

4-2016

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Shiffman, Jeremy; Schmitz, Hans Peter; Berlan, David; Smith, Stephanie L.; Quissell, Kathryn; Gneiting, Uwe; and Pelletier, David, "The Emergence and Effectiveness of Global Health Networks: Findings and Future Research" (2016). *School of Leadership and Education Sciences: Faculty Publications*. 2.

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The emergence and effectiveness of global health networks: findings and future research

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Accepted 31 January 2016

Global health issues vary in the amount of attention and resources they receive. One reason is that the networks of individuals and organizations that address these issues differ in their effectiveness. This article presents key findings from a research project on the emergence and effectiveness of global health networks addressing tobacco use, alcohol harm, maternal mortality, neonatal mortality, tuberculosis and pneumonia. Although networks are only one of many factors influencing priority, they do matter, particularly for shaping the way the problem and solutions are understood, and convincing governments, international organizations and other global actors to address the issue. Their national-level effects vary by issue and are more difficult to ascertain. Networks are most likely to produce effects when (1) their members construct a compelling framing of the issue, one that includes a shared understanding of the problem, a consensus on solutions and convincing reasons to act and (2) they build a political coalition that includes individuals and organizations beyond their traditional base in the health sector, a task that demands engagement in the politics of the issue, not just its technical aspects. Maintaining a focused frame and sustaining a broad coalition are often in tension: effective networks find ways to balance the two challenges. The emergence and effectiveness of a network are shaped both by its members' decisions and by contextual factors, including historical influences (e.g. prior failed attempts to address the problem), features of the policy environment (e.g. global development goals) and characteristics of the issue the network addresses (e.g. its mortality burden). Their proliferation raises the issue of their legitimacy. Reasons to consider them legitimate include their members' expertise and the attention they bring to neglected issues. Reasons to question their legitimacy include their largely elite composition and the fragmentation they bring to global health governance.

Keywords Alcohol harm, global health policy, health policy analysis, maternal mortality, neonatal mortality, networks, pneumonia, tobacco control, tuberculosis

KEY MESSAGES

- Global health networks—webs of individuals and organizations linked by a shared concern for a health condition—now exist for most high-burden health problems that low- and middle-income countries face. They play major agenda-setting and policy development roles, particularly by influencing how problems and solutions are understood and by recruiting new actors to address the issues that concern them.
- Global health networks are most likely to be effective when they construct compelling framings of the issue and establish political coalitions that extend beyond the health sector.
- Network emergence and effectiveness are shaped both by network decisions and by contextual factors, including historical influences, their policy environment and characteristics of the issues they address.

Introduction

Global health issues vary in the amount of policy attention and resources they receive. One reason is that the networks of individuals and organizations that address these issues differ in their effectiveness. Over the past quarter century, such networks have emerged for most high-burden health conditions, a transformation in the way global health is governed.

This concluding article to the journal supplement presents key findings from the Global Health Advocacy and Policy Project, a research initiative on the emergence and effectiveness of global health networks. Using a comparative historical research approach, we investigated six networks in three matched pairs, addressing addictive substances—tobacco and alcohol; groups vulnerable at birth—pregnant women and newborn babies; and communicable diseases affecting the respiratory system—tuberculosis and pneumonia. Despite both issues in each pair being of the same type and the second having comparable or higher burden, the first has attracted greater global priority (Table 1). Although both smoking and alcohol use lead to high levels of illness and death (157 and 139 million disability adjusted life years lost in 2010 and 2012, respectively) (Lim *et al.* 2012; World Health Organization 2014a), tobacco control has had markedly greater policy traction, evidenced most notably by the passage of a 2003 global tobacco control treaty and no such equivalent for alcohol harm. Despite representing only about one-tenth the number of deaths (0.29 million vs 2.8 million in 2013) (Inter-agency Group for Child Mortality Estimation 2014; Kassebaum *et al.* 2014), maternal survival has attracted considerably greater donor financing than newborn survival (Darmstadt *et al.* 2014; Institute for Health Metrics and Evaluation 2015). And although tuberculosis and pneumonia have a comparable mortality burden (in 2013, 1.1 million tuberculosis deaths overall vs. 935 000 pneumonia deaths among children under five alone) (World Health Organization 2014b; Liu *et al.* 2015), tuberculosis treatment has been scaled-up to a far greater extent. As of the late 2000s, directly observed treatment short course (DOTS)—the primary intervention for TB—was available in 180 countries (World Health Organization 2013a) and had averted an estimated 22 million deaths (World Health Organization 2013a); the scale-up of pneumonia interventions lags far behind.

