PRINCE MAHIDOL AWARD CONFERENCE 2017

ADDRESSING THE HEALTH OF VULNERABLE POPULATIONS FOR AN INCLUSIVE SOCIETY

PS1.1

PARALLEL SESSION 1.1

The Truth is Hard to See: The Political Economy of Visibility

BACKGROUND

One definition of vulnerable populations is those that are not visible to the state—that basic dynamic determines whose needs are recognized, which groups get services, and underpins the allocation of power and resources within the population. Much development thinking on social protections has employed the post-WWII model of the welfare state, which is predicated on citizen visibility that does not hold in LMICs, or even in many HICs. For instance, an address is often required to make citizens visible to the state, and similarly some sort of registration or documentation is mandatory in many settings. Even these basic elements fail quickly: homeless populations, residents of slums, migrants, refugees. Similarly, visibility is only possible in categories recognized by the state. The MSM, CSW, and IDU communities are not always recognized, and when they are it is often for the purpose of criminalization—an unreliable footing for delivering health services.

Political economy is an ideally suited analytic lens to explore which groups are invisible and therefore marginalized, why this is so, and what can be done about it. Political economy emphasizes the power dynamics behind whose interests are served, and can reckon persistent inequality because inequality itself is the expression of unequal access to power. Marginalized citizens are those who do not have political-economic visibility, typically do not participate in political processes (ie, they are excluded and/or not engaged), and cannot hold the state accountable for its performance.

OBJECTIVES

This session will advance a framework for understanding the political economy of visibility and explore its implications in a series of settings from around the world. Its goals are to advance an operational definition of vulnerability, discuss gradations and types of vulnerability, and explain both why such groups are marginalized and how political economic insights can inform policies and approaches to change things for the better.

MODERATOR / SPEAKERS

Jesse BUMP

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USA

Jesse Bump is Lecturer on Global Health Policy in the Department of Global Health and Population, and Executive Director of the Takemi Program in International Health at the Harvard T.H. Chan School of Public Health. Dr. Bump's research focuses on the historical, political, and economic forces that are among the most fundamental determinants of ill health and the effectiveness of related institutions. His research addresses major themes in global health history and political economy to analyze these macro forces and develop strategies to navigate better solutions within them. Projects have investigated the history of child health problems such as diarrheal disease and congenital syphilis to explain how issues rise and fall on the global health agenda and to produce strategies to align political visibility and health need; the historical development of health systems and the implications for development assistance; and the political economy of policy making and implementation in areas such as universal health coverage, humanitarian assistance, tobacco control, and nutrition governance. Bump holds a Baccalaureate in Astronomy and History from Amherst College, a Master in Public Health from Harvard University and a PhD in the History of Science, Medicine, and Technology from the Johns Hopkins University.

SPEAKERS

Akudo IKPEAZU

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Nigeria

Akudo IKPEAZU is Director for Program Coordination in the National Agency for the Control of AIDS (NACA), Nigeria, leading work on advancing the HIV prevention, treatment, care and support agenda of the National HIV and AIDS response. She has over 20 years of experience working on health and social protection policies and programs. She has devoted considerable energy to guiding efforts to amplify HIV prevention programming especially with key populations and in mainstreaming gender equality into HIV and AIDS programming in Nigeria. In her current position, she chairs several national technical working groups including those for prevention and gender and human rights from where she led innovative policies and programs to promote access to services especially for vulnerable and underserved groups. Most recently include a results-based grants program for expanding access to Prevention of Mother to Child Transmission (PMTCT) of HIV in private health facilities, using ICT platforms to reach adolescents and young people and Learning Sites for enhancing sex work interventions. Prior to her position in NACA, she participated in health systems development at the primary level in Nigeria. Health systems research remains one of her key areas of interest. Akudo is also a doctoral student at the London School of Hygiene and Tropical Medicine. She holds a Masters in Public Health and Bachelors in Medicine and Surgery.

SPEAKERS

Shahira AHMED

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Global Health
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USA

Dr. Shahira Ahmed is a Research Scientist at the Center for Global Health and Development, Boston University School of Public Health, focusing on health policy and systems research in the areas of HIV and reproductive health services. These interests fall within a broader research agenda of applying mixed methods to assess and evaluate implementation and delivery of integrated services at different levels of a health system, and evaluation of quality, equity and access to improve health systems performance. She currently leads several design and implementation studies in South Africa to assess demand and supply of HIV testing services and linkage to care, and adolescent preferences for HIV and reproductive health services in different health care settings. Previously, Dr. Ahmed was the program manager at the Program on International Health and Human Rights, Harvard T.H. Chan School of Public Health, and a research coordinator at the Women and Public Policy Program, Harvard Kennedy School. She has over 10 years of experience working and consulting globally and nationally with international agencies and national governments on policy development, implementation, monitoring and evaluation. Dr. Ahmed received her MPH from Boston University School of Public Health and Doctorate of Science from the Harvard T.H Chan School of Public Health.

SPEAKERS

Joseph HARRIS

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Joseph Harris is an Assistant Professor of Sociology at Boston University and founder of the American Sociological Association's Global Health and Development interest group. He studies the role of elite networks in public policies critical to public health and human welfare. His forthcoming book from Cornell University Press – Achieving Access: Professional Movements and the Politics of Health Universalism – examines the politics of universal coverage policy and AIDS treatment in Thailand, Brazil, and South Africa. He holds a PhD in Sociology from University of Wisconsin-Madison and a Master's in Public Affairs from Princeton University's Woodrow Wilson School for Public and International Affairs. His expertise has been recognized by the United Nations Development Programme and the World Bank, where he has served as a consultant, most recently as a Specialist on the Political Economy of Health Reform on the Japan-World Bank Project on Universal Coverage. Prior to joining the faculty at BU, he served as Lecturer at the University of Chicago's School of Public Policy Studies.

SPEAKERS

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Turkey

Saime Ozcurumez (Ph.D., McGill) is a Faculty Member in the Department of Political Science and Public Administration at Bilkent University. She was a Visiting Scholar at the Center for Middle Eastern Studies and Department of Global Health and Social Medicine at Harvard University (2015-2016) during her sabbatical where she worked on healct care service delivery to Syrians under Temporary Protection in Turkey. She conducts research and publishes on migration policy and politics in the European Union, Turkey, and Canada, diversity and health, gender and immigration, irregular immigration, social integration, media representation of migrants, comparative politics of deliberative democracy, and the Europeanization research agenda. She has articles published in International Migration, Journal of Balkan and Near Eastern Studies, Turkish Studies, Comparative European Politics, Journal of Common Market Studies, Uluslararasi Iliskiler-International Relations,Women's Studies International Forum, European Political Science. She is the co-editor of two books: Of States, Rights and Social Closure with Palgrave andAsylum, International Migration and Statelessness: Concepts, Theories and Politics (in Turkish). She has co-authored several book chapters on immigration policy process and foreign policy in Turkey in comparative perspective, Europeanization and collective identities through historical and media analysis in Turkey and access to health care by ethno-cultural groups in Canada, Italy and Germany. She has been part of many international and national collaborative research projects on cultural diversity and health care systems; transcultural memory in Europe, collective identities in Europe, migrants' media representation, transformation of immigration and asylum governance in EU accession in Turkey. Her current projects are on local governments and integration of Syrians in Turkey, the resilience of health care systems in Turkey in response to mass influx of refugees from Syria, employment and livelihood conditions of refugees in Turkey.

SPEAKERS

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USA

Victoria Fan is an assistant professor of health policy at the University of Hawai‘i at M□noa. She is a fellow at the François-Xavier Bagnoud Center for Health and Human Rights, Harvard T.H. Chan School of Public Health as well as a visiting fellow at the Center for Global Development (Washington, DC). She earned her Doctor and Master of Science from Harvard University, and Bachelor of Science from MIT. Her research topics include development assistance for health, global health policy, health systems and policy, health financing, health workforce (India and China), economic evaluation for health, and health of vulnerable populations (Haiti and Iraq).

