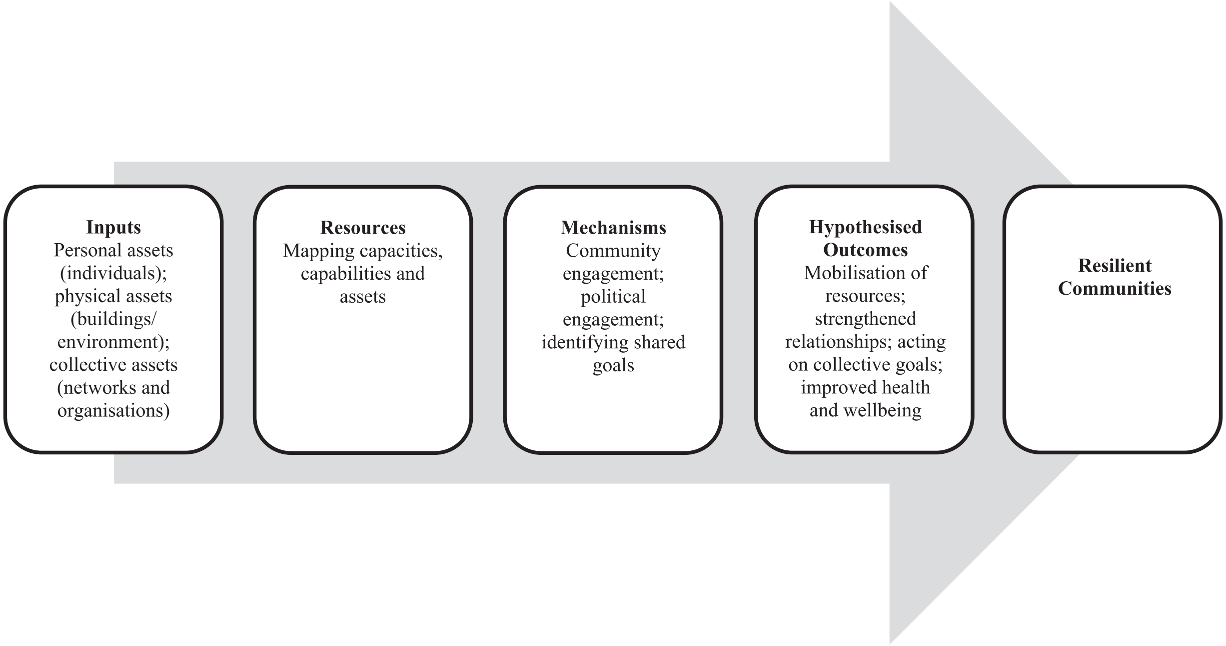
Enablers or 'triggers' in the operating context

The Strategy gained momentum during COVID-19 which catalysed its implementation countywide. '*Covid was the thing that turbocharged that way of working*' (Interviewee 1). The Strategy was indeed effectively adopted as the blueprint for localised response during the pandemic. An example of this was local 'COVID hubs', established to coordinate place-based support to vulnerable community members: '*It's helped the organisation and our partners recognise the value of taking a very place-based, person-centred approach to delivery. We've almost embedded [the Strategy] in our pandemic response*' (Interviewee 4).

Senior LA management interviewees described the Strategy as a hopeful vehicle for 'systemic change', but one that prior to the pandemic had been difficult for key personnel to envisage. Being able to demonstrate its worth was highly valued by those charged with implementation: '. . . *trying to explain to people what we actually do is quite hard and we talk about using your local assets, using your strengths, making the connections, working together or whatever. People don't always understand the value in that*' (Interviewee 7). As such, the LA's pandemic response seemed to provide a 'win' for the Strategy, building trust between the LA, partners and residents. The LA was able to publicise several examples of its resident partnerships minimising COVID's negative impacts (e.g. at a conference of lowest tier local government and third sector partners).

Figure 2

Theory of change for ABCD and improvement of public health outcomes



Opportunities for local groups to ‘test out’ ideas to meet locally identified challenges was attributed to the relaxing of criteria for small grant funding during this time, overcoming scepticism that the Strategy was simply a ‘cost-cutting exercise’: ‘*We were more responsive and there was money that could be accessed relatively easily without going through 25 million procedures*’ (Interviewee 3).

While the speed of the ‘COVID response’ rollout offered benefits, there were drawbacks too, not least concerns that the Strategy was conflated with it:

> *. . . I think we have gone a bit kind of cart before horse in a way. Because Covid happened and so then we kind of were doing [the Strategy] or doing what that looked like without actually having travelled the journey with people.* (Interviewee 1)

Shared narrative

We identified a shared narrative around needing to shift from deficit-based descriptions of communities to one of community strengths, empowering residents to mobilise assets and build resilience:

> *We definitely have a brand in [name of LA] (which is . . .) And that kind of puts the hooks for people, residents into ‘What is all this [the Strategy] malarkey then, what does it mean for us on the ground?’* (Interviewee 1)

Stakeholders across the system agreed with the intent to work in an ‘asset-based way’. Yet, although interviewees described features of ABCD as core Strategy components, *beyond* top tier LA staff there was little consensus around terminology. Three narratives emerged among the middle tier (local authority) and ground-level (non-LA) staff: the Strategy is: (1) well understood and familiar; (2) a catchy new label or shorthand for ‘*old-fashioned community development*’ and (3) lacks meaning, especially among non-statutory community workers and community groups.

Nevertheless, consultations with delivery partners helped them understand the aims and processes of the Strategy, to theoretically get people ‘on-board’:

> *The key is that partners on the ground know what [the Strategy] is . . . There’s probably 50% of people that I talk to as partners, so other organisations, Local Authorities, charities, third sector partners that would understand what [the Strategy] is.* (Interviewee 12)

Another commented: ‘*I think that [the Strategy] as an approach has evolved to a point where it is no longer owned by one organisation*’ (Interviewee 1).

However, a senior leader reflected that although the LA Strategy ‘team’ had it ‘*completely embedded in our psyche, the way we operate, the way we talk*’ (Interviewee 15), it was not fully embedded organisationally, perhaps an unexpected consequence of prioritising engagement with external partners. Another concern was that it would become solely associated with the team whose roles were ‘badged’ as part of the Strategy.

New relational infrastructure

The Strategy was described by interviewees as a way of working that united people, creating a *network* of people and support. It was also had an *enabling* role, hearing where the 'energy' was in communities and working with that, marking a change in the *culture* of the LA, from service delivery to facilitation, connection and coordination. Buyin at the highest political and administrative level was seen as significant to change:

> *What we have got now is complete political backing from the leader of both [name of city and area local governments] and also from the Chief Executive down through Corporate Executive and Service Directors, which is something that we haven't had before.* (Interviewee 13)

This new way of working bridged different tiers of local government and communities. The introduction of a 'Place Coordinator' role alongside 'Community Connectors' for each (lower tier local government) area was critical. One described their responsibilities as '*Going at this from a completely different angle … Bringing partners together at quite an organisational level, … service delivery level, we tend to be working with our five primary care networks in the area*' (Interviewee 2).

This was complemented by the grass roots engagement function: '*I've got two engagement workers which … get involved in that nitty-gritty detail and feed up the chain to make those changes on the ground*' (Interviewee 8). The narrative of 'bringing people together', 'building bridges' and 'fostering relationships' was consistent throughout the data.

The success of these roles was not taken as given, however, and we identify critical mechanisms of change as including taking *time* to discover, understand, learn, to establish *trust* and intervene where of value, not for the sake of it:

> *My role is to go out there and meet people . . . And to start with I think it's building up the trust as well, getting to know community leaders, community centres, etc., find out what they're doing . . . Trust is really important.* (Interviewee 7)

Role modelling by LA staff, for example, from tackling 'what is wrong' in communities to identifying strengths and actions to build on, was seen as important: '*I suppose to try and help us to not work in the same way (as we always did) from a county perspective, but also to lead on the practical application of [the Strategy]*' (Interviewee 1).

Some non-statutory sector community workers suggested some duplication of roles had emerged, however, with cross-sectoral engagement not always running as deep as intended: '*I would like to see … some of the county council's senior staff who are managing this project come and talk to the other organisations that are out here every day doing what they do … Because nobody ever asks us*' (Interviewee 14).

Complimentary interaction with what already existed nevertheless emerged as a strong theme among LA staff. Several accounts reported informal 'asset-mapping' by the Community Connectors alongside residents or community groups, as well as LA staff encouraging residents to work together and build on identified assets – fundamental elements of ABCD in practice.

Trust and relationships

The importance of trust and relationships was a key theme: '*Community development is a long-term process of building trust and relationships*' (Interviewee 11). An initiative seen as a precursor to the Strategy was cited to illustrate how relationships had improved over time:

> *This is when it all started, we were keen to do things for our community on a health and well-being side full stop, and [name of initiative] was the first thing on that. And we had a big community meeting . . . so we could all work together, but they didn't see it like that . . . 10 years down the line the two particular people I remember walking out are actually members of the [name of initiative] now* (Interviewee 5).

Informal communications were influential: '*A lot of that happens away from the meetings, it's just emails, conversations, walking around together … things kind of trickle out of it, but we've formed those relationships, people know the other people working in the area*' (Interviewee 2).

The creation of specific roles, such as Community Connectors, may be crucial to building social capital and capacity: '*And to start with I think it's building up the trust as well, getting to know kind of community leaders, community centres, etc., … because it's a small city everyone kind of knows everybody else*' (Interviewee 7).

Nonetheless, a legacy of distrust in local government still festered in some areas, with lingering scepticism whether the Strategy's public consultations had *really* incorporated community concerns: '*It comes across as a tick-box exercise so it can be said that community groups were spoken to when, in reality, the issues that matter to the community groups were not taken into account*' (Interviewee 4).

There was also wariness among some community group leaders, who cited examples of historic community initiatives (e.g. skill-based youth services, funding for local voluntary/community groups), which were not sustained because of budget cuts. Any optimism about empowering community initiatives was tempered by such experience of past disappointments: '*There was an improving neighbourhood scheme in X and … then the government changed and that whole team was disbanded … it's frustrating … the emphasis needs to be on sustainability*' (Interviewee 8).

Indeed, there was a recognition that progress made did not guarantee the embedding of the Strategy, and fear that some relational gains would be lost postpandemic. One interviewee suggested operations were 'slowly slipping back' to pre-pandemic modes.

Physical and operational infrastructure

Libraries were considered 'physical assets' representing locally anchored organisations that offer opportunities for residents to meet and access resources. Similarly, the concurrent use of physical buildings for problem-solving and collective action alongside 'virtual' spaces (during COVID lockdowns) was pragmatic solutions to shifting to place-based action.

Stakeholders were further engaged by the establishment of multiagency working groups to be rapidly deployed as required. While an LA-wide group predated the pandemic, some supportive local networks developed as part of the COVID response were seen as a 'vital space' for people to come together (possibly helping to build trust):

> *One of the things that was set up very early . . . is our Local Connect Group . . . in the start of the pandemic it was meeting, I think, weekly . . . it normally has about 40 or so agencies represented . . . It brings together different parts of the public sector, our community faith leaders, voluntary sector leaders, various people from all over, adult social care colleagues.* (Interviewee 4)

A variety of small grant funding sources for local groups were cited as key to success – some time-limited opportunities launched during the pandemic, others more established programmes of community funding: '*We work with the community, we run the [name of project] and that supports new community groups … In the last five years we've supported 104 new community groups to get started*' (Interviewee 14).

One programme of small grant funding is closely aligned with the Strategy's intent to stimulate local action. An interviewee saw this as vital to building capacity in a locality otherwise deemed under-resourced:

> *The only thing that we have responsibility for within the [locality primary care grouping] from an integrated neighbourhood point of view is the [name of fund]. So we've had two years of some money to develop innovation . . . we know that [locality name] CVS [Community and Voluntary Sector] doesn't get the same kind of resources as . . . other organisations do.* (Interviewee 9)

While the Strategy was also able to offer small support, their ultimate goal was still seen by some as to discourage reliance on the statutory sector and public funding. It was '*more about helping people in the community to access sources of funds, but also use their own resources a lot more, either individually or by coming together, by making connections*' (Interviewee 7).

A key contextual factor is the recent intensity of housing development across the area, including a 'new town'. Such activity can generate funding at local government's lowest tier, with developers required to partially repay the community to mitigate against negative impacts. In some cases, local government harnessed that funding to build community facilities:

> *So that's why [name of neighbourhood] is a bit different, because it does have this big pot of money that it can spend on community-led action, it can do some preventative and intervention work and it's absolutely unique and amazing to have that much money to do this sort of thing.* (Interviewee 2)

Yet this meant there was no level playing field between new and established communities: 'Then it would be more of a case of using the goodwill that's within the community itself' (Interviewee 2).

DISCUSSION

This study sought to understand how an LA place-based strategy responded to increasingly constrained budgets. The key components of ABAs are collaborative and partnership working, through which community strengths and resources are identified, developed and mobilised so that communities can be more self-supporting, avoiding more costly interventions.

Much evidence around the mobilisation of resources was understandably dominated by responding to a global pandemic. Nonetheless, clear themes likely to be strongly influential to the Strategy's implementation under 'normal' circumstances were still apparent. These are presented in the form of realist programme theories in Table 1.

Several interviewees highlighted the importance of senior-level commitment and significant resource investments in the Strategy (Table 1 PT1, CPTa and b). These include innovations described in PT3, CPTa: new roles and physical/virtual spaces to connect, communicate strategic rationale and share knowledge about resources and communities. According to Dart,[28] all moves towards engaging communities are indications of systemic change.

There are warning signs, however, shown by our observations of unexpected outcomes. One explanation suggests that where new roles are perceived as unnecessary duplication of existing posts (in another sector), the expected response is not activated, perhaps due to inattention to context, generating negative responses among community partners (PT3, CPTb). Similarly, there was lack of coherence about understanding of the Strategy across the patch, possibly due to its conflation with the pandemic response. Any lack of 'brand' understanding could cause difficulties in mobilising partners to act collectively.

Another flag is raised if investment is only committed to short-term to staff who act as enablers and facilitators of support and services. If they are indeed the 'glue' that brings the system's different parts together, they may also be foundational in the long-term. The shared experiences of short-termism in initiatives and funding underlines the importance of not fuelling any further disappointment or mistrust among community partners and reinforcing power imbalances.

Broader sociological theories associated with ABCD such as social capital, social networks, reciprocity, mutual aid,[29–31] and community resilience were clearly associated with the Strategy.[32] Hence, the 'difference made'

Table 1

Programme theory areas and component programme theories.