Drawing on a framework consisting of three categories of factors (Table 2)—network and actor features, policy environment and issue characteristics (Shiffman *et al.* 2016)—we conducted case studies of networks addressing each of the six issues. Our aims were to explain (1) how networks emerge and

evolve; (2) what role networks play, if any, in generating policy attention and (3) what factors shape the ability of networks to do so. In the sections that follow, we draw on the framework to present findings on each of these questions, with attention to how network decisions and contextual factors—including historical influences, policy environment and issue characteristics—shaped network emergence and effectiveness. We also consider network legitimacy—the question of by what authority they exert power. In the discussion, we evaluate the usefulness and limitations of the framework, identify deeper themes that emerge from the studies and point to directions for future research.

Network emergence

The studies indicate that global networks on each of the six issues have existed for at least 15 years (Table 3). No single factor stood behind the emergence of any of the six: rather, in each case network appearance was the product of a confluence of forces—the configurations slightly different for each (Table 4). These included new information on the scope of the problem (framework factor 8: severity); the condition's appearance in new forms or geographic regions (framework factor 8: severity); dissatisfaction with existing efforts to address the condition and with the way the condition was publicly understood (framework factor 9: tractability; framework factor 4: framing strategies); new evidence on how to address the problem (framework factor 9: tractability); new global agreements creating expectations that states and other actors move to address the issue (framework factor 7: norms); mobilization to counter industries marketing products the use of which causes disease (framework factor 5: allies and opponents) and concern that a particular population group was being harmed (framework factor 10: affected groups). In each case, the convergence of several of these factors led to a decision by one or more concerned individuals to bring together actors previously working in isolation with the intent of building ties among them and spurring collective action (framework factor 1: leadership).

For example, in the case of maternal survival, in 1985 for the first time the World Health Organization (WHO) produced evidence on the global scope of the problem—half a million annual deaths. Around the same time, maternal health professionals were growing increasingly uneasy that maternal and child health programs in low-income settings focused largely on children (Shiffman and Smith 2007; Smith and Rodriguez

Table 1 Issue type, burden and global priority for six issues investigated

Issue	Issue type	DALYs lost (millions) ^a	Deaths (millions in 2013) ^b	Level of global priority ^c
Tobacco use	Addictive substance	157	6.0	Strong: legally binding treaty enacted in 2003 that has compelled nation-states to carry out tobacco control measures.
Alcohol harm	Addictive substance	139	3.3 ^d	Weak: non-binding global strategy not adopted until 2010 and to date has had minimal impact on national priority.
Maternal mortality and morbidity	Group vulnerable at birth	16	0.3	Strong: 2010 UN-organized plan with heavy maternal health component; \$3.0 billion in donor funding in 2014.
Neonatal mortality and morbidity	Group vulnerable at birth	202	2.8	Moderate: while growing, as of 2010 only \$613 million in donor non-research disbursements across time for the issue.
Tuberculosis	Communicable disease affecting respiratory system	49	1.1 ^e	Strong: in 2014, \$1.4 billion in donor funding and primary strategy, DOTS, implemented in 180 countries.
Pneumonia	Communicable disease affecting respiratory system	69 ^f	0.9 (among children under five only)	Moderate: in 2013, pneumococcal vaccine policies in 192 countries but other interventions lagging.

Note: DALY, disability adjusted life years.

^aWith exception of alcohol figure, which is for 2012, all figures are for 2010. Sources: tobacco (Lim *et al.* 2012); alcohol (World Health Organization 2014a) and maternal, neonatal, tuberculosis and pneumonia (Murray *et al.* 2012).

^bSources for mortality data: tobacco (World Health Organization 2013b); alcohol (World Health Organization 2014a); maternal mortality (Kassebaum *et al.* 2014); neonatal mortality (Inter-agency Group for Child Mortality Estimation 2014); tuberculosis (World Health Organization 2014b); childhood pneumonia (Liu *et al.* 2015).

^cSources for priority data: maternal (Institute for Health Metrics and Evaluation 2015); neonatal (Darmstadt *et al.* 2014); tuberculosis (Institute for Health Metrics and Evaluation 2015; World Health Organization 2013a); pneumonia (World Health Organization and UNICEF 2015).

^dFor 2012.

^eDoes not include estimated 360 000 TB deaths among HIV-positive people, which are classified as HIV deaths according to ICD-10 (World Health Organization 2014b).

^fCombined total for pneumococcal, *H. influenzae* type B and respiratory syncytial virus pneumonias.