SHORT PAPER

Rolling out the Midwives Service Scheme to increase access to essential maternal care in Nigeria's decentralized health system: Design matters

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Background
Nigeria has among the worst maternal and child health indicators in low and middle income countries (545/100,000 live births & 213 per 1000 live births) and faces multiple health systems constraints to expanding access to essential services. The flagship Midwives Services Scheme, implemented in all 36 states, was thus introduced in 2009 to improve rural staff retention by providing financial incentives and accommodation to rural midwives, and upgraded facilities. The study examines the design of the scheme and how it has reflected the health systems context, resources, needs and population preferences.

Methods
An extensive exploratory qualitative study included 87 in-depth interviews and 8 focus group discussions with policy makers, implementers, midwives and community members at federal level and in two states. Analysis was informed by a new framework examining the fit of the newly designed intervention considering: i) leadership and commitment ii) policy and financing context iii) human resource management capacity and iv) stakeholder participation. Themes were identified and synthesized iteratively.

Results
The broad principle of the scheme was widely supported by program managers and policy makers across the three health systems levels. However, its design was based on federal level program managers' knowledge of maternal health and worker issues, and limited recognition of the decentralized nature of the health system. The design of a uniform financial package irrespective of pay structure in different states damaged equity. Implementation was hampered by inadequate management and logistical capacity to deal with the complex design, poor absorptive capacity of states for the posted midwives, failure to provide supervision, and welfare issues that affected the midwives. Additionally, the insufficient consideration of the nature of the health system, economic and cultural factors, resulted in poor local ownership and commitment.

Discussion/Conclusion
The midwives' services scheme was an ambitious national scheme involving a bundled package of interventions to improve access to skilled workers in rural communities. In designing effective human resource retention schemes, the analysis here underscores the importance of designing such schemes to reflect overall health systems structures and processes, decentralized decision and participation in national level programmes, sub-national level factors including local health workers' preferences and culture. Since decentralisation critically modifies the decision making space, an inclusive process where sub-national actors participate in choosing design options should be a pre-requisite.

1.0 Background

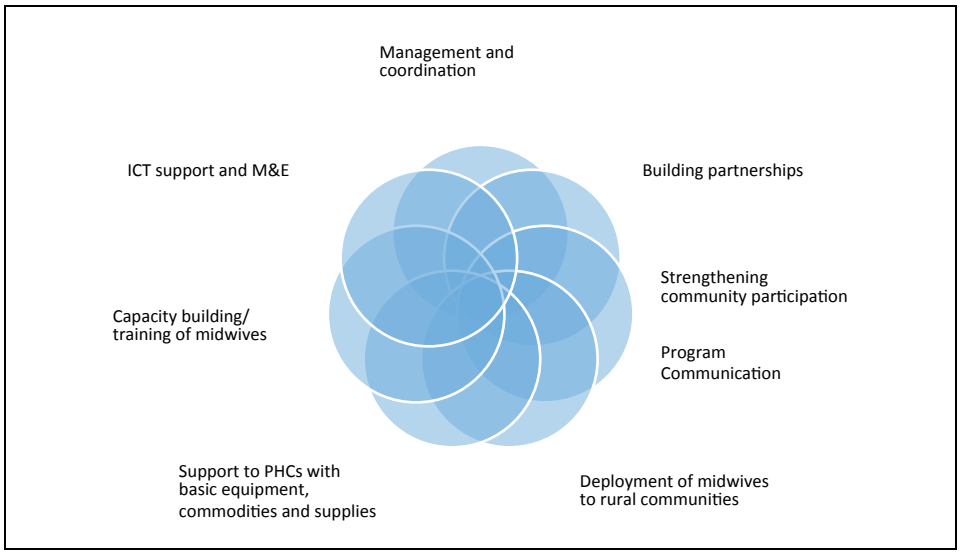
The reduction of maternal mortality remains a priority for many countries in sub-Saharan Africa (SSA) because of the unmet needs of pregnant women (1). Nigeria has among the worst maternal and child health indicators in low and middle income countries and faces multiple health systems constraints to expanding access to essential services. Every year 545 women out of 100,000 still die in pregnancy or complications associated with child birth (2). There is a critical mass of evidence on what interventions are effective and many countries have achieved remarkable progress implementing these. A key message from these experiences is that implementing these strategies depend on a functioning health system to enable their delivery. In countries where progress in improving maternal and child health has been slow, evidence points strongly to health systems that are too fragile and fragmented to deliver the volume and quality of services to those in need (3, 4). The most critical constraints faced by health systems in relation to reducing maternal mortality in low and middle income countries (LMIC) relate to human resources, financing, drugs and medical supplies (5, 6).

The Nigeria Midwives Service Scheme (MSS) was introduced in 2009 as the first large scale programme in the country focusing on rural retention of midwives. The MSS aimed at improving access to midwives through a multi-component intervention (figure 1) which includes financial incentives and accommodation to midwives and upgraded facilities, to improve rural retention of midwives. It sought to mobilize unemployed and retired midwives for deployment to selected primary health facilities in rural communities with the overall goal of increasing skilled attendance at birth and reducing maternal, newborn and child morbidity and mortality in Nigeria. In this scheme, midwives, including those newly qualified from Nigerian Schools of Midwifery; unemployed midwives and retired midwives potentially open to a new posting were deployed to health facilities in rural under-served communities. The scheme also provides systems-level support to improve midwives' capacity to provide higher quality services than what they could previously.

Box 1. The MSS: a brief overview

The scheme aims to target an estimated population of 10,711,532 through 815 (652 primary health care and 163 general hospitals) selected facilities in the 36 states & Federal Capital Territory (FCT). It is implemented through a hub & spoke model with 4 PHC facilities (spokes) clustered around 1 secondary facility (hub). The general hospital (secondary facility) acts as referral site for the cluster as result there are 163 clusters. States with greater need have more PHC facilities designated for MSS based on pre-categorization into very high mortality (VHM), high mortality (HM) and moderate mortality (MM) with 24, 16 and 12 facilities per state respectively. Criteria for inclusion of primary health facilities in the Scheme include their location in a rural, hard to reach area or underserved population serving between 10,000 and 30,000 people, client flow of at least 120 births/year and facility classified as type 3 (primary health centre). At the start of the scheme, 2,488 midwives were successfully recruited and posted.

Figure 1: Midwives Service Scheme (MSS) eight complementary components



This analysis is part of a larger study which aimed at obtaining evidence on how effectively the design of the Midwives Service Scheme (MSS) and its implementation draws on the health systems context, resources, needs and population preferences. It also examined the Scheme's contribution to improving the availability of midwives in rural locations and strengthening the health systems at all levels. This paper reports on the findings relevant to the design component of the study specifically the appropriateness of the interventions given the local context and the robustness of MSS in contributing to health systems strengthening, seeking to contribute to the global evidence on strategies for improving rural retention of health workers.

2.0 Methods

Taking into consideration the decentralized nature of the Nigerian health system and the role of the central government vis-à-vis State Ministries of Health (SMoH) in designing and implementing the Scheme, the study was conducted at four levels: federal, state, local government and facility/community levels. Two states in different maternal mortality regions (very high mortality and moderate mortality) were purposively selected for this study: Kaduna and Ebonyi (1025 and 1500 per 100,000 respectively compared to national average of 545 per 100,000). An important consideration in selecting the states for the study was that the Scheme had been operational in these settings for at least two years, thus allowing a rigorous assessment of the implementation processes. Two Local Government Areas (LGAs) were then purposively selected in each state to include a wide variety of settings, rural, urban, and remote.

Drawing on bottom-up and top-down implementation theories, the study considered the perspectives of actors working at different levels of government and the health system. This extensive exploratory qualitative study included 87 in-depth interviews and 8 focus group

discussions with policy makers, implementers, midwives and community members at federal level. Respondents were selected in accordance to their role in MSS-related policy making, in designing and implementing the Scheme, as facility-level implementers or beneficiaries at the community level. Snowball sampling was used to identify midwives who had left the Scheme but who were willing to participate in the study. The final sample sizes for each category was determined at the point of saturation; when the results of interviewing new participants no longer yielded any new data. In-depth interviews sought to elicit individual experiences, opinions, feelings and for addressing sensitive topics helping to emphasize the nuances in individual and institutional experience of MSS design. They also helped to fully explore the broad range of factors that underpin participants' answers. FGDs were also conducted because of their usefulness in identifying and eliciting opinion about group norms (7).