Programme theory area	Component PTa	Component PTb
PT 1: Area wide transformation to focus on prevention. In a context of increasing demand and limited resources, the LA introduces a strategy (resource mechanism) focused on building local strengths to foster system resilience (response mechanism) to increase self-reliance and reduce dependence on services (outcome)	**Investment in organisational infrastructure** The activation of investment in a new strategy (context) via creation of new roles at the District and community level (resource mechanism) formalised the focus on community assets (response mechanism) to facilitate the engagement and mobilisation of different actors and their resources to act collectively towards a common goal (outcome)	**Importance of high level buyin** In a context of collaborative working, senior level buyin and commitment from LA (resource mechanism) not yet replicated amongst other key system partners (response mechanism) is limited in ability to facilitate collaborative working (outcome)
PT2: Place-based working In a context of limited resources and increasing demand, a shared vision for partners coming together, pooling resources and working together (resource mechanism), means gaps can be minimised, duplication avoided and preventive work developed (response mechanism) to support local people to stay well and be supported when needed, further building community capacity (outcome)	**Shared focus and narrative** In a context of emergency response (pandemic context), shared focus between services (resource mechanism) enabled the aligning of priorities thanks to a sense of trust and common aims (response mechanism), resulting in meeting of urgent population need (outcome 1) and heightened understanding of community need (outcome 2)	**Importance of relational infrastructure** In localities with some foundations for place-based working (context), the time dedicated through the creation of new roles (resource mechanism) facilitates further connections to be made (response mechanism) supporting new ways of working (outcome)
PT3: Cultural shift A commitment to change at high level (context) enabled the Strategy (resource mechanism) to develop a shared vision (response mechanism), giving staff the impetus to best meet needs within their localities (outcome)	**New ways of working** The formalisation and widely shared commitment to a place-based strategy (context) enabled an investment in infrastructure (resource mechanism) facilitating innovative working on the ground (response mechanism), resulting in the development of bespoke place-based solutions (outcome)	**Collaboration** The infrastructure investment unlocked by the strategy (context) enabled the creation of new roles (resource mechanism), which are complimentary to other, pre-existing roles (response mechanism) in order to foster effective collaboration (outcome)

PT: Programme theory; LA: Local Authority.

by the Strategy was commonly articulated in ways allied to concepts associated with theory, rather than those easily quantifiable as 'public health outcomes' (e.g. increased collaborative working, community capacity, stronger relationships, trust). However, this lack of 'hard' evidence for reduction of health inequalities rather reinforces the criticism of ABAs as driven by austerity policies rather than true commitment to community empowerment – their promotion actively masking inherent power imbalance between relatively richer and poorer groups in society.[12,14]

Normalisation Process Theory (NPT) offered additional explanatory power when applied to the themes identified from our analysis.[33] Mechanisms central to building the coherence that is a vital first stage in NPT can be seen as strongly related to factors associated with establishing better partnership working at system level. The 'relational architecture' identified (PT2) provided important resources for generating trust and shared values, vital to addressing need and tailoring local responses. Mechanisms such as a shared agenda, joined-up working and investment in community capacity were also deemed important enablers to place-based working in the Clear Horizons framework.[28] Our findings and analysis equally resonate with a recent realist study of health alliances, delivering joint goals with a 'whole system' focus.[34]

In terms of context, we highlight the importance of what Mancini and Bowen[32] term 'community antecedents' for developing community resilience. The legacy of joint working in one particular locality within the LA was supported by both significant time and resource investment (PT2). The theme of a 'new way of working' often recurred, drawing parallels with the 'cognitive participation' stage of NPT and the 'cultural shift' considered a key mechanism in transforming service delivery (PT3).[35] The shared vision, values and development of trusted relationships are representative of this culture change, in turn facilitating 'collective action' and timely decision-making. Analysis of Community-Based Participatory Research (CBPR) partnerships supports this finding.[36]

Although there has been a 'ripple effect' of trust among system partners that may contribute to 'sustaining collaborative efforts towards health improvement',[36] the relational infrastructure alone is insufficient to embed the strategy. Tailored investment that responds to existing resources, as well as gaps in context and community antecedents, is likely to be essential to underpinning new ways of working and truly empowering communities. Evidence on local contextual characteristics of importance are specifically lacking in the current evidence base on place-based approaches.[37]

The importance of this will remain as long as devolution remains significant to health and public service delivery. Our analysis suggests that insufficient attention is currently paid to the diverse contexts apparent across a large and varied patch in terms of geography, built environment, socio-economic profile and historical investment. Yet the fact that different neighbourhoods may have different starting points is emphasised by Cassetti et al'.s[35] three AB models and our PTs (Table 1).

Aligning with emergent use of NPT in realist analyses,[38] we formulate a new middle range theory to support programme implementation and transferability of our findings, as follows: within an operating context where joined-up working was already favoured (context: community antecedents), the development of a shared narrative around the value of community assets (resource mechanism: NPT coherence) led to increased trust and building of relational as well as operational infrastructure (response mechanism: NPT collective action) leading to greater community engagement and support for grass root action (outcome). Observation of a growth in grass roots action can be seen as a valid interim outcome to building community resilience, leading to decreased reliance on services.

CONCLUSION

ABAs should not be adopted unquestioningly as the answer to health inequalities. Implementation context differs across geographies, and the insights developed here highlighting key points of context and change mechanisms are of practical relevance to implementing place-based approaches to public health in times of restrictive budgets. This study identified clear foundations (engagement, specific roles, shared values) for place-based action, stronger in some localities than others, plus enablers (building trust, small grant funding, less red tape) and barriers (conflation with COVID response, duplication of roles, contractual short-termism) to significant transformation of practice towards ABAs between LAs, partners and publics.

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AUTHOR CONTRIBUTIONS

C.L. was responsible for oversight of the case study, contributing to data collection and analysis throughout and lead authorship of this manuscript. M.B. undertook interviews and analysis, development of initial programme theories and drafted sections for initial versions of the manuscript. J.C. undertook documentary analysis and development of initial programme theories and drafted sections for initial versions of the manuscript. S.B. was also responsible for oversight of the study, engaging in early stages of data collection, development of initial programme theories and commenting on the manuscript. A.C. contributed in-depth editing and arrangement of the final manuscript and preparation for submission. M.L. was PI for the wider project to which this case study relates, provided support and feedback throughout the project on initial programme theories, initial insights from the case study, and valuable improvements to the draft manuscript.

CONFLICT OF INTEREST

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ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

This study received ethical approval from the University of Cambridge School of Humanities and Social Sciences ethics committee (award#19/231). The authors declare that they have no competing interests or beliefs affecting our objectivity in carrying out and reporting the findings of this study.

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References

1. Hastings A, Bailey N, Bramley G *et al.* The cost of the cuts: the impact on local government and poorer communities. Report, Joseph Rowntree Foundation, York, 10 March 2015.
2. British Medical Association (BMA). Feeling the squeeze – the local impact of cuts to public health budgets in England. Report, BMA, London, 14 March 2018.
3. Iacobucci G. Public health – the frontline cuts begin. *BMJ* 2016;**532**:i272.
4. Glasgow Centre for Population Health (GCPH). Asset based approaches for health improvement: redressing the balance. Concepts paper series 9, Report, GCPH, Glasgow, October 2011.
5. McKnight JL, Kretzmann JP. Mapping community capacity. Report, Center for Urban Affairs and Policy Research, Northwestern University, Evanston, IL, 1990.
6. Foot J. What makes us healthy? The assets approach in practice: evidence, action, evaluation. Available online at: https://www.nurturedevelopment.org/wp-content/uploads/2016/01/What-makes-us-healthy.pdf (2012, Last accessed 9th September 2022).
7. Morgan A, Ziglio E. Revitalising the evidence base for public health: an assets model. *Promot Educ* 2007;14(Suppl. 2):17–22.
8. McLean J. Asset based approaches for health improvement: redressing the balance. Report, Glasgow Centre for Population Health (GCPH), Glasgow, 2012.
9. Foot J, Hopkins T. A glass half-full: how an asset approach can improve community health and well-being. Report, Great Britain Improvement and Development Agency, London, 2010.
10. Hopkins T, Rippon S. Head, hands and heart: asset-based approaches in health care. Report, The Health Foundation, London, April 2015.
11. McLean J. Putting asset based approaches into practice: identification, mobilisation and measurement of assets. Report, Glasgow Centre for Population Health (GCPH), Glasgow, July 2012.
12. MacLeod MA, Emejulu A. Neoliberalism with a community face? A critical analysis of asset-based community development in Scotland. *J Community Pract* 2014;**22**:430–50.
13. Friedli L. *'What we've tried, hasn't worked'*: the politics of assets based public health. *Crit Public Health* 2013;**23**:131–45.
14. Local Government Association. A glass half-full: 10 years on review. Available online at: https://www.local.gov.uk/publications/glass-half-full-10-years-review#3-challenges-and-critiques (2020, Last accessed 25th February 2024).
15. Maclure L. Augmentations to the asset-based community development model to target power systems. *Community Dev* 2023;**54**:4–17.
16. Public Health England. Community-centred public health: taking a whole system approach. Available online at: https://assets.publishing.service.gov.uk/media/5e184c78e5274a06b1c3c5f9/WSA_Briefing.pdf (2020, Last accessed 25th February 2024).
17. Cambridgeshire County Council. Think communities: creating a shared vision, approach and priorities for building Community Resilience across Cambridgeshire and Peterborough partner organisations. Available online at: https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Think%20Communities%20Approach.pdf (2018, Last accessed 25th February 2024).
18. Pawson R, Tilley N. An introduction to scientific realist evaluation. In: E Chelimsky. WR Shadish (eds) *Evaluation for the 21st century: a handbook*. London: Sage; 1997. pp. 405–18.
19. Wong G, Westhorp G, Manzano A *et al.* RAMESES II reporting standards for realist evaluations. *BMC Med* 2016;**14**:96.
20. Dalkin SM, Greenhalgh J, Jones D *et al.* What's in a mechanism? Development of a key concept in realist evaluation. *Implement Sci* 2015;**10**:49.
21. Wiltshire G, Ronkainen N. A realist approach to thematic analysis: making sense of qualitative data through experiential, inferential and dispositional themes. *J Crit Realism* 2021;**20**:159–80.
22. Cahn ES. *No more throw-away people: the co-production imperative*. Washington, DC: Essential Books; 2000.
23. Buurtzorg Netherlands. The Buurtzorg model. Available online at: https://www.buurtzorg.com/about-us/buurtzorgmodel/ (undated, Last accessed 9th September 2022).
24. Blickem C, Dawson S, Kirk S *et al.* What is asset-based community development and how might it improve the health of people with long-term conditions? A realist synthesis. *Sage Open*. Epub 2018 July 6. DOI: 10.1177/2158244018787223.
25. Centre for Public Impact. The Wigan deal. Available online at: https://www.centreforpublicimpact.org/case-study/the-wigan-deal (2019, Last accessed 9th September 2022).
26. Brown M. Compassionate community project. Available online at: https://www.resurgence.org/magazine/article5039-compassionate-community-project.html (2018, Last accessed 9th September 2022).
27. Shift Design. Case study: the frome model of enhanced primary care. Available online at: https://shiftdesign.org/case-study-compassionate-frome/ (2019, Last accessed 9th September 2022).
28. Dart J. Place-based evaluation framework: a national guide for evaluation of place-based approaches. Report for DCDSS/DSS, Department of Communities, Disability Services and Seniors (DCDSS) and the Australian Government Department of Social Services (DSS), Canberra, ACT, Australia, 27 August 2018.
29. Putnam RD. The prosperous community. *Am Prospect* 1993;**4**:35–42.
30. Israel BA. Social networks and health status: linking theory, research, and practice. *Patient Couns Health* 1982;**4**(2):65–79.
31. Falk A, Fischbacher U. A theory of reciprocity. *Game Econ Behav* 2006;**54**:293–315.
32. Mancini JA, Bowen GL. Community resilience: a social organization theory of action and change. In: JA Mancini. KA Roberto (eds) *Pathways of human development: explorations of change*. New York: Lexington Books; 2009. pp. 245–65.
33. May CR, Cummings A, Girling M *et al.* Using normalization process theory in feasibility studies and process evaluations of complex healthcare interventions: a systematic review. *Implement Sci* 2018;**13**:80.
34. Redgate S, Spencer L, Adams EA *et al.* A realist approach to understanding alliancing within local government public health and social care service provision. *Eur J Public Health* 2023;**33**:49–55.
35. Cassetti V, Powell K, Barnes A *et al.* A systematic scoping review of asset-based approaches to promote health in communities: development of a framework. *Glob Health Promot* 2020;**27**(3):15–23.
36. Jagosh J, Bush PL, Salsberg J *et al.* A realist evaluation of community-based participatory research: partnership synergy, trust building and related ripple effects. *BMC Public Health* 2015;**15**:725.
37. UK Government. Rapid evidence review of community initiatives. Available online at: https://www.gov.uk/government/publications/rapid-evidence-review-of-community-initiatives/rapid-evidence-review-of-community-initiatives (2022, Last accessed 25th February 2024).
38. Dalkin SM, Hardwick RJ, Haighton CA *et al.* Combining Realist approaches and Normalization Process Theory to understand implementation: a systematic review. *Implement Sci Commun* 2021;**2**:68.

Representation of marginalised populations in digital surveillance for notifiable conditions in Australia: a systematic review

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Abstract

Aim: This study aims to establish whether digital surveillance methods for notifiable diseases in Australia collect and report data in relation to marginalised populations.

Methods: The literature was systematically reviewed to identify primary research studies published between January 2005 and July 2023. Studies were included if they described an Australian digital surveillance system for notifiable conditions. The results were synthesised with a focus on evaluating the collection and reporting of data in relation to marginalised populations.

Results: A total of 13 articles reporting on seven surveillance systems were identified. Influenza and adverse events following immunisation were the two most common notifiable conditions monitored. A total of six surveillance systems encompassing 16 articles reported information on sub-populations. Of these, three surveillance systems (nine articles) included data on marginalised populations.

Conclusion: The data collected or reported in relation to sub-groups that characterise diversity in terms of health care needs, access, and marginalised populations are minimal. It is recommended that a set of equity and reporting principles is established for the future creation and use of any digital surveillance system.

INTRODUCTION

Infectious diseases create significant health and economic burden globally including Australia, as highlighted by the COVID-19 pandemic. As of July 2023, there have been over 11.5 million cases and over 20,000 deaths in Australia due to the novel coronavirus.[1] In addition to COVID-19, three other diseases accounted for the vast majority of Australia's notifiable disease reports in 2022: influenza with 233,369 notifications, respiratory syncytial virus with 95,776 notifications, and chlamydia with 94,222 notifications.[2] Prior to the pandemic, annual expenditure on all infectious diseases in Australia was reported as roughly $7.52 billion.[3] In 2021, the Australian government spent $7.9 billion on specific COVID-19 health programmes alone.[4]

Timely and comprehensive surveillance of infectious diseases is essential for targeted public health response and prevention efforts. Currently, infectious diseases are monitored in Australia via the National Notifiable Diseases Surveillance System (NNDSS).[5] Over 70 conditions are legally required to be reported to this system by doctors and laboratories, encompassing gastrointestinal diseases, sexually transmissible infections and blood-borne viruses (BBVs), respiratory diseases, vaccine-preventable diseases, zoonoses, vector-borne diseases, and other diseases.[2,5] There are also a number of other surveillance systems within Australia which collect additional data to enhance public health response, such as the New South Wales (NSW) Public Health Rapid, Emergency, Disease, and Syndromic Surveillance system which monitors unplanned visits to emergency departments and emergency triple zero calls (000), to detect any unusual emerging patterns in syndromes often related to infectious pathogens.[6]

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Recently, novel methods of surveillance utilising digital technologies have emerged to complement existing methods of surveillance. This includes the use of monitoring social media data,[7–9] and Google trends with machine learning methods,[9,10] as well as the use of electronic medical records,[11] to predict disease outbreaks. Surveillance using these types of data provides benefits over traditional data sources in that they are generally publicly available and early work has shown they can provide timelier detection of some disease outbreaks.[9]

Analysis of global data has clearly linked poverty, inequality, marginalisation, and other barriers to healthcare with infectious disease burden.[12,13] If implemented inequitably, digital health technologies can further increase health disparities in marginalised populations.[14,15] This has been shown in Black communities across North America, UK, and Italy due to limited application of eHealth initiatives, and for those who live in rural areas due to limited access as a result of restricted Internet broadband coverage.[15] Being an older adult (over the age of 40 years), having low income, and having low levels of education have also been identified as barriers to acquiring and understanding how to use digital health technologies.[15] With the continuing adoption of digital health systems into Australian public health, the importance of limiting the disparity in marginalised populations such as Aboriginal and Torres Strait Islander people, elderly populations, and culturally and linguistically diverse (CALD) populations is evident. As there is very limited research on this in Australia, this study aims to establish whether digital surveillance methods for notifiable diseases in Australia collect and report data in relation to marginalised populations which will establish a benchmark and enable future assessment of whether these technologies improve health or create further marginalisation.

METHODS

Search strategy

The methods used in this review were developed in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.[16] The initial search of peer-reviewed published literature was conducted in PubMed (Medline), EMBASE, and CINAHL in January 2022. A secondary search of the literature was conducted on the 13th of June 2023 to identify additional studies published after January 2022. Initial search terms included digital health, surveillance, communicable diseases, and Australia. 'SARS-CoV-2'[Mesh] and 'COVID-19'[Mesh] were added to the secondary search. The full search strategy is available in Supplemental Appendix 1. All reference lists of all eligible studies were checked for additional studies for inclusion.

Inclusion and exclusion criteria

Studies were included if they met the following criteria:

- Described an Australian digital surveillance system, defined as systems which utilised data from social network sites (e.g. Facebook), content sharing websites (e.g. YouTube), search data (e.g. Google), blogs and forums (e.g. Reddit) and digital polls, or studies that utilised novel methods of digital analysis, specifically machine learning methods.
- Notifiable conditions were defined as any condition reportable to the NNDSS.[5]
- Full-text articles in English language.
- Were published between January 2005 and July2023.

Studies were excluded if they met the following criteria:

- Surveillance was specific to a population group (i.e. healthcare workers).
- Described the methods of the system only, without reporting results.
- Compared the surveillance system to another system or evaluated the system without reporting results of the surveillance system.

Screening

The titles and abstracts of articles identified through the search were extracted and uploaded to the systematic review software Covidence. Two authors (AD and ND) independently screened the titles and abstracts. The same authors reviewed full-text articles to assess their eligibility against the inclusion criteria. Reference lists from all included studies were examined to identify additional eligible studies. Any conflicts were resolved through discussion and consensus between the authors.