2016). This state of affairs prompted Allan Rosenfield and Deborah Maine to write an influential 1985 article published in the prominent medical journal *The Lancet* titled, 'Maternal mortality—a neglected tragedy. Where is the M in MCH?' (Rosenfield and Maine 1985). The article helped to spark a global safe motherhood initiative, launched in 1987 at a conference in Nairobi, Kenya, with the aim of reducing the number of maternal deaths in childbirth by half by the year 2000 (Shiffman and Smith 2007). An Inter-Agency Group, composed of the World Bank, a handful of United Nations agencies and several international non-governmental organizations, guided the initiative initially, and its members formed the original core of the network. For newborn survival, the stimulus was the realization among researchers working on child mortality that the newborn period constituted a growing share of deaths to children under 5 years of age and that in contrast to post-neonatal child mortality, little was being done in low-income countries to address the neonatal period (Shiffman 2016). Researchers organized a conference in 1999 at Johns Hopkins University in response. There, participants heard evidence from the Indian physician Abhay Bang that low-technology community and home-based interventions had reduced newborn deaths in a locality in Maharashtra state, generating hope among them that the problem could be addressed across low-income settings. In 2000, concerned individuals and organizations created the Healthy Newborn Partnership to coordinate global efforts.

We observe similar patterns for the other four networks. In 1967, a network of tobacco control scientists and activists coalesced around the first World Conference on Tobacco or Health (Mamudu *et al.* 2011), 3 years after an influential US Surgeon General's report unequivocally stating the harm caused by smoking. In the 1990s, tobacco control proponents from around the world augmented their networked activities around the negotiations of a global treaty on tobacco control—an idea that had been created and promoted by leading network members. During the treaty negotiations, the network brought together dozens of NGOs working on the issue, leading to the creation of a formal network organization in 1999—the Framework Convention Alliance (FCA). (Gneiting 2016). For alcohol harm, the trigger was dissatisfaction among alcohol researchers surrounding the post-Prohibition abandonment of public health strategies to address the issue and the consequent dominance of individual behavioural and medical approaches (Schmitz 2016). In 1986, they organized the Ketil Bruun Society to re-introduce a public health approach.

The alarm caused by the re-appearance of tuberculosis in Europe and North America in the late 1980s, growing concern among African leaders about the disease, the convergence surrounding DOTS as a treatment strategy and WHO leadership formed the backdrop for the formation in 2001 of the Stop TB Partnership, an alliance of organizations working on the issue (Quissell and Walt 2016). The spark for pneumonia network formation was the realization among researchers and national

Table 2 List of framework factors on the emergence and effectiveness of global health networks

Category	Category explanation	Factor	Factor explanation
Network and actor features	Factors internal to the network involving strategy and structure, and attributes of the actors that constitute the network or are involved in creating it	Leadership	A network is more likely to emerge and be effective if capable, well-connected and widely respected champions are available to lead the cause.
		Governance	Networks are more likely to be effective if they have appropriate governing structures capable of facilitating collective action and resolving disputes.
		Composition	Networks that link diverse actors are more likely to generate creative solutions to problems but also to be hampered by disagreements.
		Framing strategies	Networks are more likely to be effective when their members have discovered ways of positioning the issue that resonate with external actors, especially political elites.
Policy environment	Factors external to the network that shape both its nature and the effects the network hopes to produce	Allies and opponents	Groups with aligned interests will facilitate network expansion and power. Opponents will challenge network legitimacy and issue promotion, but their existence may inspire mobilization.
		Funding	Donor funding may facilitate network emergence and effectiveness and a dearth may hinder prospects for sustainability, but over-reliance on these resources may hamper network legitimacy.
		Norms	Widely held expectations that global actors address a particular condition facilitate network emergence. Networks that advocate for policies that violate strong social values face obstacles.
Issue characteristics	Features of the problem the network seeks to address	Severity	Network emergence and effectiveness are more likely surrounding problems that are perceived to have high mortality, morbidity or socioeconomic costs.
		Tractability	Networks are more likely to form and be effective surrounding problems for which solutions exist or are perceived to exist, especially if proposed solutions are politically uncontroversial.
		Affected groups	Network emergence and effectiveness are more likely on issues that affect groups that are readily identifiable, that societies view sympathetically and that are able to advocate for themselves.