Data analysis was informed by a new framework examining the fit of the newly designed intervention within the health system context considering: i) leadership and commitment ii) policy and financing context iii) human resource management capacity and iv) stakeholder participation. The framework draws on a diverse literature including theories of change, program and systems theories and health systems strengthening approaches. It takes a systems thinking approach in recognition of the complexity of health systems and its diverse yet inter-connected components and processes (8) therefore providing a useful lens through which the pathways for designing interventions, modeling policy options (9) and choosing an appropriate intervention in a complex health system can be understood.

Using framework analysis, themes were identified and synthesized iteratively. Transcribed data were managed and analysed in NVivo10. A coding framework was developed using both deductive and inductive approaches (10).

3.0 Results

The broad principles of the scheme were widely supported by program managers and policy makers across the three health systems levels and by community members. The design of the scheme was shaped by the federal level program managers' knowledge of maternal health and health worker issues, but did not consider the decentralized nature of the health system; economic contexts, cultural preferences and local evidence, resulting in poor local ownership and commitment. Despite the acceptance by sub-national actors that the Scheme was important and was the right course of action, given the poor engagement at the conceptual stages there was skepticism about their role. Table 1 summarizes the findings at the different levels of health administration.

Table 1: Health systems context of MSS design

Health systems context			
	Central-level	**State-level**	**Local-level**
Leadership and commitment	Strong national versus state and local level leadership. Substantial increases in federal funding were recorded between 2010 and 2014. A core technical team	Unclear role of state governments in implementation due to poor engagement at conceptual stages. Commitment was low and no budgetary provisions for MSS were made.	Poor understanding and lack of clarity of local level officials on role in overall leadership and management of scheme in the light of their traditional role in leading PHC. Local level better engaged and committed to implementation when

Health systems context			
	Central-level	**State-level**	**Local-level**
	was established at the national level to lead planning, implementation and monitoring.		compared to states. Low resource allocation despite being tasked with implementation. Also lacked equivalent managerial structures.
	Central versus local level tensions in decision making arising from decisions made centrally and passed to sub-national units for implementation.	Concerned with the infringement on autonomy conferred by federalism. Dissatisfaction with 'decision space'	Concerned about the model of recruitment and deployment, midwives' management and benefits payments which were all managed centrally. Dissatisfied with 'decision space'.
Stakeholder participation	Participation of development partners notably WHO, UNICEF, UNFPA, Pathfinder International.	Low participation of non-government stakeholders in MSS design process.	Community representatives were dissatisfied with their low participation in decision making process.
Influence of policy and political factors	Policy environment was perceived as supportive of the scheme. However, there were non-harmonised policies, policy gaps, poor funding for HRH programming and capacity challenges.	Non-harmonized HRH policies (federal vs states and LG), policy gaps in relation to HR retention and poor HRH programming and funding	Policy gaps. Weak HRH programming and funding
Human resource management (HRM) systems	Inadequate management and logistical capacity to deal with the complexities of the scheme. HRM implications of the scheme were not initially understood. Emerging issues salaries, deaths, illness, maternity leaves, and other welfare issues. Long delays in addressing issues, many remained unresolved.	Poor absorptive capacity of the posted midwives in many states.	No HRM functions assigned at this level
Financing context and financing	Strong link between the availability of funds at the federal level due to debt-relief from the 'Paris Club' and the evolution of MSS and its core principles.	State managers shared concerns about financing capacity of the state and constraints with committing funds to MSS vis-à-vis existing priorities. Cited as main reason for states' difficulties paying incentives and funding supplies or equipment, infrastructure and incentive payments	Local government staff confirmed that MSS was not include in their budgets. In the absence of allocated resources, funds were sometimes requested on an ad-hoc basis and was dependent on the discretion of the LG Chairperson.

The linkage between available evidence and MSS formulation are unclear. This may have been due to pre-existing gaps in the evidence-base, weak capacity or prevailing circumstances which did not permit analysis and gathering of new data. Regardless of the scope of the maternal mortality problem, cultural and delivery practices, midwives' availability and preferences in the locality, a uniform design was applied across the country. This was challenged by LG managers because it suggested weak understanding of geographical differences.

A critical concern raised by sub-national actors was dissatisfaction with the 'decision space'. Since the health systems decentralisation involves a combination of top-down and bottom up planning, the lack of decision space resulted in tensions. These relate especially to the model of recruitment and deployment of midwives, centralized management of midwives and payment of monthly emoluments. In contrast to the model of recruiting and posting midwives regardless of current residence, LG staff argued in favour of employment of midwives from within their locality and re-distribution within the LGA as a more sustainable approach. It was suggested that the '*imported*' midwives were often less committed and not sensitive to the local cultures, norms and preferences. For instance, in one location midwives were perceived as not being '*appropriately covered up'*. A centralized approach to HRM for midwives also meant that decisions pertaining to recruitment, posting, performance and discipline were made centrally. Consequently, LGs lacked the right to decide eligibility of midwives for payments or to deal with indiscipline or poor performance. Absorption of midwives into long-term service of state governments was central to the scheme's sustainability plan. However, ownership by states was a crucial factor in making this happen.

The study showed that the MSS is a complex intervention comprising components which address four of the six health systems building blocks (human resources, services delivery, health information and medical products/technologies) and has the potential to bring about system-wide changes. Two components, capacity building and financial incentive payments, targeted the human resources building block. Both target midwives at the individual level and were expected to lead to improvements in rural retention. Midwives were concerned with poor health and social infrastructure, lack of supervision, professional exclusion and welfare issues. A major challenge was the lack of consistent and uniform standards across states due to decentralisation and autonomy of states in setting wages. This resulted in marked variations across states with midwives in some states getting more pay than others. Implementing a uniform financial package irrespective of pay structure in the different states created equity challenges.

4.0 Discussion

It has been argued that decentralisation is a necessary condition for producing an optimum combination of top-down and bottom-up planning and policy design (11). However, considering the case of MSS it is clear that measures were not taken to ensure sufficient buy-in and inclusion of the viewpoints of sub-national actors in the design process. This is especially important in a decentralized health system where the aim is to achieve greater decision-making space at different tiers and increase responsiveness to local needs (12, 13). As found here, in many countries several challenges have hindered the functioning of decentralisation and achieving its goal of increasing decision space (14-17). Consequently, acceptability of some aspects of the scheme's design was low. Also, the health systems decentralisation implies the need for clear definition of roles with respect to the scheme.

Evidently, less political will and commitment noted at the sub-national levels was linked to poor participation in the design process. This is in line with a number of studies that have highlighted the importance of political will as a key element of success in designing and implementing such interventions (18, 19).

The study provides strong justification for the strengthening and use of evidence within a more context-matched design. This corroborates previous findings of poor use of evidence in health policy making in Nigeria (20) and other LMIC (21, 22). This factor was reported as the main reason for sub-optimal effect of a staff retention scheme in South Africa (23). Facilities were in a variety of locations; semi-rural, rural and hard-to-reach, yet they were all treated alike. These findings suggest that the design of retention schemes it should be guided by the structure of the health system. This includes considering contextual factors such as population needs and preferences, health worker availability, financing feasibility and structures required to support implementation. Financing can also be viewed as a contextual issue especially where multi-level financing is required. Interventions such as the MSS require considerable additional resources which are often not available in most low and middle income countries (24, 25). In the context of limited resources, analysis of financing was key to assuring affordability by the three tiers. It is also important to consider the absolute size of additional funds required and the demand this places on existing health budgets (26).