Data extraction and synthesis

Extraction of data was completed by one author (NDK) and cross-checked by a second author (AD) using a standard extraction form. Fields extracted included condition under surveillance, data used, study period, objective, location, sample size, overall results, study design, recruitment methods, and if any data were reported on subpopulation as well as marginalised populations specifically. Information regarding data or trends in marginalised populations was a key field for extraction to allow for an overall assessment of the equity of digital surveillance systems. Marginalised populations were defined as 'highly vulnerable populations that are systemically excluded from national or international policy making forums'.[17] This includes, but is not limited to, Aboriginal and Torres Strait Islander people, elderly people, CALD populations, refugees, and sexual minorities.[18]

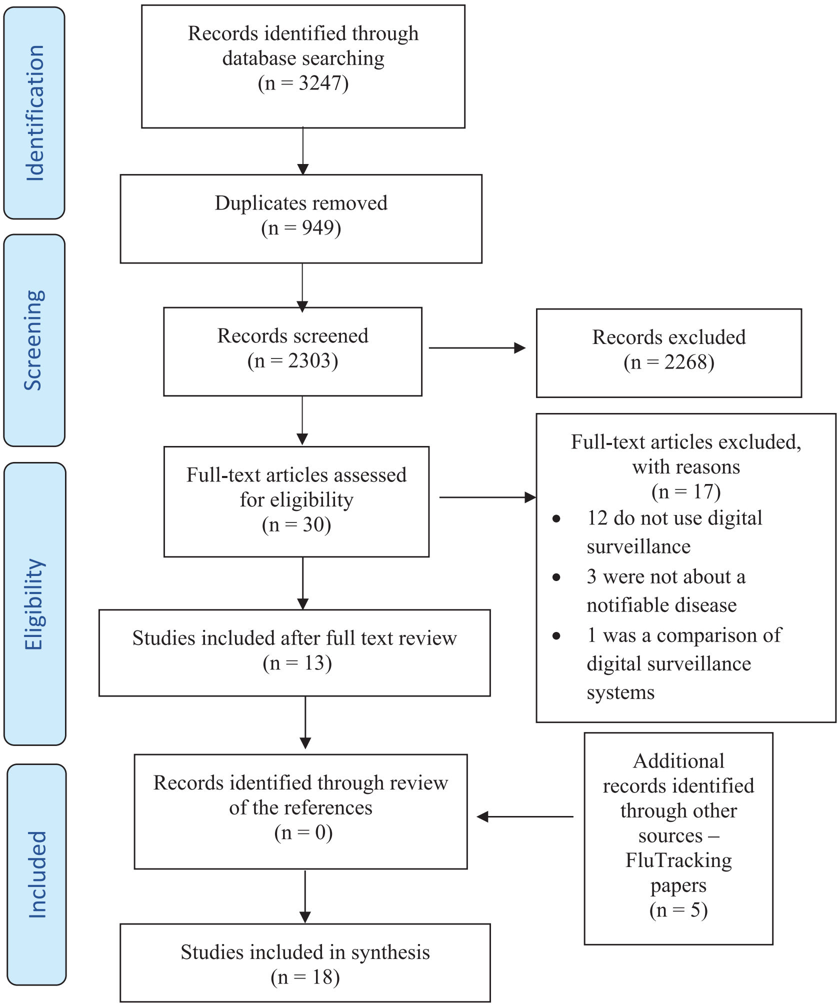
Data were formulated into tables to summarise and describe the study characteristics, as well details reported about marginalised populations within the surveillance systems.

RESULTS

A total of 3247 articles were identified from the initial search strategy, with 949 articles removed as duplicates. Screening of title and abstracts identified 35 articles for full-text review. Of these, 13 met the inclusion criteria, with 0 additional articles identified through a review of the reference lists of included articles (Figure 1). Only four of the nine available annual FluTracking reports were identified through the search. The

Figure 1.

PRISMA flowchart.



Note: PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

remaining five FluTracking articles were sourced from the Australian Government Communicable Disease Intelligence website,[19] bringing the total number of included articles to 18.

The secondary search strategy including COVID-19-related documents yielded 792 articles, with 288 duplicates removed. Screening of title and abstracts identified eight articles for full-text review; however, none of these met the inclusion criteria.

A total of seven surveillance systems were studied across the 18 included articles. Nine articles correlate to the FluTracking system, with studies conducted from 2006 to 2018.[20–28] One study correlates to the use of Twitter as a potential surveillance system, conducted in 2015.[29] One study correlates to the SmartVax system and was conducted in 2013.[30] Two articles correlate to the FASTmum programme, both studies conducted in 2013.[31,32] The VaxTracker system has two associated studies conducted in 2013 and 2017.[33,34] Two studies conducted in 2015 correlate with the AusVaxSafety programme.[35,36] The final surveillance system is the STARSS system which has one associated study conducted in 2017.[37] Overall, the time period for included articles ranged from 2006 to 2018, with the majority of studies conducted from 2013 onwards (72%). This is likely as a direct result of the creation of five of the seven surveillance systems after the 2010 incident in which a particular brand of influenza vaccine caused an increase in febrile reactions (including febrile convulsions) in Australian children.[30,32,33,35–37]

Data extraction identified influenza ($n = 10$)[20–29] and adverse events following immunisation (AEFI; $n = 8$)[30–37] as the two most common notifiable conditions monitored using digital methods for surveillance in Australia. A total of 16 of the 18 articles had influenza, influenza-like-illness, or response to the influenza vaccine as their surveillance topic.[20–33,35,36] The two studies that were not associated with influenza included the VaxTracker study conducted in 2016 regarding AEFI from the pneumococcal polysaccharide vaccine in the elderly[34] and the STARSS study analysing AEFI from any vaccine.[37] Seven studies were conducted nationally,[23–29] and of the remaining 11 studies conducted in individual states, most collected data from digital surveillance systems implemented in health practices located in NSW (*n* = 8), Western Australia (WA; *n* = 6), and South Australia (SA; *n* = 4).[20–22,30–37] The vast majority of included studies (*n* = 17) collected data from participants via online surveys linked through Short Message Service (SMS) or email, or direct response to SMS.[20–28,30–37] The one remaining study collected data from an algorithm monitoring geo-tagged tweets (see Table 1).[29]

A total of six surveillance systems (all except Twitter) encompassing 16 studies reported information on sub-populations.[20,22–28,30–37] Of these, three surveillance systems (FluTracking, FASTmum, and AusVaxSafety) encompassing nine studies included data on marginalised populations.[23–28,32,35,36] The FluTracking annual surveillance reports initially stratified data according to age, state/territory, vaccination status, and whether participants worked with patients.[20,22] From 2012 to the most recent report, other socio-demographic characteristics have been incorporated including sex, highest educational level attained, and Aboriginal and Torres Strait Islander identity.[23–28] A separate FluTracking report specific to data collected from Indigenous Australian participants was published in 2019 analysing trends in fever and cough rates and vaccination rates since 2012.[38] This information was not included in the annual reports.

Of the five digital health surveillance systems monitoring AEFI, the FASTmum programme[32] and the AusVaxSafety programme[35,36] were the only ones to report and analyse data collected from Aboriginal and Torres Strait Islander participants. The initial FASTmum article did not collect socio-demographic characteristics apart from age.[31] However, the following year an Aboriginal and Torres Strait Islander status question was added to the survey and data on response rate to SMS versus phone interview were analysed and stratified according to ethnicity.[32] The AusVaxSafety programme (which encompasses STARSS, VaxTracker, and SmartVax surveillance systems) also collected data on Aboriginal and Torres Strait Islander status; however, it did not further analyse or report this within the initial study.[35] The following AusVaxSafety study analysed fever rates in Aboriginal and Torres Strait Islander participants compared to non-Indigenous participants, but did not analyse these data in accordance with other sub-populations included, such as age, sex, underlying medical conditions, and whether or not medical attention was sought.[36] VaxTracker was the only subset of AusVaxSafety that reported including a question on Aboriginal and Torres Strait Islander identity on their survey, however, did not report any findings in their results (see Table 2).[34]

Four of the nine studies, three of which are associated with FluTracking and one with AusVaxSafety, identified the percentage of participants with incomplete surveys.[23,26,27,35] Of the FluTracking articles, approximately half (54.8%) of participants answered the question on Aboriginal and Torres Strait Islander status in 2012, when the question was first incorporated into the survey.[23] In 2016, 87.4% of participants had a complete survey,[26] rising to 92.3% in 2017.[27] Aboriginal and Torres Strait Islander representation by 2018 made up 1.6% of FluTracker's sample population.[29] The 2015 AusVaxSafety article reported that 24.5% of participants did not answer the ethnicity question; however, the percentage of participants who identified as Indigenous was 4.7%.[35] It is unclear if the 2015 AusVaxSafety study recorded responses of other ethnicities apart from 'Indigenous'. No other article included in this study recorded data on CALD populations.

DISCUSSION

This review identified that there are a number of surveillance systems within Australia for notifiable diseases utilising digital methods, which appears to be increasing over time. In our study, the two main notifiable conditions currently monitored using these methods are influenza and AEFI.[20–37] Half of the studies identified reported some information in relation to Aboriginal and Torres Strait Islander identity for the population.[23–28,32,35,36] Almost all articles reported data in relation to some specific demographics including age, sex, and education.[20,22–28,30–37] Despite this, the data collected or reported in relation to sub-groups that characterise diversity in terms of health care needs, access, and marginalised populations are minimal.

The majority of digital surveillance for notifiable conditions in Australia focuses on influenza and adverse events following the influenza vaccination.[20–33,35,36] This is consistent with global literature with most digital surveillance systems for communicable diseases focusing on influenza.[39] Epidemics of influenza occur annually, with vaccination for some groups recommended each year. The constantly evolving nature of the spread of disease and vaccination uptake makes influenza a useful case study for this type of surveillance. This has also been the case with COVID-19, which is a constantly evolving public health situation requiring surveillance and occurred concurrently with the development of new methodologies in disease surveillance. While not captured in this review, a number of digital surveillance tools were utilised in the public health response to COVID-19 in Australia. The COVID-Safe App was implemented in Australia to assist with contact tracing,[40] and within Queensland a number of digital aspects were incorporated into the response including the Queensland response Digital Corona Virus Application and integrating data from both private and public pathology laboratories into a data lake.[41] These types of examples used in the field were not included in this study as their descriptions and results are not recorded in published research articles. This is a significant limitation of our study as many developing systems that should meet our inclusion criteria may only be documented in grey literature as yet.

Approximately, half of the studies across this review, encompassing three

Table 1.

Characteristics of included studies.

Study ID – reference number	Time period	Surveillance topic	Sample size	Study design	Location	Data used
Dalton 2009 – 20	June–October 2006, June–October 2007, May–October 2008	FluTracker – Influenza	2006 – 394 2007 – 982 2008 – 4827	Surveillance system	2006-07 Hunter New England region of NSW 2008 – nation-wide	Weekly online questionnaires linked via email
Carlson 2009 – 21	June–October 2007	FluTracker – Influenza	982 participants according to FLU-1		NSW	Weekly online questionnaires compared to weekly counts of positive influenza A antigen tests from NSW Department of Health Notifiable Diseases Database
Dalton 2011 – 22	May 2009–October 2010	FluTracker – Influenza	12,603	Surveillance system	NSW, WA, SA, NT, ACT, Tasmania	Weekly online questionnaires linked via email
Carlson 2013 – 23	May–October 2011, May–October 2012	FluTracker – Influenza	2011 – 13,101 2012 – 16,046	Surveillance system	All states and territories in Australia	Weekly online questionnaires linked via email
Dalton 2015 – 24	April–October 2013, May–October 2014	FluTracker – Influenza	2013 – 18,440 2014 – 20,087	Surveillance system	All states and territories in Australia	Weekly online questionnaires linked via email
Dalton 2016 – 25	April–October 2015	FluTracker – Influenza	27,828	Surveillance system	All states and territories in Australia	Weekly online questionnaires linked via email
Carlson 2019 – 26	May–October 2016	FluTracker – Influenza	30,998	Surveillance system	All states and territories in Australia	Weekly online questionnaires linked via email
Moberley 2019 – 27	April–October 2017	FluTracker – Influenza	33,947	Surveillance system	All states and territories in Australia	Weekly online questionnaires linked via email
Howard 2022 – 28	April–October 2018	FluTracker – Influenza	45,532	Surveillance system	All states and territories in Australia	Weekly online questionnaires linked via email
Zhang 2017 – 29	2015	Geo-tagged tweets – Influenza	N/A		Australia	Tweets geo-tagged for Australia found through authors' algorithm to be ILI-related
Leeb 2014 – 30	11 November 2011–10 June 2013	SmartVax – AEFI from any vaccine	2432		Perth, WA	Response to SMS or email

(Continued)

Table 1. (Continued)

Characteristics of included studies.

Study ID – reference number	Time period	Surveillance topic	Sample size	Study design	Location	Data used
Regan 2014 – 31	March–July 2013	FASTmum – AEFI from influenza vaccine	3173		WA	Response to SMS compared to phone calls
Regan 2015 – 32	16 March–22 May 2013	FASTmum – AEFI from influenza vaccine	2011	RCT	WA – metropolitan and rural areas	Response rate to SMS compared to phone calls, and data collected from link to online survey via SMS
Cashman 2014 – 33	21 March–30 June 2013	VaxTracker – AEFI from influenza vaccine	290	Surveillance system	Northern NSW – Newcastle metropolitan and Tamworth rural populations	Survey data linked via email or text message
Pillsbury 2015 – 34	1 April–31 August 2015	AusVaxSafety – AEFI from influenza vaccine in children	3340		NSW, VIC, SA, and WA	Data collected from SMS or email with link to smartphone survey (SmartVax) or web-based survey (VaxTracker)
Pillsbury 2017 – 35	1 April–31 August 2015 1 April–4 September 2015	AusVaxSafety – AEFI from influenza vaccine in children	7402		NSW, VIC, SA, and WA (Based on 2015 article. No mention of location in this article)	Data collected from SMS or email-based survey via SmartVax, VaxTracker, or STARSS programmes
Munnoch 2019 – 36	February 2016–December 2017	VaxTracker – AEFI from pneumococcal polysaccharide vaccine in elderly	4725		Newcastle, NSW	Data collected from link to surveys sent via email or SMS
Gold 2020 – 37	September 2015–December 2017	STARSS – AEFI from any vaccine	6338	RCT	SA, NSW	Data collected from initial responses to SMS Data collected from telephone interview versus online report

ILI = influenza-like-illness; SMS = Short Message Service; AEFI = adverse events following immunisation; RCT = randomised controlled trial; NSW = New South Wales; WA = Western Australia; SA = South Australia; ACT = Australian Capital Territory; NT = Northern Territory; VIC = Victoria.

Table 2.

Data reported within included studies.

Study ID – reference number	Objective	Data reported on sub-populations	Data reported on marginalised populations
Dalton 2009 – 20	(1) Ascertain FluTracking ability to detect influenza activity and confirm vaccine effectiveness by comparing ILI syndrome rates between vaccinated and unvaccinated groups. (2) Ascertain whether influenza activity is detected earlier by FluTracking compared to other surveillance practices.	Age State/territory Vaccination status Working patients	None
Carlson 2009 – 21	Validate correlation of NSW 2007 FluTracking data with NSW data for lab-confirmed influenza	None	None
Dalton 2011 – 22	(1) Confirm vaccine effectiveness early in the season by comparing rates of ILI in vaccinated versus unvaccinated participants. (2) Use the surveillance data to compare timing, incidence, and severity of influenza over the years.	Age State/territory Vaccination status Working with patients	None
Carlson 2013 – 23	As above – with a third objective to collect data on participants' health-seeking behaviours	Age Sex State/territory Highest level of educational attainment (if 15 or older) Vaccination status Working with patients	Aboriginal and Torres Strait Islander identity added in 2012
Dalton 2015 – 24	As per Dalton 2011	Age Sex State/Territory Highest level of educational attainment (if 15 or older) Vaccination status Working with patients	Aboriginal and Torres Strait Islander identity
Dalton 2016 – 25	As per Dalton 2011	Age Sex State/territory Highest level of educational attainment (if 15 or older) Vaccination status Working with patients	Aboriginal and Torres Strait Islander identity
Carlson 2019 – 26	As per Dalton 2011	Age Sex State/territory Highest level of educational attainment (if 15 or older) Vaccination status Working with patients	Aboriginal and Torres Strait Islander identity

(Continued)

Table 2. (Continued)

Data reported within included studies.