Table 3 The six networks studied—initial and most recent forms

Network studied	Initial formation	Current structure/organization
Tobacco use	1967: Network of scientists and activists coalesces around first World Conference on Tobacco or Health.	1999: FCA forms as formal coalition of NGOs around global tobacco control treaty; over past decade, expansion and decentralization of network including new funding partner networks, regional networks, and national-level coalitions
Alcohol harm	1986: Alcohol harm researchers form Kettil Bruun Society, re-introducing idea that substance is a public health threat.	2000: Global Alcohol Policy Alliance forms, bringing together more than 200 alcohol policy and public health advocates from about 30 countries, in effort to broaden the network beyond Europe and North America.
Maternal mortality	1987: Network forms following a conference in Kenya that launches global safe motherhood initiative. Initiative initially guided by Inter-Agency Group, comprised of representatives from international organizations and NGOs.	2005: Partnership for Maternal, Newborn and Child Health forms (PMNCH), although it is only one among multiple institutions that presently connect maternal health actors. As of 2015, PMNCH links more than 680 organizations.
Neonatal mortality	1999: Network emerges following conference at Johns Hopkins on perinatal mortality in low-income settings. Proponents establish Healthy Newborn Partnership in 2000 to link concerned individuals and organizations.	2014: Global action plan on newborn survival appears, organized by small, informal group of researchers and program officers most of whom, since 2000, have constituted network's core.
Tuberculosis	Early 1990s: Coalition emerges linking researchers, donors, advocates and political leaders who understand TB to be a global public health emergency.	2001: Coalition is formalized in the form of the Stop TB Partnership, which as of 2012 encompasses approximately 1600 individuals and organizations.
Childhood pneumonia	1984: A short-lived network emerges linking officers and researchers in global and national programs dedicated to community care of the disease.	2003: Influential actors begin to rebuild network around a broader identity encompassing a larger spectrum of interventions, including vaccines.

Table 4 Factors shaping network emergence

Framework factor	Leadership (1)	Framing strategies (4)	Allies and opponents (5)	Norms (7)	Severity (8)	Tractability (9)	Affected groups (10)	
	Individual mobilizers	Concern about way condition is publicly understood	Efforts to counter industries	New global agreements	New information on scope of problem	Concern about existing efforts to address condition	New evidence on how to address problem	Harm to population group
Tobacco use	X	X	X	X	X	X		
Alcohol harm	X	X	X			X		
Maternal mortality	X	X		X	X	X		X
Neonatal mortality	X	X			X	X		X
Tuberculosis	X			X		X		X
Childhood pneumonia	X				X	X		X

program managers in low-income countries that the disease was killing many children and that community-based solutions could help address the problem (Berlan 2016). In the 1980s, they conveyed this information to the WHO, which in 1984 organized an acute respiratory infection program, providing a platform to link individuals concerned about the disease.

Network effects

The studies demonstrate that although their efforts were only one of multiple factors shaping priority, these networks did matter, particularly for global agenda-setting and policy development. They did so by (1) bringing global attention to the neglect and severity of the problems that concerned them (framework factor 8: severity), (2) advancing solutions (framework factor 9: tractability) and (3) negotiating and mobilizing to secure global agreements, convince new actors to address the issue and—for tobacco control and alcohol harm—counter opponents (framework factor 3: composition; framework factor 5: allies and opponents). Their national effects—on policy adoption, intervention scale-up and population health—are more difficult to ascertain and varied by issue. In most instances, they had more pronounced global than national effects because the majority of network members worked in organizations operating globally—including research institutions, international organizations, donor agencies and international NGOs—and focused their efforts primarily, if not exclusively, at that level. Also, barriers to national change were considerable—often more formidable than global obstacles—and included competing national development priorities, political instability and weak health infrastructures.

Network effects on global agenda setting and policy development

The six networks were among the first actors to publicize the neglect and severity of the conditions that concerned them, and they continue to monitor and raise awareness of the scope of these problems (framework factor 8: severity). The tobacco control network that emerged in 1967 helped to bring global attention to the adverse effects of the product. The FCA that formed in 1999 has published several monitoring reports highlighting discrepancies between FCTC members' commitments and actions (Gneiting 2016). Researchers in the alcohol network systematically monitor alcohol-related harm, contribute to the WHO's *Global Status Report on Alcohol and Health* and generate data for Global Burden of Disease reports (Schmitz 2016). Maternal survival proponents, through the safe motherhood initiative launched in 1987, raised global awareness of the half million annual deaths due to maternal death in childbirth (Smith and Rodriguez 2016). From 2000 on newborn survival proponents, through the Healthy Newborn Partnership and other mechanisms, brought global attention to the fact that neonatal mortality constituted >40% of deaths among children under 5 years of age and that this was the portion of child mortality declining at the slowest pace (Shiffman 2016). The Countdown to 2015, an alliance that includes maternal and newborn survival network members, produces regular monitoring reports tracking coverage of health interventions for maternal, newborn and child survival in high-mortality countries (<http://www.countdown2015mnch>).

org/reports-and-articles). A network of individuals alarmed about the tuberculosis epidemic helped to secure the 2000 Amsterdam Declaration and 2001 Washington Commitment, major global political commitments to address the disease (Quissell and Walt 2016). They support the WHO on global surveillance of the disease, including since 2010 its multi-drug-resistant variant. Under the auspices of the WHO's Acute Respiratory Infection Program, individuals concerned about pneumonia were among the first to raise awareness about its high mortality among children (Berlan 2016). Via a network re-constituted in the 2000s, they support an annual World Pneumonia Day and have used data produced by the Child Health Epidemiology Reference Group to publicize pneumonia as the world's leading killer of children.