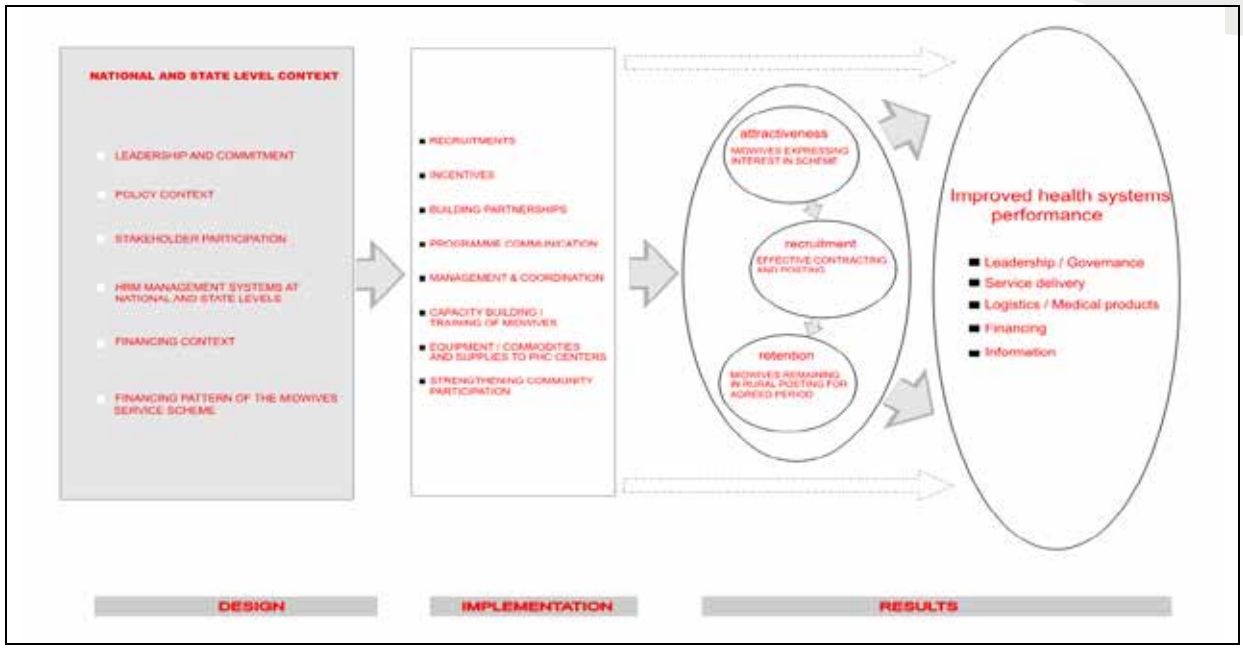
This study findings suggest that where bundled interventions are used, insufficient effort is made to ensure that the strategies employed respond to problems they are trying to address (27, 28). The financial incentive package was the most important to midwives but was not enthusiastically embraced. Midwives' views were that the incentive package was not sufficient to make rural service attractive in most locations. Other studies have also shown that reactions to incentives will depend on the context and the health worker's career stage (29).

Finally, a systems thinking approach which considers multi-level variables related to the local health systems context and how it may support implementation is important to assure a feasible design and scheme contribution to health systems strengthening (30, 31). Its application would help in identifying a clear programme theory of how and why the intervention will work, flexibilities required to accommodate local differences, and possible unintended consequences of implementation. Such a theory was not present in the case of MSS.

4.1 Conclusion

The midwives' services scheme was an ambitious national scheme involving a bundled package of interventions to improve access to skilled workers in rural communities. The analysis here underscores the importance of designing such schemes to reflect overall health systems structures and processes, decentralized decision and participation in national level programmes, sub-national level factors including local health workers' preferences and culture. The scheme is potentially replicable in other LMICs as a bundled package of interventions to improve access to skilled workers in rural communities while strengthening the health systems. Since decentralisation critically modifies the decision-making space, an inclusive process where sub-national actors participate in choosing design options should be a pre-requisite.

Figure 2: Conceptual framework for measuring results of a rural retention intervention



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"Universal Coverage in Thailand: Unintended Consequences on Vulnerable Populations"

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Thailand's universal coverage program has been heralded by healthcare analysts as a model for the industrializing world. While many aspects of Thailand's UC program have rightly earned praise and accolades the world over, passage of the law paradoxically hurt some of the country's most vulnerable groups – including a large population of stateless people – who had previously enjoyed access to state health insurance programs that existed prior to the reform. This presentation explores the differentiated approach that Thailand has taken towards the healthcare access of citizens, migrants, and stateless people. It draws out the differences and tensions in the three main state health insurance programs used by citizens—the Universal Coverage program, the Social Security program, and the Civil Servant Medical Benefit Scheme. It explores the political economy dynamics that led stateless people to be disenfranchised when the new Universal Coverage law redrew eligibility criteria along the lines of nationality and efforts to extend coverage to them after the UC reform. It examines the country's healthcare programs for migrant workers, which offer the promise of health insurance to registered migrants, but which have faced ongoing challenges doing that in practice.

Thailand's Universal Coverage program, also known as the 30-baht to cure every disease program, was one of a number of high-profile national experiments with universal healthcare that took place in the 2000s in the industrializing world (Reich et al. 2016). While Thailand's program is notable for being first, other impressive universal coverage reforms in Turkey, Mexico, Ghana, and Rwanda soon followed, and in recent years, more than 100 countries have requested technical assistance from the World Health Organization to move towards universal coverage (Chan 2016, 5). Praised by health analysts, Thailand's program led to dramatic improvements in healthcare access and financial protection, as well as a decline in catastrophic health payments (Somkotra and Legrada 2008). The new reform, which consolidated two existing state health insurance programs and extended coverage to the remainder of the population, sat alongside two programs that continued to provide health insurance to civil servants and their families (CSMBS) and a contributory social security program for workers in the formal sector (SS).

Clearly, there are many positive lessons to draw from Thailand's health reform. But even the most innovative reforms sometimes have unintended consequences. In Thailand, one unintended consequence of reform was to disenfranchise some of the people who had access to state health insurance before reform. Prior to reform, nearly 300,000 stateless people living in Northern Thailand received benefits through one of two state programs, the means-tested Low Income Card (LIC) program or the subsidized Voluntary Health Card (VHC) program (Hilltribe and Ethnic Minorities Network within the Northern Farmers' Network 2006). However, when it was passed into law, it redrew the lines of who could benefit along the lines of citizenship, effectively cutting out a large number of the country's most vulnerable people who had not been given new Universal Coverage membership cards (Harris 2013).

The Thai Health Promotion Foundation delivered basic healthcare to these populations when government programs were cut as a matter of humanitarian assistance (Wangkiat 2015a). And soon after the changes took place, a campaign that included both government officials and civil society activists[1] to ensure that stateless ethnic minorities would receive access to healthcare began, culminating in a 2010 agreement by government to provide care to stateless people living on Thailand's borders free of charge (Harris 2013). However, few people to whom these important new health rights had been extended knew that these rights existed, and consequently the hospital utilization rate did not increase significantly (Wangkiat 2013a; Hasuwannakit 2012). And some 100,000 of those non-citizens who had been extended coverage through the UC scheme were eventually purged from the rolls in 2014 (Wangkiat 2014).

The contingent nature of the arrangement – which did not make stateless people members of the Universal Coverage scheme but rather designated a specific office within Thailand's Ministry of Public Health to oversee the program – left it subject to the changing winds of politics (Bangkok Post 2010). Moreover, the office charged with overseeing the program, which included benefits very similar to the UC program, had a very small staff with limited capacity and faced the additional challenge of having to cooperate with a number of other offices in government, including the Ministry of Interior and Ministry of Finance (Suphanchaimat et al. 2015).

A further Cabinet measure approved in 2013 provided free healthcare to nearly 500,000 stateless people (Wangkiat 2013c). But the original policy was not complete in its coverage of all who needed it, and by 2015, civic groups again found themselves advocating for the extension of coverage to over 200,000 stateless people who still lacked it (Wangkiat 2015c). Healthcare access was eventually granted to an additional 160,000 people who needed it – covering a total of 626,027 people – under a program managed by MoPH that would be called the Stateless Healthcare Scheme (Wangkiat 2015d). But this left more than 30,000 whose status had been contested ineligible (Wangkiat 2015b). While addressing some of the problems of access, the program also created some new tensions. Whereas primary care gatekeepers prevented Thai citizens from using any hospital of their choosing under the UC program, some hospitals operating under the Stateless Healthcare Scheme created informal arrangements to accommodate the mobile nature of the populations, leading some Thai citizens to become upset at the notion that stateless people had more freedom than Thai citizens (Suphanchaimat et al. 2015).