Study ID – reference number	Objective	Data reported on sub-populations	Data reported on marginalised populations
Moberley 2019 – 27	As per Dalton 2011	Age Sex State/territory Highest level of educational attainment (if 15 or older) Vaccination status Working with patients	Aboriginal and Torres Strait Islander identity
Howard 2022 – 28	As per Dalton 2011 – with a third objective to compare ILI consultation rates from ASPREN with the percentage of participants with ILI who visited a general practitioner	Age Sex State/territory Highest level of educational attainment (if 15 or older) Vaccination status Working with patients	Aboriginal and Torres Strait Islander identity
Zhang 2017 – 29	To assess whether Twitter can be used as a means for public health surveillance. Study specifically addresses influenza.	None	None
Leeb 2014 – 30	Performance assessment of SmartVax in response rate to, and timeliness of, SMS texts to detect AEFI postinfluenza vaccine in adults and children	Sex Age Response to SMS Response time	None
Regan 2014 – 31	Implementation of a real-time safety monitoring programme (FASTmum) for AEFI from TIV administered to pregnant women using SMS	Age Vaccination provider Trimester of pregnancy Response to SMS Type of AEFI	None
Regan 2015 – 32	Follow-up study for the FASTmum programme comparing response rate, adverse events reported, and timeliness of obtaining this information between SMS and phone call for pregnant women who had recently received TIV	Age Residence Trimester of pregnancy SES Type of vaccine Response to SMS Type of AEFI Medical attention sought	Aboriginal or Torres Strait Islander identity, response rate to SMS, and response to telephone interview

(Continued)

Table 2. (Continued)

Data reported within included studies.

Study ID – reference number	Objective	Data reported on sub-populations	Data reported on marginalised populations
Cashman 2014 – 33	To report on the performance of the VaxTracker system in detecting AEFI in children after receiving the inactivated influenza vaccine during the 2013 influenza season	Age Sex Response rate Type of vaccine Type of AEFI Medical attention sought	None
Pillsbury 2015 – 34	To monitor the safety of different influenza vaccine brands in children aged 6 months to 4 years using the AusVaxSafety SMS-based surveillance system during the 2015 influenza season	Age Sex Underlying medical conditions Type of vaccine and if concomitant vaccines received Type of AEFI Medical attention sought	Aboriginal or Torres Strait Islander identity
Pillsbury 2017 – 35	To monitor the safety of different influenza vaccine brands in children aged 6 months to 4 years using the AusVaxSafety SMS-based surveillance system during the 2015 and 2016 influenza seasons	Age Sex Underlying medical conditions Type of vaccine and if concomitant vaccines received Type of AEFI Medical attention sought	Aboriginal or Torres Strait Islander identity, and type of AEFI experienced
Munnoch 2019 – 36	Using VaxTracker to monitor AEFI in patients aged 55–61 years enrolled in the Australian Study for the Prevention through the Immunisation of Cardiovascular Events trial who received the pneumococcal vaccine	Age Sex Response rate Type of AEFI Medical attention sought	Survey included Aboriginal or Torres Strait Islander identity, but this was not reported in results
Gold 2020 – 37	Evaluate efficacy of monitoring AEFI for any vaccination on the Australian Immunisation Schedule through SMS using the STARSS programme	Age Sex Index of Relative Socioeconomic Advantage and Disadvantage quintile Type and number of vaccines administered Type of AEFI Medical attention sought	None

ILI = influenza-like-illness; ASPREN = Australian Sentinel Practice Research Network; SMS = Short Message Service; AEFI = adverse events following immunization; TIV = trivalent influenza vaccine; NSW = New South Wales; SES = Socioeconomic status.

of the seven surveillance systems, reported data on Aboriginal and Torres Strait Islander Australians.[23–28,32,35,36] However, completeness and representativeness of these data in some instances were identified as an issue.[24,27,28,36] The FluTracking system has collected data on Aboriginal and/or Torres Strait Islander identity since 2012, although the number of participants was not large enough to be representative of the Aboriginal and Torres Strait Islander population.[24] The completeness of data has improved over time, increasing to 92.3% in 2017.[28] However, the proportion of participants identifying as Aboriginal and/or Torres Strait Islander remains low (approximately 1.6%) compared with 3.3% of the Australian population.[29] FluTracking credits the high completeness of the data with a small minimum data requirement. This means, only a few variables are collected from participants at registration, with a clear purpose for the collection of each field.[42]

The inclusion of data in relation to Aboriginal and Torres Strait Islander Australians is important for surveillance systems to ensure that responses can be appropriately targeted where needed. Australia's Indigenous Digital Inclusion Plan, which seeks to provide all Australians with equal access to Internet, technology, and information, identifies that Aboriginal and Torres Strait Islander's level of digital inclusion is 7.9 points below the national score.[43] This score compares the level to which people are considered digitally included at an individual level.[43] There is a high rate of mobile phone use within the Aboriginal and Torres Strait Islander population44; however, less access to[44,45–47] and affordability of digital systems and technologies compared to non-Indigenous Australians are key contributors to this inequity.[43,45] Hence, levels of digital literacy,[43,45] as well as age and education level,[48] can impact recruitment into use of digital surveillance systems or technologies. Making systems accessible and culturally appropriate is necessary for the inclusion of Aboriginal and Torres Strait Islander people.

As noted earlier, there are also issues with the completeness of data as well as variations in reporting. For example, in notifiable disease data there is still great variation in completeness across states and territories.[49] There are also additional requirements for the creation and use of any digital surveillance system when collecting and reporting Aboriginal and Torres Strait Islander data. System design should address the importance of data sovereignty, which is 'the right of Aboriginal and Torres Strait Islander peoples, communities and organisations to maintain, control, protect, develop, and use data'.[50] As well, systems should be co-designed with Aboriginal and Torres Strait Islander community representatives, with results being reported back to the community openly.

Despite these challenges, evidence suggests that digital health interventions can be effective and beneficial in marginalised populations.[51,52] This evidence, coupled with a disproportionate impact from communicable diseases,[53] means that funded and accessible digital health surveillance programmes are an important aspect to lessen digital health inequity. Some programmes are currently attempting to address this disparity. For example, the ATLAS Indigenous primary care surveillance network aims to monitor the STI and BBV burden in Aboriginal and Torres Strait Islander populations across Australia.[54] This network is partnered with the Aboriginal Community-Controlled Health Organisation sector and was designed to address the disparity in testing, treatment, and management of sexually transmissible infections and blood borne viruses, but as yet only a methods article has been published.[55]

There are a number of other marginalised groups who are also important to consider in infectious disease surveillance. These include those who are homeless and older individuals, both groups disproportionately affected by communicable diseases and recommended to receive annual influenza vaccination.[55] The majority of studies in this review collected and reported information in relation to age of participants.[20,22–28,30–33,35,36] However, no studies collected or reported data on homelessness, CALD, or other marginalised populations. Historically, surveillance of diseases within homeless populations is challenging as this information is generally not recorded in data collection systems.[56] One aspect of digital technology which is showing promise to assist with surveillance in homeless populations is data linkage.[57] However, this has not yet been used for communicable disease surveillance. There are further challenges for data collection as participation in digital reporting would require a phone or computer and homeless individuals have reduced access to digital technology.[58] Despite the challenges, the importance of surveillance to identify how best to target public health interventions remains. Further investigation into how these barriers can be overcome is warranted.

There are several limitations to this study which need to be considered in the interpretation of the findings. We restricted publications to those in English; however, as the aim was to investigate this issue in the Australian context it is unlikely that relevant articles were not included due to language. We did not incorporate grey literature into our search, which may have resulted in publication bias. There may be systems operating in Australian Health Departments which have not been part of research studies or publications. However, we believe this review provides initial evidence to highlight this issue and a follow-up study engaging the grey literature and health departments would be the next step to further this work.

Overall, there are limited research articles investigating digital surveillance for notifiable conditions in Australia. Incorporating these methods into public health practice is essential, feasible, and provides additional information which can complement existing systems. However, greater focus on the equity of these systems and the need to incorporate data for marginalised populations is essential. Issues of inequity in recruitment, varying levels of digital literacy, matters of privacy and data sovereignty, and the overall accessibility of the digital health system for inclusion of marginalised populations should be addressed, ideally prior to its use. Local data are necessary to make local decisions, and so these data should also be fed back to the communities on which they impact for further work to be done. Therefore, it is recommended that a set of principles is established for the future creation and use of any digital surveillance system.

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CONFLICT OF INTEREST

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SUPPLEMENTAL MATERIAL

Supplemental material for this article is available online.

References

1. WHO Health Emergency Dashboard. *WHO (COVID-19) homepage – Australia*. World Health Organization. Available online at: https://www.health.gov.au/health-alerts/covid-19/case-numbers-and-statistics#covid19-situation-overview (updated 12 July 2023; last accessed 12 July 2023)
2. National Notifiable Diseases Surveillance System. *National communicable disease surveillance dashboard*. Australian Government Department of Health and Aged Care. Available online at: https://nindss.health.gov.au/pbi-dashboard/ (updated 13 July 2023; last accessed 13 July 2023)
3. Australian Institute of Health and Welfare. *Disease expenditure in Australia 2018–2019*. Australian Government; 2021. Available online at: https://www.aihw.Gov.au/reports/health-welfare-expenditure/disease-expenditure-australia/contents/australian-burden-of-disease-groups (updated 18 February 2022; last accessed 5 January 2023)
4. Australian Institute of Health and Welfare. *Health expenditure*. Australian Government; 2022. Available online at: https://www.aihw.Gov.au/reports/health-welfare-expenditure/health-expenditure (updated 18 October 2022; last accessed 5 January 2023)
5. Australian Government Department of Health and Aged Care. *National Notifiable Diseases Surveillance System (NNDSS)*. Australian Government; 2022. Available online at: https://www.health.Gov.au/our-work/nndss (updated 19 July 2022; last accessed 5 January 2023)
6. NSW Health. *Rapid surveillance using PHREDSS*. NSW Government; 2022. Available online at: https://www.health.nsw.gov.Au/epidemiology/Pages/rapid-surveillance-using-PHREDSS.aspx (updated 13 April 2022; last accessed 5 January 2023)
7. Young SD, Mercer N, Weiss RE *et al*. Using social media as a tool to predict syphilis. *Prev Med* 2018;**109**:58–61.
8. Young SD, Rivers C, Lewis B. Methods of using real-time social media technologies for detection and remote monitoring of HIV outcomes. *Prev Med* 2014;**63**:112–5.
9. Kogan NE, Clemente L, Liautaud P *et al*. An early warning approach to monitor COVID-19 activity with multiple digital traces in near real time. *Sci Adv* 2021;**7**(10):eabd6989.
10. Johnson AK, Bhaumik R, Tabidze I *et al*. Nowcasting sexually transmitted infections in Chicago: predictive modeling and evaluation study using Google trends. *JMIR Public Health Surveill* 2020;**6**(4):e20588.
11. Chadwick D, Forbes G, Lawrence C *et al*. Using an electronic health record alert to prompt blood-borne virus testing in primary care. *AIDS* 2021;**35**(11):1845–50.
12. Quinn SC, Kumar S. Health inequalities and infectious disease epidemics: a challenge for global health security. *Biosecur Bioterror* 2014;**12**(5):263–73.
13. Harris M, Reza JN. *Global report for research on infectious diseases of poverty*. Geneva: World Health Organization; 2012. 184 pp.
14. Lawrence K. Digital health equity. In: SL Linwood (ed.) *Digital health*. Brisbane, Australia: Exon Publications; 2022. pp. 121–30.
15. Yao R, Zhang W, Evans R *et al*. Inequities in health care services caused by the adoption of digital health technologies: scoping review. *J Med Internet Res* 2022;**24**(3):e34144.
16. Page MJ, McKenzie JE, Bossuyt PM *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Syst Rev* 2021;**10**(1):89.
17. O'Donnell P, Tierney E, O'Carroll A *et al*. Exploring levers and barriers to accessing primary care for marginalised groups and identifying their priorities for primary care provision: a participatory learning and action research study. *Int J Equity Health* 2016;**15**(1):197.
18. Baker K, Adams J, Steel A. Experiences, perceptions and expectations of health services amongst marginalized populations in urban Australia: a meta-ethnographic review of the literature. *Health Expect* 2021;**25**(5):2166–87.
19. FluTracking. FluTracking Research (Australia). Australian Government. Available online at: https://info.flutracking.net/research/australia-research/ (last accessed 5 January 2023)
20. Dalton C, Durrheim D, Fejsa J *et al*. FluTracking: a weekly Australian community online survey of influenza-like illness in 2006, 2007 and 2008. *Commun Dis Intell Q Rep* 2009;**33**(3):316–22.
21. Carlson SJ, Dalton CB, Tuyl FA *et al*. FluTracking surveillance: comparing 2007 New South Wales results with laboratory confirmed influenza notifications. *Commun Dis Intell Q Rep* 2009;**33**(3):323–7.
22. Dalton CB, Carlson SJ, Butler MT *et al*. FluTracking weekly online community survey of influenza-like illness annual report, 2010. *Commun Dis Intell Q Rep* 2011;**35**(4):288–93.
23. Carlson SJ, Dalton CB, Butler MT *et al*. FluTracking weekly online community survey of influenza-like illness annual report 2011 and 2012. *Commun Dis Intell Q Rep* 2013;**37**(4):E398–406.
24. Dalton CB, Carlson SJ, McCallum L *et al*. FluTracking weekly online community survey of influenza-like illness: 2013 and 2014. *Commun Dis Intell Q Rep* 2015;**39**(3):E361–8.
25. Dalton CB, Carlson SJ, Durrheim DN *et al*. FluTracking weekly online community survey of influenza-like illness annual report, 2015. *Commun Dis Intell Q Rep* 2016;**40**(4):E512–20.
26. Carlson SJ, Cassano D, Butler MT *et al*. FluTracking weekly online community survey of influenza-like illness annual report, 2016. *Commun Dis Intell(2018)* 2019;**43**. DOI: 10.33321/cdi.2019.43.15.
27. Moberly S, Carlson S, Durrheim D *et al*. FluTracking: weekly online community-based surveillance of influenza-like illness in Australia, 2017 annual report. *Commun Dis Intell (2018)* 2019;**43**. DOI: 10.33321/cdi.2019.43.31.
28. Howard ZL, Carlson SJ, Moberley S *et al*. FluTracking: weekly online community based surveillance of influenza-like illness in Australia, 2018 annual report. *Commun Dis Intell* 2022;**46**(3):316–22.
29. Zhang K, Arablouei R, Jurdak R. Predicting prevalence of influenza-like illness from geo-tagged tweets. In *Proceedings of the 26th International Conference on World Wide Web Companion 2017 (WWW'17)*, Perth, Australia, 3–7 April 2017, pp. 1327–34. Available online at: https://eprints.qut.edu.au/131715/1/p1327-zhang.pdf
30. Leeb A, Regan AK, Peters IJ *et al*. Using automated text messages to monitor adverse events following immunisation in general practice. *Med J Aust* 2014;**200**(7):416–8.
31. Regan AK, Blyth CC, Mak DB *et al*. Using SMS to monitor adverse events following trivalent influenza vaccination in pregnant women. *Aust N Z J Obstet Gynaecol* 2014;**54**(6):522–8.
32. Regan AK, Blyth CC, Tracey L *et al*. Comparison of text-messaging to voice telephone interviews for active surveillance of adverse events following immunisation. *Vaccine* 2015;**33**(31):3689–94.
33. Cashman P, Moberley S, Dalton C *et al*. Vaxtracker: active on-line surveillance for adverse events following inactivated influenza vaccine in children. *Vaccine* 2014;**32**(42):5503–8.