Network members also generated, synthesized and disseminated research that provided evidence on the tractability of the problems they were addressing (framework factor 9: tractability). Network members contributed evidence on the effectiveness of tax increases and limits on marketing for an influential 1999 World Bank study calling for greater tobacco control in low-income countries (World Bank 1999). The WHO's *Global Status Report on Alcohol and Health* prominently mentions research by network members on the efficacy of tax increases and marketing restrictions (World Health Organization 2014a). A 2009 *Lancet* series, focused on alcohol as 'one of the most pressing public health problems in the world', also profiles this research and network member policy recommendations (Lancet 2009, p. 2171). From the 1990s on researchers core to the maternal survival network produced hundreds of studies on maternal mortality and conceived of and contributed the bulk of the material for three influential *Lancet* series on maternal survival (in 2006, 2007 and 2013), laying out the need for quality intrapartum care (Shiffman and Smith 2007; Smith and Rodriguez 2016). Between 2000 and 2015, newborn survival network members—most of whom were researchers—expanded the evidence base on how to address the issue and in doing so altered the perception that newborn survival was an intractable problem in low-income settings (Shiffman 2016). As with maternal survival, they conceived of and organized influential *Lancet* series (in 2005 and 2014) demonstrating the tractability of the problem. Tuberculosis network members conduct much of the research on TB diagnostics, drugs and vaccines, producing knowledge that informs WHO policies (Quissell and Walt 2016). In the 1980s, individuals concerned with pneumonia developed guidance for the WHO on diagnosing and addressing pneumonia in communities and hospitals (Berlan 2016). A reconstituted network in the 2000s produced reviews of prior research, including an influential 2008 issue of the *Bulletin of the World Health Organization* and an article based on a collective effort to identify pneumonia research gaps (Rudan *et al.* 2011).

In addition, networks mobilized and negotiated to recruit new actors, build coalitions, acquire resources and secure global agreements on the issues that concerned them (framework factor 3: composition; framework factor 5: allies and opponents). Network members actively sought support from within the WHO and recruited tobacco control advocates from around the world, leading to an expansion in formal network membership of the FCA from 60 organizations in 1999 to approximately 500 presently. The network also expanded its reach through new funding sources, such as the significant support by Bloomberg

Philanthropies and the Bill and Melinda Gates Foundation. Although the Global Alcohol Policy Alliance has not experienced FCA's growth nor attracted significant funding, it was able during the 2000s to create a number of regional networks (Schmitz 2016). In the first 5 years of the safe motherhood initiative, maternal survival network members engaged representatives of >80 countries through national and regional conferences. In the late 2000s, although not all of these represented new pledges, they helped to draw an estimated \$40 billion in commitments from 127 stakeholders for the Global Strategy for Women's and Children's Health. The TB network early on garnered the support of USAID in financing TB efforts. As of 2012 Stop TB Partnership individual and organizational membership had reached approximately 1600, and the number of advocacy NGOs and local organizations signing onto the Global Plan continues to grow (Quissell and Walt 2016). Newborn survival network members convinced UNICEF to take up the issue and used their board positions in the Partnership for Maternal, Newborn and Child Health to ensure that it did not neglect the newborn (Shiffman 2016). Pneumonia network members produced and disseminated research that may have influenced the creation of an Advanced Market Commitment for a pneumococcal vaccine and decisions by the Gates Foundation and GAVI to address the disease (Berlan 2016). Moreover, each network was centrally involved in the conceptualization and crafting of an influential global plan, strategy or framework that has spurred action on these problems: the 2001 Global Plan to Stop TB, the 2003 Framework Convention on Tobacco Control, the 2009 and 2013 Global Action Plans for Prevention and Control of Pneumonia (and Diarrhoea in the latter plan), the 2010 Global Strategy to Reduce the Harmful Use of Alcohol, the 2010 Global Strategy on Women's and Children's Health and the 2014 Every Newborn Action Plan. Most recently, several of the networks influenced the content of Sustainable Development Goal (SDG) number three on health (Box 1). United Nations member states officially adopted the SDGs in September 2015.

Network effects on national policy

While all six networks played large global agenda-setting and policy development roles, their national policy effects are more difficult to ascertain and vary by issue. Tobacco, tuberculosis and maternal survival networks had more pronounced national policy effects than those for newborn survival, pneumonia and alcohol. By pushing for and monitoring country compliance with the FCTC, tobacco network members helped to facilitate a doubling in the number of people protected by comprehensive smoke-free laws—to 787 million—between 2008 and 2010 and have influenced policy on other issues such as pictorial health warnings and advertising bans (Eriksen *et al.* 2012; Gneiting 2016). The Global Stop TB Partnership supported the cross-national diffusion of DOTS (World Health Organization 2013a; Quissell and Walt 2016). Research by TB network members has informed country strategic plans, particularly in the 22 highest burden countries (World Health Organization 2014b). A maternal survival network facilitated country policy adoption by organizing regional and national safe motherhood conferences between 1987 and 1992 and helping UN agencies and other partners to develop roadmaps for maternal and newborn health in 33 African countries in the mid-2000s (de Bernis and

Box 1 Network influence on the SDGs

The 17 SDGs, unanimously adopted by United Nations member states in September 2015, are the latest expression of global development priorities. Goal three concerns health ('Ensure healthy lives and promote well-being for all at all ages.' See <http://www.globalgoals.org/global-goals/good-health>, accessed 4 January 2016).