As before, a range of supportive actors within the state and civil society championed the extension of healthcare access to stateless people, this time including the Network of Indigenous People in Thailand, the country's National Economic and Social Advisory Council, the Lawyers Council of Thailand, and the Senate Committee on Human Rights and Consumer Protection (Wangkiat 2015a; Wangkiat 2015b). Some accounts have suggested that pressure from civil society and the media played a particularly important role in leading to the reforms (Suphanchaimat et al. 2015).

The state has taken a similarly complex approach towards the extension of healthcare coverage to migrant workers. To address the problem of healthcare access for legally documented migrant workers, a Compulsory Health Insurance program for Migrants (CMHI) was introduced in 2004 just after the UC program was passed into law, with a pilot Social

[1] Advocates included officials from the National Health Security Office, the Federation of Northern Farmers and Northern People's Network and the Stateless Watch for Research and Development Institute of Thailand (Harris 2013).

Security program for migrants managed by the Ministry of Labor beginning in 2010 (Harris 2013). Although these programs offered the promise of extending healthcare coverage to registered migrant workers, significant challenges have hindered coverage in practice. For one, the cost of the CMHI program to migrants was initially 1,300 baht per year, not including a fee of 600 baht for an initial medical screening and 30 baht per hospital visit – a substantial amount of money for people who typically make 135 baht or less per day, an amount that is below the state minimum wage (Martin 2007: 14, 24). In August 2013, this premium rose to 2,200 baht per year but excluded some services covered by the UC program, including substance abuse and psychiatric therapy, dental prostheses, dialysis, and kidney transplants (Guinto et al. 2015: 6). Unregistered migrant workers did not have access to any of these services.

With the introduction of the new Social Security program, the CMHI – which had been the primary health insurance program for migrants – would become a prerequisite for migrant workers applying for temporary work permits for durations of less than a year; upon nationality verification, Lao, Khymer, and Burmese citizens now contribute to and receive benefits through Social Security (and the Workers' Compensation Fund) for two years with the opportunity to renew for an additional two years (ILO and UN 2013: 13-14). While the ability of migrants to contribute to pensions and access unemployment benefits would appear to make Thailand somewhat unique in terms of its progressive approach to migrants with respect to social policy, in practice migrants have been unable to claim those benefits due to a number of legal restrictions that prevent them from doing so (ILO and UN 2013: 14).

However, even before the transition from migrant use of CMHI to Social Security, the CMHI program was known to be an 'income generator' for hospitals, since migrants typically pay a significant amount of money into the healthcare system but utilize a small amount of care on average, owing to lack of knowledge about the program, language barriers, and other issues (IOM and WHO 2009: 34). For their part, some hospitals have also proved reluctant to sell migrants CMHI cards out of fear that they might be used by or sold to other migrants (Guinto et al. 2015: 7). These factors helps to explain why the CMHI program has provided coverage to just 60,000 of the more than one million registered migrant target population in Thailand (Guinto et al. 2015: 6).

Conclusion

Concern with the inclusion of non-nationals in healthcare and other social policy arrangements is increasingly a concern not just of scholars but practitioners as well (Soysal 1994; Brolan et al 2013; ILO and UN 2013; Guinto et al. 2015; Levitt et al 2016). This issue is perhaps particularly salient in Southeast Asia where six of the region's 14 million migrant workers work in other ASEAN nations, with 90% of them in Thailand, Malaysia or Singapore (Baruah 2012 in Ormond et al. forthcoming: 4). Thailand presents an interesting case study of the successes and challenges posed by an industrializing country known as a leader in the Universal Coverage movement that has aimed to extend universal healthcare to people living inside its borders. While the country has not succeeded in providing universal coverage to stateless people or registered migrant workers (as it has for its own citizens), it has succeeded in incrementally extending healthcare coverage to more than 600,000 stateless people (Wangkiat 2015d) and a significant number of registered migrant workers. However, these programs are themselves imperfect and have been the product of struggle by advocates within the state and civil society over a long period of time. As other work has shown, politics has been at the center of these

struggles, amid a complex calculus involving concerns related to public health, national security, immigration, and disease control (Harris 2013, 2015). This case study illustrates the ongoing tensions and challenges that must be negotiated in the process of such reforms and highlights the need for further research and policy advocacy in this area.

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The impact of internal displacement on child mortality in post-earthquake Haiti: a difference-in-differences analysis

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Abstract

Background: The Haiti earthquake in 2010 resulted in 1.5 million internally displaced people (IDP), yet little is known about the impact of displacement on health. In this study, we estimate the impact of displacement on infant and child mortality and key health-behavior mechanisms.

Methods: We employ a difference-in-differences (DID) design with coarsened exact matching (CEM) to ensure comparability among groups with different displacement status using the 2012 Haiti Demographic and Health Survey (DHS). The participants are 21,417 births reported by a nationally representative sample of 14,287 women aged 15–49. The main independent variables are household displacement status which includes households living in camps, IDP households (not in camps), and households not displaced. The main outcomes are infant and child mortality; health status (height-for-age, anemia); uptake of public health interventions (bed net use, spraying against mosquitoes, and vaccinations); and other conditions (hunger; cholera).

Results: Births from the camp households have higher infant mortality (OR = 2.34, 95 % CI 1.15 to 4.75) and child mortality (OR = 2.34, 95 % CI 1.10 to 5.00) than those in non-camp IDP households following the earthquake. These odds are higher despite better access to food, water, bed net use, mosquito spraying, and vaccines among camp households.

Conclusions: IDP populations are heterogeneous and households that are displaced outside of camps may be self-selected or self-insured. Meanwhile, even households not displaced by a disaster may face challenges in access to basic necessities and health services. Efforts are needed to identify vulnerable populations to provide targeted assistance in post-disaster relief.

Keywords: Infant mortality, Child mortality, Internally displaced people, Earthquake, Haiti

Background

On January 12, 2010, an earthquake of magnitude 7.0 struck Haiti near its capital. The earthquake killed a total of 222,600 people and displaced 1.5 million people (IDP) [1–3]. Poor physical infrastructure in Haiti has been cited as a primary cause of the excess number of deaths from injuries in the disaster's immediate aftermath [4]. In the medium to long-term aftermath, however, poor public health infrastructure has been cited as a primary cause of excess mortality [5], exacerbated by weak governance of the Haitian state [6]. Many IDP relocated to camps where anecdotal accounts described inadequate sanitation and security [3, 7]. Other IDP relocated to other areas in Haiti.

A few studies based on surveys have shown that the earthquakes had detrimental effects on household welfare. For example, Saint-Macary and Zanuso showed that households that were disproportionately impacted by the earthquakes had lower participation in labor markets [8]. They also found that households that received material assistance and/or moved to camps saw larger reductions in their assets. Similarly, Novella and Zanuso showed that households that were most affected by the

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earthquakes were less likely to invest in the human capital of their children [9].

In this paper, we contribute to this literature by estimating the impact of displacement on mortality and key mechanisms explaining health status. We utilize the Demographic and Health Survey from Haiti for 2012. Specifically, we estimate the causal impact of internal displacement to a camp or to a non-camp setting in another location within Haiti on child mortality. To address confounding variables that are related to both our outcomes and displacement, we employ matching methods in conjunction with a difference-in-differences (DID) research design. We also examine associations of key mechanisms explaining health status such as anemia and stunting and utilization such as immunization and bed net use.

Methods

Data and research design

Our primary data source to evaluate the impact of internal displacement on health is the fifth Demographic and Health Survey in Haiti [10]. The survey was conducted two years after the Haiti earthquake from January to June 2012. The information on children and birth history came from a nationally representative sample of 14,287 women aged 15–49. The standard core DHS questionnaire collects rich information regarding housing and socioeconomic status of households, health care utilization, and a number of maternal and child health outcomes including child mortality and biometric indicators.