34. Munnoch SA, Cashman P, Peel R *et al*. Participant-centered online active surveillance for adverse events following vaccination in a large clinical trial: feasibility and usability study. *J Med Internet Res* 2019;**21**(10):e14791.
35. Pillsbury A, Cashman P, Leeb A *et al*. Real-time safety surveillance of seasonal influenza vaccines in children, Australia, 2015. *Euro Surveill* 2015;**20**(43). DOI: 10.2807/1560-7917.ES.2015.20.43.30050.
36. Pillsbury A, Quinn H, Cashman P *et al*. Active SMS-based influenza vaccine safety surveillance in Australian children. *Vaccine* 2017;**35**(51):7101–6.
37. Gold MS, Lincoln G, Cashman P *et al*. Efficacy of m-Health for the detection of adverse events following immunization – the stimulated telephone assisted rapid safety surveillance (STARSS) randomised control trial. *Vaccine* 2021;**39**(2):332–42.
38. FluTracking. FluTracking Research (Australia). Australian Government. Available online at: https://info.flutracking.net/wp-content/uploads/2020/05/IndigenousSummary.pdf (last accessed 5 January 2023)
39. Shakeri Hossein Abad Z, Kline A, Sultana M *et al*. Digital public health surveillance: a systematic scoping review. *Npj Digit Med* 2021;**4**(1):41.
40. Vogt F, Haire B, Selvey L *et al*. Effectiveness evaluation of digital contact tracing for COVID-19 in New South Wales, Australia. *Lancet Public Health* 2022;**7**(3):e250–8.
41. Dyda A, Fahim M, Fraser J *et al*. Managing the digital disruption associated with COVID-19-driven rapid digital transformation in Brisbane, Australia. *Appl Clin Inform* 2021;**12**(5):1135–43.
42. Dalton C, Carlson S, Durrheim D. Insights from flutracking: thirteen tips to growing a web-based participatory surveillance system. *JMIR Public Health Surveill* 2017;**3**(3):e48.
43. Australian Government National Indigenous Australians Agency. Indigenous Digital Inclusion Plan Discussion Paper. Commonwealth of Australia; 2021. Available online at: https://www.niaa.gov.Au/sites/default/files/publications/indigenous-digital-inclusion-plan-discussion-paper.pdf (last accessed 5 January 2023)
44. Media Usage amongst Aboriginal and Torres Strait Islander people (infographic). McNair Ingenuity Research. Availabe online at: https://mcnair.com.au/wp-content/uploads/Media-Usage-amongst-Aboriginal-and-Torres-Strait-Islander-People-McNai. . ..pdf
45. Rennie E, Thomas J, Wilson C. Aboriginal and Torres Strait Islander people and digital inclusion: what is the evidence and where is it? *Commun Res Pract* 2019;**5**(2):105–20.
46. McCallum GB, Versteegh LA, Morris PS *et al*. Mobile phones support adherence and retention of indigenous participants in a randomised controlled trial: strategies and lessons learnt. *BMC Public Health* 2014;**14**:622.
47. Kirkham R, MacKay D, Barzi F *et al*. Improving postpartum screening after diabetes in pregnancy: results of a pilot study in remote Australia. *Aust N Z J Obstet Gynaecol* 2019;**59**(3):430–5.
48. Perkes SJ, Bonevski B, Hall K *et al*. Aboriginal and Torres Strait Islander women's access to and interest in mHealth: national web-based cross-sectional survey. *J Med Internet Res* 2023;**25**:e42660.
49. Australian Government Department of Health. Australia's notifiable disease status, 2016: annual report of the National Notifiable Diseases Surveillance System. *Commun Dis Intell* 2021;**45**(28). DOI: 10.33321/cdi.2021.45.28.
50. Indigenous Data Governance Sovereignty (Information Sheet). Lowitja Institute. Available online at: https://www.lowitja.org.au/icms_docs/328550_data-governance-and-sovereignty.pdf
51. Choukou MA, Maddahi A, Polyvyana A *et al*. Digital health technology for Indigenous older adults: a scoping review. *Int J Med Inform* 2021;**148**:104408.
52. Anderson-Lewis C, Darville G, Mercado RE *et al*. MHealth technology use and implications in historically underserved and minority populations in the United States: systematic literature review. *JMIR Mhealth Uhealth* 2018;**6**(6):e128.
53. Menzies R, Turnour C, Chiu C *et al*. Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, Australia 2003 to 2006. *Commun Dis Intell Q Rep* 2008;32 Suppl:S2–67.
54. Bradley C, Hengel B, Crawford K *et al*. Establishment of a sentinel surveillance network for sexually transmissible infections and blood borne viruses in aboriginal primary care services cross Australia: the ATLAS project. *BMC Health Serv Res* 2020;**20**:769.
55. Australian Government Department of Health Aged Care. *Influenza (flu)*. Australian Government. Available online at: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/influenza-flu (updated April 2022; last accessed 5 January 2023)
56. Aldrige RW, Story A, Hayward AC. Morbidity and mortality in homeless individuals, prisoners, sex workers, and individuals with substance use disorders in high-income countries: a systematic review and meta-analysis. *Lancet* 2018;**391**(10117):241–50.
57. Trick WE, Rachman F, Hinami K *et al*. Variability in comorbidities and health services use across homeless typologies: multicenter data linkage between healthcare and homeless systems. *BMC Public Health* 2021;**21**(1):917.
58. Australian Government Australian Institute of Family Studies. *The digital divide in telepractice service delivery*. Australian Government. Available online at: https://aifs.gov.au/resources/short-articles/digital-divide-telepractice-service-delivery#footnote-001 (updated September 2021; last accessed 5 January 2023)

What's love got to do with it? Exploring social love and public health

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social love; public health; love; health systems; systems change

WHAT THIS PAPER ADDS

- A definition of social love that addresses current professional concern over use of the concept.
- Discussion of the potential of social love to add value to public health systems, other public systems, and the populations they serve.
- A proposal of a way forward to explore the operationalisation and application of social love to existing public health decision making, and to collectively re-imagine the ways that we can incorporate 'social love' into everyday practice.

IMPLICATIONS FOR POLICY AND PRACTICE

- A public health system dominated by a biomedical model of care neglects 'social love', to the potential detriment of those providing and using public health services.
- Social love has the potential to add value to public health systems, other public systems, and the populations they serve, by acting as a lens through which public health policy making and decision making occurs, with the aim of improving the health and wellbeing of our populations.

INTRODUCTION

Relationships of all types are central to our lives and to our mental and physical health.[1] Love is an important concept in modern society, yet the popular use of the term 'love' does not capture the full breadth of its meaning. When one hears the word love, the mind naturally goes to romantic relationships. This presents a challenge, as the single term is used to convey several complex meanings: familial love, friendship love, parental love, spiritual love, strong individual and/or collective caring and nurturing actions towards others, and strong feelings towards objects and pastimes. The catch-all nature of the term 'love' is one of the primary reasons its use is often avoided by scientific, evidence-based professions, who develop their own ways of referring to the concept.[2–6] These include using related but distinct concepts like belonging, kindness, connection, and attachment, instead of using the term love. By taking care to avoid confusion with romantic love, we, as public health professionals, are missing an opportunity to explore the impact of a concept that could be important in our practice, and in the impact that we can make in society. In this article, we explore how the concept of love may align with, enhance, and improve public health decision making and service delivery.

LOVE AS A CONCEPT IN PUBLIC HEALTH AND SOCIAL CARE

The concept of love in health and social care is not new, and its importance in improving people's lives is well recognised.[2–9] Bell hooks[10] suggested that living by a 'love ethic' could bring about much needed societal change, helping to overcome dominant systems of inequality, and this theory has received attention in a social care context. hooks believed that embracing a love ethic meant utilising all dimensions of love in our daily lives (care, commitment, trust, responsibility, respect, and knowledge) and taking actions that are for the collective good. hooks was not the first to describe love as action for the good of others, and there are multiple other proposed terms and slightly differing definitions of the same, including agape (the Ancient Greek term for love for everyone), compassionate love[11], the art of loving[2] altruistic love, tender loving care[9], caritas[7], unselfish love[7], and a love of humanity[6]. hooks' definition is of focus here for two reasons.

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First, hooks suggested that the 'love ethic' is applicable at societal, whole population level, whereas other definitions referred to here are mainly discussed in the literature in terms of individuals; and second, because it includes loving actions for the good of the self, protecting against exploitation and abuse of power[8], whereas many of the other definitions include an element of self-sacrifice.

Another scholar, Lynn Underwood,[11] has articulated aspects of compassionate love that overlap with hooks' work and has developed a conceptual framework of compassionate love for use in research. Underwood describes the key features as: free choice for the other; some degree of cognitive understanding of the situation, the other, and oneself; valuing the other; openness and receptivity; and response of the 'heart'. Underwood's work differs from hooks' work, in that Underwood emphasises the importance of a physical or emotional cost to self when taking compassionately loving actions (also described as a deep investment of self[12]). Despite elements of Underwood's definition adding value to hooks' 'love ethic', including valuing the other and being open and receptive, we disagree that love should include sacrifice of self and therefore align with hooks.

hooks' work encourages a focus at a societal level, calling upon individuals to enact justice, challenge systems of power, and build connected communities. These aims are aligned with being a public health leader: having a passion to make the world a better place, advocating for traditionally excluded and disadvantaged groups, actively changing practice on the ground, working collaboratively with all stakeholders, and influencing policy at national level.[13] Despite this, the 'love ethic' proposed by hooks has not yet been adequately explored in the context of public health systems, nor has it been considered beyond the individual, at organisational or institutional level. Levine and Cooney[14] are the first authors to our knowledge to consider the potential of love and 'generative' relationships (where both parties are better off as a result) in transforming our lives. They suggest that 'love, as a context within which we live, may have very powerful public health implications' (p. 87) and describe an opportunity to consider how we 'redesign our neighbourhoods, communities, organisations, processes, and policies to intentionally promote generative relationships, to create human systems as they were intended to be – places where it is easy to care and love one another' (p. 88).

There are multiple reasons for the stark absence of love from the public health literature, including the prevailing biomedical model and scientisation of health, where subjectivity is less valued over objective empiricism,[4,6] and the connotation of romance or sex from the word love. Szeintuch[3] suggested use of the term 'social love' to overcome the issues around confusion of the terms 'love ethic' or compassionate love, with romantic or sexual love, and to ensure that the platonic nature of the love being described was immediately apparent. Szeintuch proposed a false binary however, with romantic and sexual love distinct from social love, the term under which they grouped all other types of love. We do not believe that all other forms of love can be grouped under one term. Instead, we believe that the term social love could and should be used to describe the concept created by the amalgamation of the work of hooks and Underwood outlined above.

For the purposes of this article, the term social love will be used more specifically than used by Szeintuch, to describe both the motivation and actions of a system, organisation, or institution (and people working within them), for the purpose of increasing the wellbeing of another, self, community, and the environment. Central to social love is a collective affective quality, and it involves care, respect, commitment, knowledge, responsibility, and trust, as well as valuing the other, self, community, and environment, and remaining open and receptive.

WHERE DOES SOCIAL LOVE FIT IN THE PUBLIC HEALTH SYSTEM?

There is no single definition of a population-focused public health system, meaning it is conceptualised in different ways and often mistaken for healthcare systems that focus on the health of individuals.[15] It can be considered as a complex system of interconnecting elements, which can promote or undermine good health and wellbeing.[16] According to this definition, the public health system includes organisations, their underpinning policies and governance, and how they influence, work, and act within and across each other to enable or constrain actions to improve public health. In contrast many healthcare systems are rooted in a biomedical model which does not focus on wider health and wellbeing needs[17] or love and compassion.

A public health system dominated by a biomedical model of care often neglects social love to the potential detriment of those providing and using public health services:

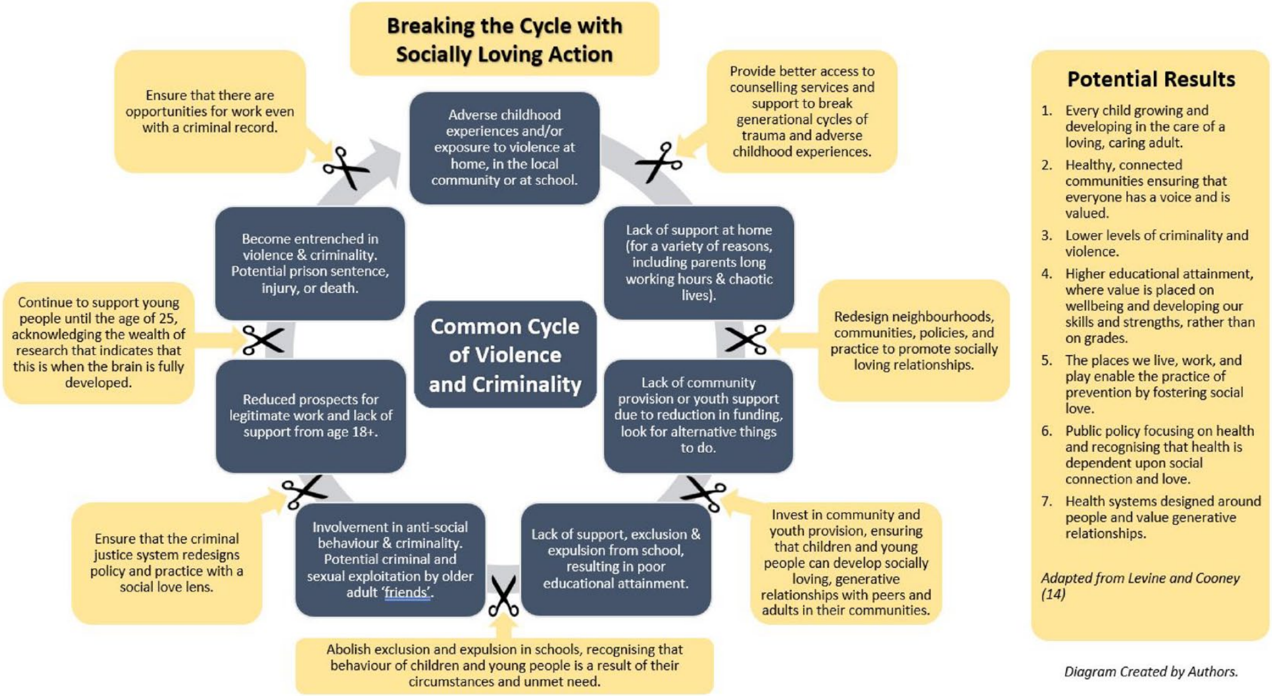
For those providing public health services, the academic literature suggests reasons for avoiding talking about love, including underfunding and a lack of resources, increasing technological and bureaucratic demands, and a belief that love and compassion are considered weak and unprofessional.[2,7] Trezciak and Masserelli refer to this as a compassion crisis in healthcare that can worsen health and prolong recovery.[18] Stickley and Freshwater argue that relationships are consistently undervalued in the UK health system and are not considered in the provision of resources,[2] and the House of Commons Health and Social Care Committee found that health professionals are often burnt out and experience 'compassion fatigue'.[19]

For those receiving public health services, decision making occurs at a population level, meaning there is a degree of separation between the organisation or service, and the individuals in receipt of them.[20] This demands an awareness at organisational, service, and professional level which integrates imagination, empathy, and care, if the potential effects of population health policies and practices on an individual's health and wellbeing are to be understood.[21] Levine and Cooney[14] suggest that we have unintentionally designed neighbourhoods, communities, organisations, processes, and policies that create the opposite of what is needed, because we have failed to consider the importance of generative relationships; and that the absence of generative relationships may explain our experience of entrenched and enduring health inequalities, burden of chronic disease, and poor life trajectories of so many children.

With mounting evidence that human connection and compassion is associated with the delivery of high-quality healthcare, lower healthcare costs, reduced healthcare provider burnout, and effective public health programming,[18] now is the time to recognise the unlocked potential of social love as a concept that could introduce a new way of understanding public health policy and practice and add a new dimension to public health discourse.

WHAT PUBLIC HEALTH CHALLENGES COULD SOCIAL LOVE HELP WITH? VIOLENCE AS AN EXAMPLE

Violence is a serious social and public health issue, with over 1.77 million police recorded violence against the person offences in England and Wales in 2020/2021[22] and costs to UK society estimated at over £3 billion.[23] War and violence cost the world $14 trillion every year.[24] The need to address the complex causes of violence is reflected in a shift towards a public health, 'whole systems' approach. In the diagram below, we demonstrate the potential of social love to disrupt the commonly accepted pathway to violence and outline the possible outcomes that the changes could bring. It is important to note that many of these suggestions require funding changes and decision making at central government level. Public health has always been about science and art, and this involves influencing and making the case for change.



Adverse childhood experiences and/or exposure to violence at home, in the local community or at school.

Lack of support at home (for a variety of reasons, including parents long working hours & chaotic lives).

Lack of community provision or youth support due to reduction in funding, look for alternative things to do.

Lack of support, exclusion & expulsion from school, resulting in poor educational attainment.

Involvement in anti-social behaviour & criminality. Potential criminal and sexual exploitation by older adult 'friends'.

Reduced prospects for legitimate work and lack of support from age 18+.

Become entrenched in violence & criminality. Potential prison sentence, injury, or death.

Provide better access to counselling services and support to break generational cycles of trauma and adverse childhood experiences.

Redesign neighbourhoods, communities, policies, and practice to promote socially loving relationships.

Invest in community and youth provision, ensuring that children and young people can develop socially loving, generative relationships with peers and adults in their communities.

Abolish exclusion and expulsion in schools, recognising that behaviour of children and young people is a result of their circumstances and unmet need.

Ensure that the criminal justice system redesigns policy and practice with a social love lens.