We conducted most of our research prior to major deliberations on the SDGs. For this concluding paper, we sought to bring our findings up-to-date by examining what influence the networks we studied had on the SDG health targets. We reached out via e-mail and telephone to 14 key informants to gather information on this question.

Five of the six issues we studied are mentioned explicitly (*italics added*) in SDG 3 (there are additional elements to SDG 3 that are not listed below):

- By 2030, reduce the global maternal mortality ratio to < 70 per 100 000 live births
- By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1,000 live births
- By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
- Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol
- Strengthen the implementation of the WHO Framework Convention on Tobacco Control in all countries, as appropriate

Pneumonia is not mentioned explicitly but is included implicitly since it is a leading cause of under-5 mortality.

Information from key informants provides evidence that the networks, to varying degrees, influenced the selection of these issues for inclusion and the targets selected:

- The fact that maternal mortality was in the MDGs made it highly likely that it would be included in the SDGs, given the impetus to complete this unfinished agenda. Maternal survival proponents shaped the content of the goal by engaging UN and donor agencies and coming to a consensus on the target to be included. In 2014, a meeting was organized by the WHO, the Maternal Health Task Force, United Nations Population Fund, USAID and the Maternal and Child Health Integrated Program concerning Ending Preventable Maternal Mortality (United States Agency for International Development 2014). The meeting included many core maternal survival network members. Their representatives from 30 countries agreed on a 2030 global target MMR of < 70 per 100 000 live births. It is that target that is included in the SDGs.
- With respect to child survival, global actors involved in formulating the SDGs initially focused their attention on sustaining an under-5 mortality target, as a continuation of the MDGs. Initiatives and advocacy by newborn survival proponents influenced the decision to add a neonatal mortality target. Particularly influential was their organization of a global conference on newborn survival in Johannesburg, South Africa in 2013; their creation of an Every Newborn Action Plan in 2014 which included a neonatal mortality target; their links with a UN-led global Every Woman Every Child movement and advocacy within their own organizations, many of which participated in SDG development. The target included in the SDGs—'to reduce neonatal mortality to at least as low as 12 per 1,000 live births'—came from the Every Newborn Action Plan.
- Organizations within the TB network influenced the SDG negotiation process through several different mechanisms. First, the WHO had a coordinating role in defining SDG 3 and its targets and indicators. This was done in continuous consultation with its Global TB Programme (GTB). GTB stayed closely engaged with the proceedings in New York to ensure TB's inclusion, and the final language of the target to 'end the epidemics of AIDS, tuberculosis, and malaria' directly reflects the 2014 End TB Strategy elaborated by GTB in consultation with its advisory bodies, governments, national programs, partners, and civil society, and agreed upon by all WHO Member States at the World Health Assembly in May 2014. The Stop TB Partnership and many of the activist organizations also advocated on behalf of this target.
- The alcohol and tobacco networks have been producing evidence on harm, linking this to development questions and proposing solutions. Their success in doing so likely increased the probability of mention of tobacco control and alcohol harm in the SDGs. However, for both alcohol and tobacco, the language in the SDGs does not include specific reduction targets (in contrast to road traffic accidents which have a specific target of 50% reduction in injuries and deaths by 2020). A general target establishes the goal, 'to reduce by one third premature mortality from non-communicable diseases.' This gives states extensive leeway with regard to the risk factors they choose to address. Tobacco is mentioned as a separate target under Goal 3, but it requires states only to, 'strengthen the implementation of the WHO Framework Convention on Tobacco Control, as appropriate.' Alcohol is not included as a separate target but mentioned alongside other substance abuse issues. States are asked in very general terms to 'strengthen prevention and treatment'. While the FCA engaged in systematic lobbying at the international and domestic levels to push tobacco control onto the SDG agenda, members of the alcohol control network had no sustained involvement in SDG negotiations. However, they did participate in the 2011 UN Meeting on NCDs which defined the global response by 2030.
- Pneumonia does not appear anywhere in the SDGs. This may be due to a combination of a lack of network member focus on seeking to influence the goals and limited influence beyond the child survival community. Follow-up correspondence with four networks members who play leadership and coordination roles reveal that none of them personally participated in the SDG process. They reported knowing of some colleagues who did so, but in each case those participating focused on a broader issue, like child survival, access to essential medicines or immunizations, rather than securing a pneumonia reference. The lack of a reference to pneumonia in the SDGs, especially compared to issues with significantly lower mortality burdens, is viewed by some of the respondents as indication of a lack of broader influence by the network.