As households and individuals that were internally displaced by the earthquake may be inherently different from those who were not, a simple comparison of health outcomes between the displaced and non-displaced would yield biased results which reflect the underlying drivers of their displacement. Therefore, we adopt a two-stage research design to enhance inter-group comparability. First, using coarsened exact matching, we match individuals on a number of household characteristics that would affect their likelihood of being displaced by the earthquake. Second, we assess the impact of internal displacement on infant and child mortality among those coming from similar households. This minimizes the effects from uncontrolled factors that affect both displacement and child health.

The 2012 Haiti survey asked questions especially pertaining to the earthquake. For instance, it asked individuals whether they "live in current housing during the earthquake," based upon which we determined whether the individual had been displaced. In addition to standard household covariates, questions on earthquake-related housing damage and mortality were also used to match and enhance the comparability of households.

The key health outcomes in our study are infant mortality and under-five child mortality. The information is captured through the full birth history recalled by the interviewed women and recorded in the survey. To provide a more comprehensive picture of health status, health interventions and behaviors and to explore potential mechanisms affecting mortality, we further examined the relationship of displacement on key indicators of health status such as anthropometric growth (height for age) and anemia level (ordinal indicating severity), uptake of public health interventions of bed net use, spraying against mosquitoes, and vaccination for BCG, measles, and DPT, as well as conditions of experiencing hunger in the last 4 weeks, and infection with cholera after October 2010.

Statistical analysis

Matching

Our analyses begin by matching individuals on household characteristics which delivers a similar likelihood of displacement across groups. We employ coarsened exact matching (CEM) for this purpose. Conceptually, CEM is similar to exact matching, but rather than requiring matched pairs to have exactly the same covariate values, they are matched by meaningful groups of covariate values [11]. We choose CEM over some "approximate matching" methods including propensity score matching (PSM) for several reasons. First, PSM may lead to a poorer imbalance on matched covariates, which in certain circumstances may compromise the validity of the research design, perhaps, more so than non-matching [12, 13]. In contrast, CEM belongs to monotonic imbalance bounding matching methods, which bound the maximal imbalance by *ex ante* choice [14]. Second, for approximate matching methods such as PSM, in addition to the iterative process of estimation, matching and balance checking, its application also requires analyses to be limited to "common support" so as to remove extrapolations beyond data limits and model dependency. CEM, on the other hand, limits the analyses to common empirical support automatically. There are a number of other benefits, described extensively in the literature [11, 13, 14].

We perform a logit regression to explore potential predictors of camp residence and displacement. Based on the results, we match households on their likelihood of being displaced based upon the following characteristics: location of residence (region, urban/rural), household size, gender of household head, wealth index, and whether the housing was damaged during the earthquake.

Difference-in-differences (DID)

The DHS records the full birth history of the interviewed women including births prior to the earthquake.

This allows us to employ a DID design to identify the births prior to the earthquake as controls. We use a logit model to analyze the impact of IDP on infant and child mortality, with the following specification:

$$M_{it} = \alpha + \beta Loc_i + \gamma Post_i + \delta(Loc_i * Post_t) + \theta X_i + \eta Z_i + \varepsilon_{it}$$

where, M_{it} refers to the logit of the probability of the binary dependent variable indicating whether the live birth i born in year t died or not prior to 1 year of age (infant mortality), and whether a live birth died prior to reaching 5 years of age (child mortality). The variable Loc_i indicates the location of the household. Households belong to one of the following three groups: camp resident, displaced but not residing in a camp, and non-displaced (in the same housing after earthquake). The variable $Post_t$ is a dummy variable indicating whether the birth was born after the earthquake. The DID interaction term between *Loc* and *Post* in our model and its coefficient, δ, captures the impact of displacement on infant and child mortality controlling for inherent mortality differences prior to the earthquake. The vector X_i is a set of household characteristics, such as geographical location, household size, household head characteristics, wealth and land ownership, and damage by the earthquake. We also control for a number of birth characteristics, Z_i, which include indicators for a twin birth, gender, birth order, and preceding interval in months. The household and birth characteristics adjust for any remaining imbalance resulting from the coarseness in our matching procedure.

We next explore the key mechanisms explaining child mortality by estimating a logit model in the cross section. All the dependent variables are binary except for the time to water source (continuous), and the severity of anemia (ordinal—non-anemic, mild, moderate and severe), for which an ordinary least squares model and an ordered logit model are estimated respectively. Once again, we control for household and child characteristics.

Results

Descriptive statistics

Our investigation is based upon the matched sample of 21,417 births from 6011 households. Descriptive statistics on these matched births by displacement status are presented in Table 1. Approximately one-third of the matched births were from displaced households, with 9.69 % residing in camps and the rest living elsewhere. Prior to matching, the three groups were different (descriptive statistics of the pre-matched sample are presented in Appendix 1); CEM

Table 1 Descriptive statistics of household characteristics and earthquake damage among matched birth

Variable	Non-displaced	Non-camp IDP	Camp IDP
Matched rate, % of sample	68.06 %	87.44 %	87.30 %
Number of households (% of matched households)	3,669 (61.03 %)	1,662 (27.65 %)	680 (11.31 %)
Number of births (% of total)	13,867 (64.75 %)	5,474 (25.56 %)	2,076 (9.69 %)
Household size, mean	5.20	5.44	4.35
Urban, %	48.13 %	42.44 %	63.15 %
Wealth Index, %			
1 = Poorest	15.09 %	20.81 %	0.00 %
2	14.79 %	19.86 %	1.45 %
3	37.42 %	21.17 %	80.25 %
4	21.11 %	22.62 %	17.15 %
5 = Richest	11.59 %	15.55 %	1.16 %
Land ownership	55.44 %	60.61 %	28.42 %
Household Head			
Gender: female, %	46.49 %	42.38 %	57.32 %
Age, mean	43.27	41.07	37.88
Highest education attained, secondary and higher, %	23.44 %	28.92 %	34.63 %
Impact of earthquake			
Housing damage by earthquake, %	57.58 %	46.22 %	87.52 %
Family member(s) killed, %	3.09 %	5.20 %	8.83 %

matching reduced this imbalance among households of different displacement statuses.

Model analyses

Point estimates from our model showed that households residing in camps experienced increased infant and child mortality relative to households that were not displaced, whereas households that were displaced but not relocated to camps saw reductions. We also found that infant and child mortality was the highest in the camps, despite higher access to key mechanisms of health status compared to households elsewhere.

Impact of displacement on infant and child mortality

The results of the DID analyses are shown in Table 2. Across the three models, post-earthquake births were associated with lower mortality compared to those pre-earthquake, e.g. the OR of post-earthquake was 0.49 (95 % CI 0.32 to 0.75) for infant mortality and 0.38 (95 % CI 0.24 to 0.58) for child mortality among IDP, indicating that child survival improved over time.

Our DID captured differential trends in mortality. The estimates of the interaction term between displacement and post-earthquake in the fully adjusted model showed that births in camp households had higher infant and child mortality than the two other groups. After the earthquake, the camp IDP births compared to non-camp IDP births had a high OR = 2.34 (95 % CI 1.15 to 4.75) of infant mortality and OR = 2.34 (95 % CI 1.10 to 5.00) of child mortality. Odds ratios of camp births compared to births in non-displaced households were 1.19 (95 % CI 0.48 to 2.99) in infant mortality and 1.34 (95 % CI 0.58 to 3.08) in child mortality. This is consistent with the finding that the births from non-camp IDP households had lower infant and child mortality than the non-displaced births. Among these two groups, displacement was associated with odds ratios of 0.58 (95 % CI 0.27 to 1.26) and 0.63 (95 % CI 0.31 to 1.27), for infant and child mortality, respectively. Similarly, the unadjusted model also shows that non-camp IDP births had the lowest infant and child mortality among the three groups and that there is no statistically significant difference in mortality between births from camp and non-displacement households.

As a sensitivity analysis, we restricted the pre-earthquake control sample to those within 5 and 7 years before 2010 earthquake, respectively (Appendix 2). Estimates are consistent and showed that camp births had higher infant and child mortality than non-camp IDP births while their mortalities were not statistically different than those of the non-displaced ones.