Continue to support young people until the age of 25, acknowledging the wealth of research that indicates that this is when the brain is fully developed.

Ensure that there are opportunities for work even with a criminal record.

Potential Results

1. Every child growing and developing in the care of a loving, caring adult.
2. Healthy, connected communities ensuring that everyone has a voice and is valued.
3. Lower levels of criminality and violence.
4. Higher educational attainment, where value is placed on wellbeing and developing our skills and strengths, rather than on grades.
5. The places we live, work, and play enable the practice of prevention by fostering social love.
6. Public policy focusing on health and recognising that health is dependent upon social connection and love.
7. Health systems designed around people and value generative relationships.

Adapted from Levine and Cooney (14)

Diagram Created by Authors.

PRACTICALLY, HOW COULD SOCIAL LOVE INTRODUCE A NEW WAY OF UNDERSTANDING PUBLIC HEALTH POLICY AND PRACTICE, AND ADD A NEW DIMENSION TO PUBLIC HEALTH DISCOURSE?

We have demonstrated in this article the potential value of social love to the health and wellbeing of the population, and that social love is currently unheard of, and potentially undervalued, in public health systems. To address these challenges, we believe it is important that people working within public health systems, other public systems, and the populations that they serve be involved in the development of the concept of social love, to understand how it relates to their purpose and core work.

POTENTIAL QUESTIONS FOR THE PUBLIC HEALTH COMMUNITY

We tentatively propose a 'check and challenge' series of questions for the public health community, as we believe it is important that organisations, services, and people working within the public health system have a starting point for considering social love in their work. Social love is a lens through which we can explore problems and solutions, and is applicable to the whole public health process, from defining a public health issue, all the way through to decision making and taking action. The definition of social love in this article provides a starting pointing for developing a more mature understanding of its potential role in public health policy and practice.

Consider each of these elements throughout the whole public health process:

Motivation: What is our ultimate aim? Is it to increase the health and wellbeing of others, self or community? This may involve asking 'why?' repeatedly to get to the ultimate aim.

Care: How does this impact the health, welfare, maintenance, and protection of the population/community/environment?

Respect: Are we valuing others, ourselves, our communities, and our environment? This should be regardless of circumstance, for example, even if the issue we are addressing is perceived as self-caused.

Commitment: Are we acting from a position of dedication to improving the health and wellbeing of the other, self or community?

Knowledge: Do we have an accurate understanding of the situation (the issue, the causes of it, the impacts, and unintended consequences of our proposed actions or decision), as well as the community this will affect and possible impacts to our environment?

Responsibility: Are we behaving in a socially and morally just way towards others, self, community, and environment?

Trust: Do we trust our evidence and information? Do we believe that our work is reliable/true?

Openness and receptivity: Have we been open and receptive, allowing inspiration and innovation to feature in our work?

NEXT STEPS

We invite interested organisations, teams, and practitioners to get in touch if they would like to explore the operationalisation and application of social love to existing public health decision making, and to collectively re-imagine the ways that we can incorporate 'social love' into everyday practice.

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CONFLICT OF INTEREST

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References

1. Umberson D, Montez JK. Social relationships and health: a flashpoint for health policy. *J Health Soc Behav* 2010;**51**(Suppl.):S54–66.
2. Stickley T, Freshwater D. The art of loving and the therapeutic relationship. *Nurs Inq* 2002;**9**(4):250–6.
3. Szeintuch S. Social love: the power of love in social work. *Aust Soc Work* 2022;**75**(4):471–82.
4. Smith M. Editorial. *Scott J Resid Child Care* 2016;**15**(3). Available online at: https://pureportal.strath.ac.uk/en/publications/editorial-42 (last accessed 18 December 2023).
5. Vincent J. Perspectives on love as a component of professional practice. *Int J Soc Pedag* 2016;**15**(3):6–21. Available online at: https://www.scienceopen.com/hosted-document?doi=10.14324/111.444.ijsp.2017.02 (last accessed 1 June 2022).
6. Morley L, Ife J, Morley' L. Australian social work social work and a love of humanity social work and a love of humanity, 2008. Available online at: https://www.tandfonline.com/action/journalInformation?journalCode=rasw20 (last accessed 1 June 2022).
7. Arman M, Rehnsfeldt A. The presence of love in ethical caring. *Nurs Forum* 2006;**41**(1):4–12.
8. Godden NJ. The love ethic: a radical theory for social work practice. *Aust Soc Work* 2017;**70**(4):405–16.
9. Kendrick KD, Robinson S. Tender loving care as a relational ethic in nursing. *Nurs Ethics* 2002;**9**(3):291–300.
10. hooks B. *All about love: new visions*. New York: Harper Perennial; 2001.
11. Underwood LG. Compassionate love: a framework for research. In: B Fehr, S Sprecher. LG Underwood (eds) *The science of compassionate love: theory, research, and applications*. Malden, MA: Wiley-Blackwell; 2009. pp. 3–25.
12. Underwood LG. The human experience of compassionate love: conceptual mapping and data from selected studies. In: SG Post, LG Underwood, JP Schloss. WB Hurlbut (eds) *Altruism and altruistic love: science, philosophy, and religion in dialogue*. New York: Oxford University Press; 2002. pp. 72–88.
13. Faculty of Public Health. Careers in public health, 2023. Available online at: https://www.fph.org.uk/training-careers/careers-in-public-health/ (last accessed 20 February 2023).
14. Levine MJ, Cooney MA. Love as a public health intervention. *J Public Heal Manag Pract* 2018;**24**(1):87–9. Available online at: https://journals.lww.com/jphmp/Fulltext/2018/01000/Love_as_a_Public_Health_Intervention.16.aspx (last accessed 20 February 2023).
15. Jarvis T, Scott F, El-Jardali F *et al*. Defining and classifying public health systems: a critical interpretive synthesis. *Heal Res Policy Syst* 2020;**18**(1):1–12. Available online at: https://health-policy-systems.biomedcentral.com/articles/10.1186/s12961-020-00583-z (last accessed 6 September 2022).
16. Barnes A, Black M, Baxter S *et al*. Understanding public health systems: a participatory systematic review and systems infographic. *Lancet* 2019;**394**:S22. Available online at: http://www.thelancet.com/article/S0140673619328193/fulltext (last accessed 20 February 2023).
17. The Health Foundation. Time for action: how NHS England is embedding the learning from Realising the Value. 2016. Available online at: https://www.health.org.uk/newsletter-feature/time-action-how-nhs-england-embedding-learning-realising-value (last accessed 12 July 2022).
18. Trzeciak S, Mazzarelli A. *Compassionomics: the revolutionary scientific evidence that caring makes a difference*. Pensacola, FL: Studer Group; 2019.
19. House of Commons Health and Social Care Committee. Workforce burnout and resilience in the NHS and social care second report of session 2021-22 report, together with formal minutes relating to the report, 2021. Available online at: www.parliament.uk/hsccom (last accessed 12 July 2022).

20. NHS England. Population health and the population health management programme, 2023. Available online at: https://www.england.nhs.uk/integratedcare/what-is-integrated-care/phm/ (last accessed 4 May 2023).
21. Nihlén Fahlquist J. Public health and the virtues of responsibility, compassion and humility. *Public Health Ethics* 2019;**12**(3):213–24. Available online at: https://academic.oup.com/phe/article/12/3/213/5498767 (last accessed 6 September 2022).
22. Statista. Violent crimes in England and Wales 2021, 2022. Available online at: https://www.statista.com/statistics/288256/violent-crimes-in-england-and-wales/ (last accessed 22 June 2022).
23. Public Health Institute. Demonstrating the costs of violence to the healthcare system development of a costing tool, 2021. Available online at: www.flaticon.com (last accessed 11 July 2022).
24. Broom D. War and violence cost everyone $5 a day. World Economic Forum; 2021. Available online at: https://www.weforum.org/agenda/2021/02/war-violence-costs-each-human-5-a-day/ (last accessed 5 May 2023).

Predictors of fuel poverty and the equity of local fuel poverty support: secondary analysis of data from Bradford, England

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inequalities; fuel poverty; energy poverty; equity; logistic regression

Abstract

Aims: Addressing fuel poverty is a critical public health issue given its recent rise in prevalence across Europe. Although previous research identifies national risk markers of fuel poverty, evidence is lacking on whether these are consistent across local geographies, and the equity of local interventions. In the UK's current economic climate, it is more crucial than ever that services benefit households in greatest need. This study aimed to determine significant predictors of fuel poverty among households in Bradford, England, comparing them to national-level predictors, and evaluate if households possessing significant fuel poverty predictors were equitably referred to a local fuel poverty service (Warm Homes Healthy People, WHHP).

Methods: A multivariate logistic regression model determined significant fuel poverty predictors in Bradford using household-level data from the Energy Saving Trust and the Low Income High Costs fuel poverty definition. Statistical testing highlighted significant differences in predictors of fuel poverty between households referred to WHHP and all Bradford households.

Results: Significant ($p < .05$) predictors of fuel poverty included: living in an area with lower average household incomes and higher proportion of ethnic minority individuals, and living in a property with a lower energy efficiency rating. Households living in a detached or older property, and homeowners were more likely to be fuel poor. Differences in the direction of the relationship with fuel poverty were identified between some national and local predictors. Most predictors were significantly ($p < .05$) overrepresented among WHHP households, suggesting equitable service reach. Ethnic minorities, younger people, and multiperson households were underrepresented.

Conclusions: Local fuel poverty predictors were similar to many national-level predictors, but identified differences in the direction of the relationship between some national and local predictors reaffirm the value of locally focused research. WHHP successfully targeted households possessing key predictors, but should ensure that ethnic minorities, younger people, and multiperson households are equitably referred.

INTRODUCTION

Fuel poverty, also known as energy poverty,[1] is defined as a household's inability to afford to keep adequately warm to achieve a healthy standard of living at a reasonable cost.[2] Fuel poverty is a critical issue for public health, given its association with a multitude of health and socioeconomic consequences for households and wider society. In much of Europe, fuel poor households are at greater risk of damp, cold, and mouldy homes, leading to development or exacerbation of respiratory health issues (including asthma and infections such as influenza) and cardiovascular conditions (including strokes and heart attacks).[3,4]

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Fuel poverty negatively impacts mental health[5] due to stress, anxiety, and worry about finances and living conditions. Groups more vulnerable to fuel poverty include those already living with these health conditions, older people, households with young children, and low-income households.[6] People living in fuel poverty are more likely to have days off work and school, which can impact household finances and educational attainment.[7,8] There are also knock-on effects for healthcare. For example, in England, annual National Health Service treatment costs related to illnesses caused by cold homes are estimated to be around £1.3 billion.[9]

Three main drivers of fuel poverty widely discussed in the literature are income, energy efficiency, and energy prices,[7] with recent research highlighting the complexity of interaction between these drivers and additional factors, including demographic and physical housing characteristics, and national and local policies that impact on energy prices and household expenditure.[10,11]

Existing literature highlights key risk markers of and vulnerabilities to fuel poverty.[11–16] In England, most research on this topic is nationally focused, with significant characteristics influencing whether a household is living in fuel poverty grouped into three main categories: household income and employment,[5,8,17] occupant demographics,[10,18] and housing characteristics.[5,18,19] Energy consumption habits are also important to consider[20] but it is notable that these will not impact whether a household is deemed fuel poor according to current UK government definitions.[21]

Yet while research identifies national risk markers of fuel poverty, evidence is lacking on whether these are consistent across local geographies. This information is crucial to enable locally based intervention services to be aware of and equitably engage with populations most at risk of fuel poverty. Previous evaluations of fuel poverty initiatives in Europe highlight issues with targeting and reaching fuel poor homes.[12,13,22] There is a significant research gap in evaluating the equity of local interventions. This is a particular concern in the UK given long-term cuts to local authority budgets and the ongoing cost-of-living crisis[17,23]: more than ever there is a need to ensure local funding and fuel poverty programmes benefit those who most need help.

This study aimed to address these gaps in the literature. First, through determining significant predictors of fuel poverty in one local geography and exploring if and/or how these differ to national findings; and, second, by evaluating if households with significant local predictors of fuel poverty have been equitably referred into a local fuel poverty service, and thus if they are benefitting households in most need.

INTERVENTION SITE

Bradford, a district in West Yorkshire, England, with over half a million residents[24] was selected as an appropriate intervention site to explore risk markers of fuel poverty at a smaller geographic level as it has a different demographic structure and housing stock to the national average: a younger, more deprived population; higher proportion of ethnic minority individuals; an older housing stock; and higher proportion of privately rented homes compared to the national average. Bradford has higher than average rates of fuel poverty, with 19.2% of households living in fuel poverty in 2021, compared to 13.1% nationally, as measured by using the UK government's Low Income Low Energy Efficiency (LILEE) definition.[25–28]

Furthermore, Bradford has a fuel poverty service–Warm Homes Healthy People (WHHP)–that has been operating for over a decade, with data from which it was possible to evaluate the equity of referrals. Initially funded by the Department of Health, but now commissioned by Bradford Council, WHHP aims to address the impacts and underlying causes of fuel poverty by focusing on prevention and early intervention. Multiple WHHP service providers work in partnership across Bradford, including the lead provider Groundwork, Bradford AgeUK, Inn Churches, and the HALE Project.[29]

WHHP provides services including energy supplier switching advice, installation of simple energy efficiency measures, and support for energy bills, debt, and benefits checks.[29] To be referred into WHHP, households must fit into one or more eligibility criteria (Table 1) to capture those most vulnerable to fuel poverty, based on national evidence.[7] Referrals are via organisations including health and social care, voluntary sector, and educational establishments, or self-referral.

METHODS

A retrospective, observational, cross-sectional design using secondary analysis was used. Measuring fuel poverty is challenging because it is a multidimensional concept.[30] Since 2021 in England, fuel poverty has been measured using the 'LILEE' indicator. To be considered fuel poor using LILEE, a household's disposable income (after housing costs and energy needs, equivalised to account for the number of occupants) must be below the relative poverty line (60% below the median national household income) and they must live in a property with a Standard Assessment Procedure (SAP) Band of D or below. LILEE superseded the 'Low Income High Costs' (LIHC) indicator, which deemed a household to be fuel poor if it exceeded both a national income threshold (determined using the same methodology as LILEE) and a fuel cost threshold (weighted median of fuel costs of all households to keep at an adequate standard of warmth, equivalised to account for the number of occupants).[31]

For this study, the LIHC indicator was used because it includes households living in more energy efficient homes (i.e. SAP Band A–C properties), who cannot be classed as fuel poor using the LILEE indicator.[31] This was considered more appropriate as the WHHP service provides a range of interventions beyond energy efficiency improvements which could benefit any household living in fuel, regardless of SAP Band rating.

Ethical approval was not required as this secondary research study used anonymised datasets containing no

Table 1

Eligibility criteria for the Warm Homes Healthy People service[29].

Household member(s) aged over 65 years
Household income below £16,190
Household member(s) with long-term health condition
Household member(s) with a mental health condition
Household member(s) living with dementia
Household member(s) with a learning disability
Children under 5 years in the household
Pregnant household member
Asylum seeker or refugee
In receipt of benefits
Accommodation in disrepair/not adequately heated
Experiencing/fleeing domestic abuse

identifiable information, in accordance with the University of York's Ethics Committee policies. The datasets were used in accordance with a data sharing agreement agreed prior to the project. The raw datasets are compliant to General Data Protection Regulation.

All data cleaning and analysis were performed in R Studio version 4.2.1.

Aim 1: to determine significant local-level predictors of fuel poverty

The Home Analytics Database was used to determine significant predictors of fuel poverty among households in Bradford, provided to the West Yorkshire Combined Authority, including Bradford Council, by the Energy Saving Trust.[32] This dataset contains detailed information on every home across Bradford District as of November 2021, resulting in a raw sample size of 226,696 properties. It is a complete dataset with no missing values. The variables are a mixture of property-specific variables, and estimated variables based on small geographies in which the property is situated including Census Output Areas (COAs), Lower Level Super Output Areas (LSOAs), and Middle-Level Super Output Areas (MSOAs). If a variable likely to be a predictor of fuel poverty was not present in the Home Analytics Database, an estimated value for each household was sourced from publicly available datasets (e.g. 2021 Census data) to ensure a comprehensive set of fuel poverty predictors could be included in the analysis. There were 22 variables eligible for inclusion in the final logistic regression model (Table 2).

The dependent variable was estimated fuel poverty status (fuel poor or not fuel poor), calculated by ranking homes by their relative fuel poverty probability, estimated by the Energy Saving Trust using the LIHC definition, and determining the top 19.2% homes (Bradford's estimated 2021 fuel poverty rate)[25] as those estimated to be living in fuel poverty.