Wolman 2009; Smith and Rodriguez 2016). Between 1990 and 2010, there was a moderate decline in the global maternal mortality ratio—3.1% per annum (World Health Organization, United Nations Children’s Fund, United Nations Population Fund and The World Bank 2012)—although it is difficult to assess the contribution of network activity to this change, as many other factors likely were influential, including improvements in the status of women and programming on other issues such as family planning.

A newborn survival network pushed for national adoption of policies and programs to reduce neonatal mortality, but only a handful of countries have devoted significant public resources to the issue (Darmstadt *et al.* 2014; Shiffman 2016). And while neonatal mortality declined at a rate of 2.1% per annum between 2000, the year of network formation, and 2010, there is no strong evidence that newborn survival programs were a major contributor (Lawn *et al.* 2012, 2014). While there has been a sustained decline in child pneumonia (from 3.6 million in 1991 to 0.9 million in 2013) (Garenne *et al.* 1992; Liu *et al.* 2015), network efforts were strong only from the late 2000s on, so the limited network influence on policy to date could not be primarily responsible (Berlan 2016). And although 66 WHO member states had written national alcohol policies as of 2012 (World Health Organization 2014a), few countries have strong programs to address alcohol harm (Schmitz 2016). It may take more time for the alcohol harm network to capitalize on the 2010 Global Strategy but progress is lagging when compared to the first 5 years after the FCTC entered into force.

Other factors shaping outcomes

Networks were hardly the sole source of change in policy outcomes, even for global agenda setting where their effects were most pronounced. Changes in issue characteristics and the policy environment, and the efforts of individual, rather than networked, actors also shaped global attention to these issues. For instance, the AIDS-related re-emergence of tuberculosis in Western Europe and North America in the late 1980s—an issue characteristic—was the initial spark for a resurgence of global attention to the disease. The significant rise in harm caused by

smoking and drinking in low- and middle-income countries created considerable demand for action that contributed to the formation and influence of global health networks addressing these problems. The inclusion of maternal mortality as a Millennium Development Goal (MDG)—a feature of the policy environment only tangentially influenced by network members—was a major reason for the growth in attention to this issue through the 2000s (Smith and Rodriguez 2016). The 1999 study on home-based care for the newborn by Abhay Bang and colleagues—research conducted with minimal interaction with global institutions—was the original catalyst that shifted perceptions on the tractability of the problem (Shiffman 2016). Nevertheless, evidence from the case studies strongly indicates that networks were an influential contributor, particularly to raising global attention to these issues.

Sources of network effectiveness

Many factors shaped the flourishing of networks and consequently their capacity to generate attention and resources. Two, however, were influential in all cases (Table 5). First, the more effective networks constructed a compelling framing of the issue (framework factor 4: framing strategies), one that encompassed a shared understanding of the problem, a consensus on solutions and convincing reasons to act [what social movement scholars term diagnostic, prognostic and motivational framing (Snow and Benford 1988)]. These reasons pertained to the threat the problem posed, an ethical imperative or both. Such a framing facilitated network coalescence and inspired others to work on the issue. Second, those networks helped build political coalitions that included individuals and organizations beyond their traditional bases in the health sector, a task that necessitated their engagement in the politics of the issues, not just technical aspects (framework factor 3: composition and framework factor 5: allies and opponents). Sustaining a cohesive frame and building a broad coalition were often in tension: the former demanded focus, the latter wide appeal. Effective networks found ways to balance the two challenges.

Table 5 Network coalitions and issue framing

Network	Nature of coalition	Framing of issue
Tobacco use	Relatively broad: researchers and advocates from high and low-income countries	Cohesive: a public health threat, with industry as the vector of disease
Alcohol harm	Narrow: largely researchers from high-income countries	Contested: public health framing competes with individual behavioural and medical framings
Maternal mortality	Broad: initially insular, evolves into political coalition linking researchers, advocates and politicians from high and low-income countries	Cohesive: an ethical imperative—a matter of women’s rights and equity—that requires urgent action due to slow progress
Neonatal mortality	Narrow: tight core of health-oriented professionals; expansion beyond health sector has been slow	Cohesive but inadequate: essential for achieving MDG 4. But other strong rationales that political leaders might find compelling and urgent have yet to emerge
Tuberculosis	Broad: researchers, advocates and political leaders from high and low-income countries, linked via Stop TB Partnership	Relatively cohesive: a social threat, with DOTS as core strategy to address the disease (although some disagreement on DOTS’ efficacy)
Childhood pneumonia	Narrow and unstable: emerges, dissolves then reappears—a function of shifting ties with broader child survival initiatives and internal differences over interventions	Contested: forceful positioning as ‘leading killer of children’, but historically disagreement over whether it should be a stand-alone issue or integrated into child survival