Health status and utilization

To explore mechanisms through which displacement status affects infant and child mortality, we examined the associations between displacement status and indicators of health status and uptake of public health interventions. Results are presented in Table 3.

Table 2 Impact of displacement status on infant and child mortality

	Camp vs. Non-displaced (n = 10,261)		Camp vs. Non-camp IDP (n = 4,428)		Non-camp IDP vs. Non-displaced (n = 12,449)	
Dependent variable	OR	95 % CI	OR	95 % CI	OR	95 % CI
Infant mortality						
Unadjusted	0.57	0.17 to 1.85	2.54**	1.41 to 4.57	0.22**	0.08 to 0.65
Camp/Displacement*Post-earthquake						
Adjusted[a]						
Camp/Displacement	0.75	0.35 to 1.60	0.88	0.61 to 1.28	1.14	0.83 to 1.57
Post-earthquake	0.72	0.36 to 1.41	0.49***	0.32 to 0.75	0.73	0.37 to 1.43
Camp/Displacement*Post-earthquake	1.19	0.48 to 2.99	2.34*	1.15 to 4.75	0.58	0.27 to 1.26
Under-5 child mortality						
Unadjusted	0.57	0.19 to 1.67	2.37**	1.38 to 4.07	0.24**	0.09 to 0.67
Camp/Displacement*Post-earthquake						
Adjusted[a]						
Camp/Displacement	0.91	0.48 to 1.73	0.81	0.59 to 1.11	1.28	0.98 to 1.66
Post-earthquake	0.54*	0.30 to 0.96	0.38***	0.24 to 0.58	0.56*	0.31 to 1.00
Camp/Displacement*Post-earthquake	1.34	0.58 to 3.08	2.34*	1.10 to 5.00	0.63	0.31 to 1.27

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

[a]All adjusted models control for birth characteristics (twin birth, sex, preceding interval and birth order), region, location (rural/town/city), altitude, household size, sex, age and education level of the household head, wealth index, land ownership, whether housing was destroyed and family members killed by earthquake

Table 3 Association between displacement status and child health status and health behaviors in post-earthquake Haiti[a]

	Camp vs. Non-displaced			Camp vs. Non-camp IDP			Non-camp IDP vs. Non-displaced		
Dependent variable	N	OR	95 CI	N	OR	95 CI	N	OR	95 CI
Child health status									
Stunting	1,910	1.06	0.41 to 2.72	1,077	1.44	0.85 to 2.45	2,503	1.40	0.99 to 1.98
Anemia level	1,718	1.03	0.59 to 1.81	938	1.57*	1.07 to 2.30	2,248	0.94	0.76 to 1.17
Malaria									
Bed net use	4,083	3.23***	2.03 to 5.17	2,152	1.76***	1.29 to 2.42	5,051	1.39**	1.13 to 1.69
Indoor spraying	4,072	22.53***	11.08 to 45.80	2,138	11.07***	4.64 to 26.42	5,036	1.27	0.82 to 1.97
Vaccination[b]									
BCG vaccination	1,971	2.62*	1.18 to 5.81	1,157	0.90	0.56 to 1.43	2,534	1.56*	1.01 to 2.40
Measles vaccination	2,472	2.33*	1.16 to 4.65	1,407	0.91	0.61 to 1.37	3,179	1,23	0.91 to 1.67
DPT vaccination (3 shots)	2,478	1.43	0.77 to 2.65	1,406	0.86	0.56 to 1.32	3,184	0.96	0.71 to 1.30
Other conditions									
Hunger	4,084	0.58*	0.38 to 0.88	2,151	1.06	0.76 to 1.49	5,051	0.72***	0.59 to 0.87
Cholera after Oct 2010	4,084	0.55	0.30 to 1.01	2,152	0.64*	0.42 to 0.97	5,052	0.98	0.78 to 1.24

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

[a] All models are adjusted for region, location (rural/town/city), altitude, household size, sex, age and education level of the household head, wealth index, land ownership, whether housing was destroyed and family members killed by earthquake. Stunting refers to height-for-age < −2SD

[b]Measles vaccination refers to aged 1 year or older. DPT vaccination refers to fully vaccinated (3 shots) for children aged 1 year or older. BCG vaccination refers to children born after the earthquake (Jan 2010). Analyses are limited to subgroups of children in the sample. For BCG vaccination, analyses are performed to those born after the earthquake as the vaccine is recommended at birth. For measles and DPT vaccines, the analyses are performed for children at least one years of age. For recommended vaccination schedule, please see World Health Organization (2015) [23]

We assessed two non-mortality biomarker-based health measures: growth for age and level of anemia. Our analyses detected a significantly higher likelihood of having severe anemia among children in camp households than those in the non-camp IDP households (OR = 1.57, 95 % CI 1.07 to 2.30). There was no significant difference among household of different displacement status in anthropometric growth, an indicator of long-term household stresses and chronic food insecurity.

Across the indicators on uptake of public health interventions, camp households consistently had relatively better access to basic necessities. Compared to non-displaced households, camp households were more likely to use a bed net for sleeping (OR = 3.23, 95 % CI 2.03 to 5.17) and to spray their households against mosquitoes (OR = 22.53, 95 % CI 11.08 to 45.80). Moreover, camp households also had better access to water, with a regression coefficient for displacement at −5.37 (95 % CI −9.41 to −1.32) (OLS results not shown). Non-camp IDP households also had significantly higher use of a bed net (OR = 1.39, 95 % CI 1.13 to 1.69) compared to the non-displaced households.

We further investigated differences in having received vaccines recommended during early childhood (specifically BCG, measles, and DPT). Compared to non-displaced children, children in camps were significantly more likely to have been vaccinated against measles by 1 year of age (OR = 2.33, 95 % CI 1.16 to 4.65) and, among children born after the earthquake, to have been given the BCG vaccine (OR = 2.62, 95 % CI 1.18 to 5.81). Children in non-camp IDP households were also more likely to have received the BCG vaccination than their counterparts in non-displaced households (OR = 1.56, 95 % CI 1.01 to 2.40).

Other dependent variables assessed were the experience of hunger in the last four weeks and cholera infection of any family member since October 2010. Compared to non-displaced households, camp households were less likely to have experienced hunger (OR = 0.58, 95 % CI 0.38 to 0.88) and were also less likely to have any family member that suffered from cholera since the inception of the cholera outbreak (OR = 0.55, 95 % CI 0.30 to 1.01). In contrast, non-camp IDP households were less likely to go hungry (OR = 0.72, 95 % CI 0.59 to 0.87) compared to non-displaced households.

Discussion

The increasing frequency and intensity of natural disasters has wrought significant economic toll on populations around the world [15]. When coupled with poor infrastructure, these disasters become particularly devastating by displacing numerous people and producing complex social and health situations. In this study, we examined the impact of household

displacement as a result of the 2010 Haiti earthquake on child health and explore potential underlying mechanisms. To our knowledge, our study is the only study which has used nationally representative data to quantitatively assess the impact of internal displacement by natural disasters on health.

There are several limitations to our study. Similar to all studies based upon surveys, our results are susceptible to recall bias by the interviewed mothers. This is true for birth histories that are further away from the time of the interview. Recall bias also likely occurred in the documentation of health behaviors and uptake of public health interventions (but not biomarker-based indicators). Unlike our analyses on infant and child mortality, our analyses on health behavior mechanisms used a cross-sectional design, preventing definitive conclusions about the directionality of potential causal relationships. For instance, our observation that camp households were less likely to have experienced hunger recently and yet their children were more likely to have severe anemia, could be due to households with poor food intake previously being drawn to camps since camps were thought to have adequate food supply from aid agencies and organizations.

Our record of the displacement status was limited to three categories (moved to a camp, moved elsewhere, or did not move) and lacks variability and precision of the intensity of displacement from one place to another. Hence, the variable did not allow us to assess the dose–response relationship of displacement on health, because the displacement status is determined by the information of residence at the time of the interview. We lack data on how long a household had been displaced or has been living in a camp, or how the housing quality changed from one location to another. Households reporting to reside in camps could have been displaced and lived in camps since the immediate aftermath of the earthquake or some time afterward. Likewise, non-camp IDP households may have never lived in a camp, or may have moved out of a camp by the time of the survey. Thus, the identified differences between the two displaced populations in our models may be under-estimated.