Associations between each independent variable and fuel poverty status were examined using univariate logistic regression models. Variables showing a significant association with fuel poverty, determined if $p < .05$, were eligible to be included in a multivariate logistic regression model.

A multivariate logistic regression model was built to identify significant predictors of fuel poverty among Bradford households, using fuel poverty status as the dependent variable, and purposefully selected predictors of fuel poverty as independent variables. Model assumptions were tested and the model adjusted accordingly. All variables were entered into the final model simultaneously. Any independent variable in the final logistic regression model with $p < .05$ was considered a statistically significant predictor of fuel poverty when all other factors were held constant.

Aim 2: to evaluate if households possessing significant predictors of fuel poverty were equitably referred to a local fuel poverty service

Data were provided by the lead WHHP service provider, Groundwork.[29] Demographic and housing characteristic data of each household are collected by Groundwork employees when conducting home visits to referred households. Data used in the analysis were collected between January 2018 and April 2023 and consisted of 1588 entries that included a household postcode within Bradford District and were therefore eligible to be utilised in the analysis. Although this is a subset of all WHHP referrals in Bradford as Groundwork works in partnership with multiple organisations who also provide the WHHP service, the dataset is considered broadly representative of all households referred into the service as Groundwork is the lead service provider and responsible for the majority of referrals.

Variables representative of those found to be significant predictors of fuel poverty in Bradford, as determined by the final multivariate logistic regression model in Aim 1, were used in the WHHP analysis at household level (Table 3). All variables were contained in the dataset apart from SAP Band rating, individuals in poor health, and underoccupied households. As only the postcode of households referred to WHHP was included in the dataset, estimated SAP Band ratings were calculated by using the mean SAP Band rating for the household's postcode, derived from household level SAP Band ratings as of 31 May 2023.[33]

Table 2

List of independent variables eligible to be included in the logistic regression model.

Variable name	Variable type	Geography	Source and year of data collection	Description
Individuals claiming benefits (%)	Continuous	Census Output Area	Energy Saving Trust, 2020[32]	The proportion of individuals in the area claiming at least one of the following benefits: Employment and Support Allowance, Universal Credit, Jobseekers Allowance, Disability Living Allowance, Income Support, Pension Credit. As reported by the Department for Work and Pensions.
Dependent children households (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of households in the area that contain one or more dependent children, defined as a person aged 0–15 years or a person aged 16–18 years who is in full-time education and lives in a family with their parent, parents, grandparent, or grandparents
Ethnic minority individuals (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of individuals in the area who are of an ethnic minority group, defined as any ethnic group apart from White British
Single-person households (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of households in the area that contain one person living alone
LSOA IMD rank	Continuous	LSOA	Energy Saving Trust, 2019[32]	The LSOAs rank (out of all LSOAs in England) based on the 2019 IMD score in England
Lone-parent households (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of households in the area that contain one parent with a dependent child (described above), living in a household with no other people
Median age of individuals (years)	Continuous	Census Output Area	Office for National Statistics, 2020[24]	The median age in years of all individuals living in the area
MSOA income (£00's)	Continuous	MSOA	Energy Saving Trust, 2018[32]	The median income (£ per annum) of households in the MSOA the property is located within. Figures represent net annual income, after housing costs. Based on Office for National Statistics estimates.
Individuals in poor health (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of individuals in the area self-reporting as having bad or very bad general health
Individuals seeking employment (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of individuals in the area of working age (16–64 years) who were economically active and unemployed, including people who were looking for work and could start within 2 weeks, or waiting to start a job that had been offered and accepted, excluding full-time students
Underoccupied households (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of households in the area whose property has more bedrooms than required for the occupants. The following should have their own bedroom: adult couple, any remaining adult (aged 21 years or over), two males/females (aged 10–20 years), one male/female (aged 10–20 years), and one male/female (aged 9 years or under) if there is an odd number of males/females aged 10–20 years, one male/female aged 10–20 years if there are no males/females aged 0–9 years to pair with him/her, two children (aged 9 years or under) regardless of sex, any remaining child (aged 9 years or under)

(Continued)

Table 2 (Continued)

List of independent variables eligible to be included in the logistic regression model.

Variable name	Variable type	Geography	Source and year of data collection	Description
Unemployed individuals (%)	Continuous	Census Output Area	UK Census, 2021[27]	The proportion of individuals in the area of working age (16–64 years) who were either economically active and unemployed, or economically inactive due to long-term sickness and disability, looking after home and family, or another reason given, excluding full-time students and retired individuals
SAP Band rating	Categorical	Household	Energy Saving Trust, 2021[32]	The energy efficiency (SAP) band of the property
Property age	Categorical	Household	Energy Saving Trust, 2021[32]	The time period the property was built
House type	Categorical	Household	Energy Saving Trust, 2021[32]	The type of property
Tenure	Categorical	Household	Energy Saving Trust, 2021[32]	The type of housing tenure
Estimated floor area (m^2)	Continuous	Household	Energy Saving Trust, 2021[32]	An estimate of the property's total floor area (m^2)
Wall type	Categorical	Household	Energy Saving Trust, 2021[32]	The property's wall construction type
Loft insulation	Categorical	Household	Energy Saving Trust, 2021[32]	Indicates whether the property has a loft and if so, what its insulation thickness is
Wall insulation	Categorical	Household	Energy Saving Trust, 2021[32]	Indicates whether the property's walls are insulated
Glazing type	Categorical	Household	Energy Saving Trust, 2021[32]	Indicates the main type of glazing on the property's windows
Main fuel type	Categorical	Household	Energy Saving Trust, 2021[32]	The primary fuel type used to heat the property

LSOA = Lower Level Super Output Area; IMD = Index of Multiple Deprivation; MSOA = Middle-Layer Super Output Area; SAP = Standard Assessment Procedure.

Data for individuals in poor health and underoccupied households could not be accurately sourced so were not included in the analysis.

For each predictor of fuel poverty determined by the univariate and multivariate regression models, WHHP service reach was deemed equitable if there was a statistically significant difference in the predictor values of the WHHP households compared to all Bradford households in the same direction as the relationship of the predictor with fuel poverty, that is the predictor characteristic was overrepresented among WHHP households compared to the Bradford average. If the direction of the relationship between fuel poverty and the predictor characteristic was opposite in the univariate and multivariate logistic regression models, the direction of the relationship in the univariate model would be used to determine equity as the statistical tests used (described below) did not adjust for confounders, consistent with the univariate model.

Bradford data were gained from the Home Analytics dataset used in Aim 1 ($n = 226{,}696$ properties). For continuous variables, Mann–Whitney *U* tests were performed as all variables did not follow a normal distribution, with the null hypothesis being that there is no difference between the medians or mean ranks.[34] For categorical variables, a

Table 3

Variables used in the analysis of the WHHP data and the percentage of households in the total dataset ($n = 1588$) with a completed entry for the variable (January 2018–April 2023).

Variable name	Variable type	Percentage of households with a completed entry
Annual household income (£s)	Continuous	6.4
Employment status of household reference person	Categorical	59.3
Receiving benefits	Categorical	[a]
Lone-parent household	Categorical	59.3
Single-person household	Categorical	59.3
Age of household reference person (years)	Continuous	55.7
Ethnicity of household reference person	Categorical	47.5
Count of long-term health conditions of household reference person	Categorical	[a]
Mean SAP Band rating of postcode	Categorical	99.7
Tenure status	Categorical	62.5
Property type	Categorical	63.2
Property build year	Categorical	41.6
Number of bedrooms per household member	Categorical	35.1

WHHP = Warm Homes Healthy People; SAP = Standard Assessment Procedure.
[a] The percentage of households with a completed entry is unknown due to the way in which the response, or unanswered question, was coded in the dataset provided.

chi-square test of homogeneity was performed as all variables met the assumption that at least 80% of the expected frequencies were 5 or greater and all the expected frequencies have a value of at least 1. The null hypothesis was that the WHHP households had the same proportions of fuel poverty characteristics as all Bradford households. Null hypotheses were rejected if $p < .05$.

RESULTS

Aim 1: to determine significant local-level predictors of fuel poverty

The univariate logistic regression (Table 4) showed that all independent variables were statistically significantly associated with fuel poverty, so could be included in the multivariate logistic regression model.

After rigorous assumption checking for the multivariate logistic regression model (see Supplemental material Section 1), the final model contained 226,489 data points and 13 variables. The following variables were removed from the final model due to high collinearity with other variables: estimated floor area, wall type, loft and wall insulation, glazing type, main fuel type, LSOA Index of Multiple Deprivation (IMD) rank, households with dependent children, and unemployed individuals. All independent variables in the final model had a squared scaled general variance inflation factor value <4. The final model had good predictive power as demonstrated by the McFadden's R^2 statistic being 0.69 and an area under the receiver operating characteristic curve value of 0.98 (see Supplemental material Section 2). The model (Table 4) showed that all predictor variables of fuel poverty remained significant after adjusting for the other independent variables in the model, apart from the 1983–1995 category in the property build year variable ($p = .22$).

Continuous independent variables which increased the likelihood of households in Bradford being fuel poor after controlling for other independent variables in the model (Table 4) included living in an MSOA with lower average household income (odds ratio (OR) = 0.930, 95% confidence interval (CI) = 0.929–0.931), living in a COA with a higher proportion of ethnic minority individuals (OR = 1.026, 95% CI = 1.024–1.027), individuals in poor health (OR = 1.044, 95% CI = 1.034–1.053), underoccupied households (OR = 1.013, 95% CI = 1.011–1.015), and a lower median age of individuals (OR = 0.984, 95% CI = 0.979–0.988). Households living in COAs with a smaller proportion of individuals seeking employment (OR = 0.955, 95% CI = 0.947–0.962) and lone-parent households (OR = 0.959, 95% CI = 0.954–0.963) were more likely to be fuel poor when all other variables were held constant. Households living in COAs with a lower proportion of single-person households (OR = 0.991, 95% CI = 0.989–0.994) or a higher proportion of benefits claimants (OR = 1.008, 95% CI = 1.004–1.012) were significantly more likely to be fuel poor; however, the 95% CIs of these variables were close to 1.

A lower SAP Band and older property age (except properties built ⩽13 years before the reference group, post-1996) significantly increased the likelihood of a household in Bradford being fuel poor (Table 4). The estimates of the SAP Bands were large, for example SAP Band F–G households were 383.58 times (95% CI = 310.12–474.44) more likely to be fuel poor than SAP Band A–B households. The magnitude of the estimate and width of the CIs may be influenced by the relatively small

Table 4

Results of the univariate (unadjusted) and multivariate (adjusted) logistic regression model with fuel poverty as the dependent variable, presented to three decimal places for continuous variables (due to narrow confidence intervals) and two decimal places for categorical variables.

Variable	Group	Unadjusted odds ratio (95% confidence interval)	*p*-value from univariate model	Adjusted odds ratio (95% confidence interval)	*p*-value from multivariate model
MSOA average income (£00's)	–	0.950 (0.949, 0.950)	<.001	0.930 (0.929, 0.931)	<.001
Individuals claiming benefits (%)	–	1.041 (1.04, 1.042)	<.001	1.008 (1.004, 1.012)	<.001
Individuals seeking employment (%)	–	1.248 (1.244, 1.252)	<.001	0.955 (0.947, 0.962)	<.001
Lone-parent households (%)	–	1.018 (1.017, 1.020)	<.001	0.959 (0.954, 0.963)	<.001
Single-person households (%)	–	0.973 (0.973, 0.974)	<.001	0.991 (0.989, 0.994)	<.001
Median age of individuals (years)	–	0.829 (0.827, 0.831)	<.001	0.984 (0.979, 0.988)	<.001
Ethnic minority individuals (%)	–	1.057 (1.057, 1.058)	<.001	1.026 (1.024, 1.027)	<.001
Individuals in poor health (%)	–	1.071 (1.068, 1.074)	<.001	1.044 (1.034, 1.053)	<.001
Underoccupied households (%)	–	0.955 (0.954, 0.956)	<.001	1.013 (1.011, 1.015)	<.001
SAP Band	A–B (reference)	–	–	–	–
	C	1.59 (1.32, 1.9)	<.001	1.52 (1.23, 1.88)	<.001
	D	14.32 (12.08, 16.97)	<.001	29.5 (24.18, 35.98)	<.001
	E	56.59 (47.75, 67.05)	<.001	180.06 (147.2, 220.25)	<.001
	F–G	63.07 (53.06, 74.97)	<.001	383.58 (310.12, 474.44)	<.001
Property build year	Post-1996 (reference)	–	–	–	–
	1900–1929	13.03 (12.23, 13.88)	<.001	2.54 (2.26, 2.84)	<.001
	1930–1949	3.67 (3.43, 3.92)	<.001	1.41 (1.26, 1.59)	<.001
	1950–1966	2.39 (2.23, 2.55)	<.001	1.87 (1.66, 2.11)	<.001
	1967–1982	1.96 (1.83, 2.11)	<.001	1.3 (1.16, 1.47)	<.001
	1983–1995	1.14 (1.04, 1.25)	<.05	1.09 (0.95, 1.26)	.22
	Pre-1900	13.47 (12.65, 14.33)	<.001	3.28 (2.93, 3.68)	<.001

(Continued)

Table 4 (Continued)

Results of the univariate (unadjusted) and multivariate (adjusted) logistic regression model with fuel poverty as the dependent variable, presented to three decimal places for continuous variables (due to narrow confidence intervals) and two decimal places for categorical variables.

Variable	Group	Unadjusted odds ratio (95% confidence interval)	*p*-value from univariate model	Adjusted odds ratio (95% confidence interval)	*p*-value from multivariate model
Property type	Detached house (reference)	–	–	–	–
	Block of flats	4.34 (4.09, 4.6)	<.001	0.24 (0.21, 0.28)	<.001
	End-terraced house	2.8 (2.65, 2.95)	<.001	0.62 (0.56, 0.68)	<.001
	Flat in mixed use building	3.2 (3.01, 3.41)	<.001	0.19 (0.17, 0.22)	<.001
	Large block of flats	1.89 (1.76, 2.02)	<.001	0.14 (0.12, 0.16)	<.001
	Mid-terraced house	6.31 (6.04, 6.6)	<.001	0.58 (0.53, 0.63)	<.001
	Semi-detached house	1.45 (1.38, 1.51)	<.001	0.51 (0.47, 0.55)	<.001
	Small block of flats/ dwelling converted in to flats	1.09 (1.02, 1.16)	<.05	0.24 (0.21, 0.27)	<.001
Tenure	Owner-occupied houses (reference)	–	–	–	–
	Housing association	0.43 (0.41, 0.44)	<.001	0.42 (0.39, 0.45)	<.001
	Local authority	0.3 (0.2, 0.44)	<.001	0.47 (0.27, 0.82)	<.05
	Privately rented	1.62 (1.58, 1.66)	<.001	0.72 (0.68, 0.75)	<.001

MSOA = Middle-Layer Super Output Area; SAP = Standard Assessment Procedure.

proportion of households in the reference group, SAP Band A–B (5% of all Bradford households), with only 0.3% of Bradford's fuel poor households having a SAP Band of A–B (see Supplemental material Section 3), reducing stability of the estimates.

Detached homes (the reference group) were most likely to be fuel poor out of all property types, followed by end- and mid-terraced houses (OR = 0.62, 95% CI = 0.56–0.68 and OR = 0.58, 95% CI = 0.53–0.63, respectively). Owner-occupied houses (the reference group) were most likely to be fuel poor, followed by privately rented homes (OR = 0.72, 95% CI = 0.68–0.75).

Aim 2: to evaluate if households possessing significant predictors of fuel poverty were equitably referred to a local fuel poverty service

Tables 5 and 6 present comparisons, including significance testing, of demographics and household characteristics of the WHHP households compared to all Bradford households. An overview of the tables is provided below.

The pattern of referrals for income and employment variables was as expected, with WHHP households having significantly lower median household income, and a significantly higher proportion of household reference persons (HRPs) seeking employment and receiving benefits compared to the Bradford average.

For occupant demographic variables, a significantly higher proportion of WHHP households was lone-parent households than the Bradford average which was the expected direction according to the regression results. However, for single-person households and median age of HRPs the pattern of referrals was in the opposite direction to expected, with a significantly higher proportion of single-person households and older HRPs among the WHHP households compared to the Bradford average. There was no significant difference between the proportion of ethnic minority households

Table 5

Results of Mann–Whitney *U* test for continuous variables deemed significant predictors of fuel poverty in Bradford, comparing households in the WHHP programme with all households in Bradford.

Variable	WHHP respondents (*n*)	WWHP median	Bradford median	*U*-statistic	*p*-value	Estimate (95% confidence intervals)	Expected direction based on regression results
Annual household income (£s)	101	14,000.00	36,600.00	1,639,571	<.001	–21,400.00 (–22,700.00, –20,000.00)	Yes
Age (years) – 17+ only	885	47.00	46.00	193,941,521	<.001	3.00 (1.00, 4.00)	No

The final column indicates if the difference in values between the WHHP respondents and total Bradford population is in the same direction as expected from the regression results (Table 4). WHHP = Warm Homes Healthy People

Table 6

Results of chi-square test of homogeneity for categorical variables deemed significant predictors of fuel poverty in Bradford, comparing households in the WHHP programme with all households in Bradford.

Variable	WHHP respondents (*n*)	WHHP proportion (%) and 95% confidence intervals	Bradford households (*n*)	Bradford proportion (%) and 95% confidence intervals	Chi-square test statistic	*p*-value	Expected direction based on regression results
Proportion of benefits claimants	1588	44.33 (41.89, 46.77)	226,696	17.39 (17.23, 17.55)	795.21	<.001	Yes
Proportion seeking employment	941	21.04 (18.44, 23.64)	226,696	3.62 (3.54, 3.70)	802.41	<.001	Yes
Proportion of lone-parent households	942	21.23 (18.62, 23.84)	226,696	8.99 (8.87, 9.11)	169.38	<.001	Yes
Proportion of single-person households	942	36.09 (33.02, 39.16)	226,696	30.78 (30.59, 30.97)	12.17	<.05	No
Proportion of people from an ethnic minority	755	41.72 (38.20, 45.24)	226,696	43.28 (43.08, 43.48)	0.69	.41	No
Proportion of households in SAP Bands D, E, F, or G	1588	79.79 (77.81, 81.77)	226,696	71.37 (71.18, 71.56)	54.11	<.001	Yes
Proportion of home owners	992	35.28 (32.31, 38.25)	226,696	64.32 (64.12, 64.52)	361.17	<.001	Yes
Proportion of people living in detached properties	1004	4.18 (2.94, 5.42)	226,696	12.99 (12.85, 13.13)	67.97	<.001	Yes
Proportion of people living in properties built before 1967	661	75.04 (71.74, 78.34)	226,696	66.50 (66.31, 66.69)	21.18	<.001	Yes

The final column indicates if the difference in values between the WHHP respondents and total Bradford population is in the same direction as expected from the regression results (Table 4). WHHP = Warm Homes Healthy People; SAP = Standard Assessment Procedure.

among WHHP households and the Bradford average, in contrast to the regression results which showed that ethnic minority households are significantly more likely to be fuel poor.

The pattern of referrals for housing characteristic variables was as expected, with a significantly higher proportion of WHHP households living in a postcode with lower energy efficiency properties (mean SAP Band of D or below), a significantly higher proportion living in older properties (built before 1967), and a significantly lower proportion of WHHP households being homeowners and living in detached properties compared to the Bradford average.

DISCUSSION

The results of the multivariate logistic regression model showed that after holding all other variables constant, households in Bradford were significantly more likely to be fuel poor if they lived in an area with lower average household income, a lower average age of individuals, and a higher proportion of ethnic minority individuals, individuals in poor health, and benefits claimants. A higher proportion of individuals seeking employment, lone-parent households, and single-person households in the area significantly reduced the likelihood of being fuel poor. In terms of housing characteristics, older properties, detached homes, owner-occupied homes, and underoccupied households were most likely to be living in fuel poverty. Households living in properties with a lower SAP Band rating were also significantly more likely to be fuel poor, with large ORs, indicating SAP Band could be a strong predictor and efficient criterion for identifying fuel poor households, but the estimates for this variable may be unstable due to relatively low frequencies of fuel poor households in the reference category (SAP Band A–B). Although significantly associated with fuel poverty as shown by the respective univariate regression models, LSOA IMD rank, proportion of households with dependent children, and additional property characteristics related to energy efficiency (household floor area, fuel type, glazing type, loft insulation, wall type, and wall insulation) were removed from the final multivariate regression model due to high collinearity with other variables. This local information enables local fuel poverty interventions to target those most at risk of fuel poverty in Bradford, rather than relying on national estimates which has been the focus of most previous research in the UK.[8,10,15,18,19,35]

These findings largely agree with previous research on national risk markers of fuel poverty,[15,18,19] with predictors in Bradford covering all three main categories of household income and employment, occupant demographics, and housing characteristics; however, the direction of the relationship of some variables with fuel poverty in the final multivariate model (namely lone-parent households, property type, and tenure) was found to be inverse to that of some national research,[18] discussed below.

Households in areas with a higher proportion of lone-parent households were less likely to be fuel poor in Bradford after controlling for other predictors, whereas national research suggests that they are more likely to be fuel poor than other household compositions,[18,35] consistent with the univariate regression findings. Households living in detached homes were most likely to be fuel poor in Bradford after controlling for other predictors, whereas national research indicates they are least likely to be fuel poor,[18] consistent with the univariate regression findings. Homeowners were most likely to be fuel poor in Bradford after controlling for other predictors, whereas national research suggests privately rented households are most likely to be fuel poor,[5,18,35] consistent with the univariate regression findings. Possible explanations for these differences include using different definitions of fuel poverty, or adjusting for confounders in the final multivariate regression model in the study which had not been adjusted for in previous national research. These differences reaffirm the complexity of the relationship between fuel poverty and household characteristics, and the challenge of measuring fuel poverty.

Previous evaluations of schemes similar to WHHP were largely process evaluations which did not consider equity or provide in-depth service-user demographics,[36] highlighting the value of this study to fill a research gap. Most predictors of fuel poverty in Bradford were significantly overrepresented among WHHP households compared to the Bradford average, suggesting the targeting and reach of the WHHP service were equitable for the majority of predictors of fuel poverty. This is a positive finding and contrasts with other evaluations of fuel poverty schemes that highlight poor targeting of fuel poor households.[12,13,22] This novel insight shows the potential benefit of local interventions such as WHHP who possess in-depth knowledge about the local demographic and housing context of areas and have developed meaningful partnerships with well-established local organisations, increasing the likelihood of successfully targeting and engaging with households most vulnerable to fuel poverty. This is particularly important to mitigate the impacts of the ongoing cost-of-living crisis[17,23] and documented failures in the UK's wider social security system.[37]

However, some variables showed no significant overrepresentation or were underrepresented in WHHP households, namely ethnicity, multiperson households, and younger HRPs, even though they have been identified as national predictors of fuel poverty[8,19] and were important local predictors in this study. This indicates that service reach may not be completely equitable, and there is a need for these disparities to be explored further.

Limitations and further research

As a number of variables were estimated using small-area geography averages due to lack of household-level data, particularly demographic characteristics, future research studies should collect appropriate household-level data for all fuel poverty-related variables to improve internal validity of the study findings and remove possibility of ecological fallacy. The majority of variables in the regression model to determine predictors of fuel poverty utilised 2021 data, whereas the data from WHHP households were collected over 5 years (2018–2023), a likely period of change in some household characteristics such as income and employment status due to impacts of the COVID-19 pandemic and cost-of-living crisis. Future studies should aim to collect household data over a shorter time period to ensure all variables represent a specific time point.

Some WHHP variables had over 50% of entries missing (Table 3), reducing the power of the study. There was also an issue with determining data completeness for two variables (long-term conditions and benefits) due to the question format, meaning it was unknown whether a blank response meant the respondent did not answer the question or did not have any long-term conditions/receive any benefits. This resulted in the total proportion of long-term conditions and benefits claimants in the WHHP population likely being underreported.

Due to risks of non-response bias, selection bias, and poor questionnaire validity in the current dataset which must be reviewed and minimised, further research should explore the inequities highlighted in more detail and determine possible explanations via interviews and focus groups with representative populations, in addition to obtaining and analysing data from the other providers in the WHHP partnership beyond the lead provider, Groundwork. This will allow future interventions to be developed to ensure that the WHHP service successfully engages with all households most likely to be living in fuel poverty.

CONCLUSIONS

Significant predictors of fuel poverty for households in one local area in England (Bradford) were similar to previously researched national predictors of fuel poverty, covering all three main categories of household income and employment, occupant demographics, and housing characteristics. However, identified differences between the direction of the relationship of some national and local predictors of fuel poverty reaffirm the complex relationship between fuel poverty and multiple household characteristics, and highlight the usefulness and need for research on local predictors of fuel poverty.

The WHHP service equitably reaches fuel poor households in Bradford across the majority of predictors of fuel poverty. However, ethnic minority groups, younger people, and households containing more than one individual are seemingly underrepresented in the service. This knowledge is vital to appropriately target resources during the ongoing cost-of-living crisis and cuts to local budgets, and has filled a research gap around assessing the equity of a local fuel poverty intervention.

This approach should be reproduced among other local authorities across England to ensure fuel poverty services effectively target local households most at risk of fuel poverty rather than relying on national averages.

CONFLICT OF INTEREST

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: This research was carried out as part of Public Health Registrar Training, supported by Health Education England and while on placement with Bradford Council, supervised by University of York academics. Barnes works with the Bradford Council NIHR Health Determinants Research Collaboration and Anti-Poverty Coordination Group.

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ETHICAL APPROVAL

Ethical approval was not required as this secondary research study used anonymised datasets containing no identifiable information, in accordance with the University of York's Ethics Committee policies. The datasets were used in accordance with a data sharing agreement agreed prior to the project. The raw datasets are compliant to General Data Protection Regulation.

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SUPPLEMENTAL MATERIAL

Supplemental material for this article is available online.

References

1. Li K, Lloyd B, Liang X-J *et al*. Energy poor or fuel poor: what are the differences? *Energ Pol* 2014;**68**:476–81.
2. Boardman B. *Fuel poverty: from cold homes to affordable warmth*. London: Belhaven Press; 1991.
3. de Vries R, Blane D. Fuel poverty and the health of older people: the role of local climate. *J Public Health (Oxf)* 2013;**35**(3):361–6.
4. Institute of Health Equity. Fuel poverty, cold homes and health inequalities in the UK. Available online at: https://www.instituteofhealthequity.org/resources-reports/fuel-poverty-cold-homes-and-health-inequalities-in-the-uk (2022, last accessed 3 July 2023).
5. Institute of Health Equity. The health impacts of cold homes and fuel poverty. Available online at: https://www.instituteofhealthequity.org/resources-reports/the-health-impacts-of-cold-homes-and-fuel-poverty (2011, last accessed 3 July 2023).
6. National Institute of Health Care Excellence (NICE). Excess winter deaths and illness and the health risks associated with cold homes. Available online at: https://www.nice.org.uk/guidance/ng6/chapter/what-is-this-guideline-about (2015, last accessed 3 July 2023).
7. Hills J. Getting the measure of fuel poverty: final report of the fuel poverty review. GOV.UK. Available online at: https://www.gov.uk/government/publications/final-report-of-the-fuel-poverty-review (2012, last accessed 3 July 2023).
8. Middlemiss L. Who is vulnerable to energy poverty in the Global North, and what is their experience? *Wires Energ Environ* 2022;**11**:e455.
9. NHS Confederation. Could the energy crisis cause a public health emergency? Available online at: https://www.nhsconfed.org/long-reads/could-energy-crisis-cause-public-health-emergency (2022, last accessed 13 October 2023).

10. Robinson C, Lindley S, Bouzarovski S. The spatially varying components of vulnerability to energy poverty. *Ann Am Assoc Geograph* 2019;**109**:1188–207.
11. Mould R, Baker KJ. Uncovering hidden geographies and socio-economic influences on fuel poverty using household fuel spend data: a meso-scale study in Scotland. *Indoor Built Environ* 2017;**26**:914–36.
12. März S. Assessing the fuel poverty vulnerability of urban neighbourhoods using a spatial multi-criteria decision analysis for the German city of Oberhausen. *Renew Sustain Energ Rev* 2018;**82**:1701–11.
13. Walker R, Liddell C, McKenzie P *et al*. Fuel poverty in Northern Ireland: humanizing the plight of vulnerable households. *Energ Res Soc Sci* 2014;**4**:89–99.
14. Gouveia JP, Seixas J, Long G. Mining households' energy data to disclose fuel poverty: lessons for Southern Europe. *J Clean Prod* 2018;**178**:534–50.
15. Robinson C, Bouzarovski S, Lindley S. 'Getting the measure of fuel poverty': the geography of fuel poverty indicators in England. *Energ Res Soc Sci* 2018;**36**:79–93.
16. Imbert I, Nogues P, Sevenet M. Same but different: on the applicability of fuel poverty indicators across countries – insights from France. *Energ Res Soc Sci* 2016;**15**:75–85.
17. University of York. Cost of living crisis: fuel poverty. Available online at: https://www.york.ac.uk/business-society/research/spsw/cost-living-crisis-fuel-poverty/ (2023, last accessed 1 August 2023).
18. Department for Business, Energy & Industrial Strategy (BEIS). Annual fuel poverty statistics report: 2022 (2020 data). Available online at: https://www.gov.uk/government/statistics/annual-fuel-poverty-statistics-report-2022 (2022, last accessed 4 July 2023).
19. Department for Business, Energy & Industrial Strategy (BEIS). Modelling the likelihood of being fuel poor. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/266469/likelihood_of_being_fuel_poor.pdf (2013, last accessed 4 July 2023).
20. Kearns A, Whitley E, Curl A. Occupant behaviour as a fourth driver of fuel poverty (aka warmth & energy deprivation). *Energy Policy* 2019;**129**:1143–55.
21. House of Commons Library. Fuel poverty in the UK. Available online at: https://commonslibrary.parliament.uk/research-briefings/cbp-8730/ (2023, last accessed 5 July 2023).
22. Boardman B. *Fixing fuel poverty: challenges and solutions*. London: Earthscan; 2010.
23. Broadbent P, Thomson R, Kopasker D *et al*. The public health implications of the cost-of-living crisis: outlining mechanisms and modelling consequences. *Lancet Reg Health Eur* 2023;**27**:100585.
24. Office for National Statistics. Population and household estimates, England and Wales. Available online at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/populationandhouseholdestimatesenglandandwales/census2021unroundeddata (2022, last accessed 3 July 2023).
25. Department for Energy Security Net Zero Department for Business Energy Industrial Strategy. Fuel poverty statistics. GOV.UK. Available online at: https://www.gov.uk/government/collections/fuel-poverty-statistics (2023, last accessed 4 July 2023).
26. Ministry of Housing, Communities and Local Government. English indices of deprivation 2019. GOV.UK. Available online at: https://www.gov.Uk/government/statistics/english-indices-of-deprivation-2019 (2019, last accessed 4 July 2023).
27. Office for National Statistics. Topic summaries – 2021 census. Available online at: https://www.nomisweb.co.uk/sources/census_2021_ts (2023, last accessed 4 July 2023).
28. Office for National Statistics. Households by housing tenure and combined economic activity status of household members: table D. Available online at: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/workingandworklesshouseholdstabledhouseholdsbyhousingtenureandcombinedeconomicactivitystatusofhouseholdmembers (2023, last accessed 8 August 2023).
29. Groundwork. Groundwork homepage. Available online at: https://www.groundwork.org.uk/ (2023, last accessed 5 July 2023).
30. Dubois U. From targeting to implementation: the role of identification of fuel poor households. *Energ Pol* 2012;**49**:107–15.
31. Department for Business Energy Industrial Strategy (BEIS). Sustainable warmth: protecting vulnerable households in England. GOV.UK. Available online at: https://www.gov.uk/government/publications/sustainable-warmth-protecting-vulnerable-households-in-england (2021, last accessed 3 July 2023).
32. Energy Saving Trust. Home analytics. Available online at: https://energysavingtrust.org.uk/service/home-analytics/ (2022, last accessed 3 July 2023).
33. Department for Levelling Up Housing Communities. Energy performance of buildings data England and Wales. Available online at: https://epc.opendatacommunities.org/login (2023, last accessed 31 July 2023).
34. Bland M. *An introduction to medical statistics*. 4th edn. Oxford: Oxford University Press; 2015.
35. Keung A, Bradshaw J. Who are the fuel poor? University of York. Available online at: https://www.york.ac.uk/media/business-society/research/Who_are_the_fuel_poor_revised_v2.pdf (2023, last accessed 11 March 2023).
36. Public Health England. Warm home fund helped vulnerable residents. Available online at: https://www.gov.uk/government/news/warm-home-fund-helped-vulnerable-residents (2013, last accessed 30 August 2023).
37. Changing Realities. 'Terrified for this winter': why the cost-of-living crisis is far from over for families on a low income. Changing Realities. Available online at: https://changingrealities.org/ (2023, last accessed 3 November 2023).