After accounting for socioeconomic factors that shape the susceptibility of households being displaced by the earthquake, we find that survival of children in camp households was most adversely affected by the earthquake, followed by those in households that were not displaced.

In contrast to our expectations, the households that were displaced but did not reside in camps seem to be least impacted in terms of children's health. Although intuition might be that the displaced population was more vulnerable than the non-displaced one [3], the IDP was in fact heterogeneous. Households displaced *other* than to camps had greater reductions in infant and child mortality compared to those displaced to camps. These findings may partially be explained by selective migration. That is, people who moved in response to the earthquake could be self-selected as unobserved health problems may compromise mobility [16]. Alternatively, the migration of households could be a manifestation of self-insurance strategies with extended families or friends who can provide shelter in hardship, a common informal risk-coping strategy in developing countries [17]. This is consistent with our observation that the non-camp IDP households enjoy better access to resources which improve health. These findings highlight the importance of migration as a strategy to reduce the impact of a disaster [18].

There was no significant difference in child mortality between those displaced to camps and those not displaced. Compared to IDP groups, children in non-displaced households had poorer access to resources which can improve health. This implies that, for some households with the same likelihood of displacement, staying behind results in poorer living conditions and access to health services; they might live in a damaged house in a disaster-prone area but simply cannot afford or lack the networks to migrate. Future studies and investigations are required to understand the challenges and difficulties confronting these vulnerable households. Although they are not internally displaced, they are frequently overlooked. For governments and agencies working in post-disaster relief, beyond the displaced population, efforts need to be dedicated to identify and reach out to households that could be "left behind" in damaged areas.

Households in camps experienced higher infant and child mortality than households not displaced to camps, and our investigation into household conditions and health practices yielded additional insights into possible mechanisms. On one hand, households in camps seem to have good access to resources which can improve health such as food and water access. On the other hand, children in camps do suffer from a higher likelihood of severe anemia, which is consistent with their higher infant and child mortality. This raises the issue of the quality of food to enhance their physical well-being.

Without cause of death data, we can speculate on the potential reasons for differences in mortality observed. Infectious disease and malnutrition are well-known causes of child mortality in complex emergencies. Although efforts to vaccinate may reduce risk against certain diseases such as measles, mortality risks persist from risk factors associated with higher risk of diarrhea and respiratory infections. In particular, malnutrition

(including protein energy malnutrition) resulting from food insecurity and limited access to nutritious food in camps can lead to compromised immunity and increased susceptibility to infections, resulting in further energy loss, and triggering a vicious cycle of deteriorating nutritional status and illness. We found higher rates of hunger and anemia of children in camps compared to those displaced elsewhere, despite higher rates of vaccination coverage.

A third explanatory factor may be the risks associated with heightened security risks of living in camps. News reports suggested an increased incidence of both sexual and other physical violence in camps, which in turn could lead to higher mortality and morbidity from physical injury, mental health, and challenges to caretakers and mothers in their ability to care for their children. Indeed, according to the 2012 Haiti DHS report, 36 % of women aged 15–49 living in camps reported to have experienced physical violence, and 16 % having experienced sexual violence, both higher than the population averages at 28 % and 13 %, respectively [10]. Prevalence of domestic violence in camps was also a notable issue in camps at 29 %.

Finally, our study's emphasis on physical health should not de-emphasize the importance of mental health as an essential dimension of human health, especially in a complex emergency context.

Conclusions

Our use of a DID design to evaluate the impact of displacement on infant and child mortality, as well as a series of examinations into the association between displacement status and access to resources which can improve health, underline complexities in post-disaster relief. Not only is it the case that there is much work to be done to improve the health of those living in camps and that these households are likely to face a wide range of short and long-term challenges in the years to come, the displacement population itself is heterogeneous. Moreover, even individuals that are not displaced by disasters are not well-protected and risk-free. Evidence-based and better-targeted interventions require greater knowledge and better systematic evaluations of what works and who is at risk. Given the extensive impact of the earthquake on Haiti, all public health interventions including those that tackle water treatment, vaccination, and vector control [19–21] should consider the post-earthquake housing context. Despite the US$6 billion in aid to Haiti, there are few evaluations of services delivered and lives saved [22]. Scholars, governments and international agencies should begin to systematically collect and analyze information on disaster impact, so that we can make progress to establish resilient and responsive health systems that can truly be the safety nets of our populations.

Appendix 1

Table 4 Descriptive statistics of the pre-matched sample

Variable	Non-displaced	Non-camp IDP	Camp IDP
Number of households (% of total)	5,008 (65.50 %)	1,871 (24.47 %)	767 (10.03 %)
Number of births (% of total)	20,375 (70.23 %)	6,260 (21.58 %)	2,378 (8.20 %)
Household size, mean	5.94	4.92	3.99
Urban, %	32.12 %	50.40 %	70.14 %
Wealth Index, %			
1 = Poorest	28.45 %	14.86 %	0.00 %
2	22.76 %	16.83 %	8.60 %
3	16.87 %	21.33 %	73.14 %
4	16.53 %	26.94 %	17.21 %
5 = Richest	15.38 %	20.15 %	1.04 %
Land ownership	72.34 %	55.21 %	25.55 %
Household Head			
Sex (female), %	39.36 %	43.99 %	58.02 %
Age, mean	45.25	38.75	35.78
Highest education attained, secondary and higher, %	24.56 %	39.76 %	41.85 %
Impact of earthquake			
Housing destroyed by earthquake, %	26.18 %	46.23 %	86.83 %
Family member(s) killed, %	1.00 %	5.36 %	9.28 %

Appendix 2

Table 5 Sensitivity analyses limiting pre-earthquake control births within 5 and 7 years before the 2010 earthquake

	Camp vs. Non-displaced			Camp vs. Non-camp IDP			Non-camp IDP vs. Non-displaced		
	N	OR	95 % CI	N	OR	95 % CI	N	OR	95 % CI
Infant Mortality: Whether the children die by 12 months old									
All year included	10,261	1.19	0.48 to 2.99	4,428	2.34*	1.15 to 4.75	12,449	0.58	0.27 to 1.26
Excluding births prior to year 2005	3,655	0.93	0.32 to 2.69	1,826	2.43*	1.09 to 5.45	4,535	0.52	0.24 to 1.10
Excluding births prior to year 2003	4,641	0.99	0.33 to 2.98	2,257	2.52*	1.11 to 5.75	5,760	0.52	0.25 to 1.10
Child Mortality: Whether the children die by 5 years old									
All year included	10,261	1.34	0.58 to 3.08	4,428	2.34*	1.10 to 5.00	12,449	0.63	0.31 to 1.27
Excluding births prior to year 2005	3,655	0.83	0.30 to 2.31	1,826	2.00	0.84 to 4.76	4,535	0.55	0.28 to 1.09
Excluding births prior to year 2003	4,641	0.87	0.30 to 2.51	2,257	1.92	0.79 to 4.63	5,760	0.59	0.29 to 1.20

*$p < 0.05$

Abbreviations
CEM, coarsened exact matching; DHS, Demographic and Health Survey; DID, difference-in-differences; IDP, internally displaced people; PSM, propensity score matching

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DHS data are available from the DHS Program upon request at dhsprogram.com. The code to replicate these results is available upon request from the authors and will be posted to a public data repository.

Authors' contributions
VF conceived of the study and methods. BC led the data analysis in cooperation with VF. TH contributed to literature review. BC wrote the first draft. All authors contributed to the writing and analysis. All authors read and approved the final manuscript.

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The authors declare that they have no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
Procedures and questionnaires for standard DHS surveys have been reviewed and approved by the ICF International Institutional Review Board (IRB). The ICF International IRB ensures that the survey complies with the U.S. Department of Health and Human Services regulations for the protection of human subjects (45 CFR 46).

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