Box 2 Future research questions on global health networks

1. Emergence:

- a. While the studies indicate that multiple configurations of factors stand behind network emergence, would investigating a larger sample of networks reveal that one (or more) configuration is particularly common?
- b. Why did global health network proliferation begin in the 1970s and 1980s? What historical forces shaped their appearance at this particular juncture?
- c. Are we likely to see the same rate of global health network proliferation over the next 40 years as we have seen in the past 40 years? Is the global health network space becoming crowded, a factor that might make it difficult for future networks to gain traction?

2. Global agenda-setting:

- a. Are networks more effective if they proceed in stages: first—in order to generate momentum—building a tight coalition of actors concentrated in the health sector who are sympathetic to the cause and embrace a shared framing of the issue, and then loosening the framing to appeal to a broader set of actors, expanding the coalition beyond the health sector?
- b. Under what circumstances are confrontational tactics (such as those employed by tobacco control and HIV/AIDS initiatives) advantageous for generating sustained attention to an issue?
- c. Is it primarily the production of objective evidence on tractability that enables networks to influence the agenda status of an issue or rather their ability to shape the perception that a problem can be surmounted?
- d. Even in the absence of global health networks, would individuals and organizations have produced the technical and medical knowledge now available? Might the distinctiveness of global health networks lie more in their linking of this evidence with normative claims, adding a moral element to the process? (Kapstein and Busby 2010)

3. National effects:

- a. Once they have had global agenda-setting influence, why are some networks more effective in producing national effects than others?
- b. How do the quality of linkages with national networks influence global health network effectiveness?
- c. How do the appropriateness of their framing strategies for national level contexts influence their effectiveness?
- d. Are there life-cycle effects: do the limited national effects of some networks have as much to do with their relative youth as with any deficiency in strategies?
- e. Which country-specific factors explain differential receptiveness to global health networks?

4. Framework generalizability:

- a. To what extent are the framework categories of network and actor features, policy environment and issue characteristics useful for explaining the emergence and effectiveness of global health networks in categories not studied in this project, including those addressing health systems issues (e.g. health workforce), environmental risk factors (e.g. industrial pollution) and interventions (e.g. vaccinations)?
- b. What influential factors does the framework miss? For emergence? For effectiveness?

5. Legitimacy:

- a. What dimensions ought to be considered in assessing the legitimacy of global health networks (e.g. transparency, inclusiveness, representation, expertise, effectiveness)? What ethical frameworks should be used to assess their legitimacy?
- b. Why are some networks perceived to be more legitimate than others?

The three comparisons reveal the influence of these two factors in shaping network effectiveness. After two decades of disagreements on interventions, in the mid-2000s prominent maternal survival proponents coalesced around a strategy emphasizing emergency obstetric care, skilled attendance at birth and access to comprehensive reproductive health services, including family planning (Shiffman and Smith 2007; Smith and Rodriguez 2016). Also, slow progress on the maternal survival MDG and growing expectations that governments prioritize women's rights and health put pressure on political leaders to act (Smith and Rodriguez 2016). These same

pressures led to the emergence in the mid-2000s of a broad political coalition on maternal survival, one the network helped build, that included the UN Secretary-General and heads of state from low and high-income countries (Smith and Rodriguez 2016). For 15 years following the 1987 emergence of a maternal survival initiative, the network's composition had been limited largely to technical actors from Northern agencies (Shiffman and Smith 2007; Smith and Rodriguez 2016). Newborn survival has not yet benefited from similar positive shifts in framing and network composition (Shiffman 2016). While network members largely agreed on the interventions

needed to reduce neonatal mortality and advanced arguments for attention to the issue (especially its rising share of child mortality and its centrality to achieving the child survival MDG), they never discovered a framing that provided a sense of urgency and that national political leaders found sufficiently compelling to justify the provision of extensive public resources. Moreover, while expanding to some degree, the composition of the network's core (a small group of committed health professionals and the health-oriented agencies they work for) has changed little since its emergence in the 2000s. And while there are some signs of movement, including attempts to mobilize parent groups on preterm birth and success in building alliances to secure a neonatal mortality target in the SDGs (Box 1), a sustained, broad political coalition has yet to appear.

Tobacco control and alcohol harm networks also differed on framing and composition. The tobacco control network, while tight-knit and with strict entry requirements (e.g. no contact with industry), evolved into a strong political coalition linking researchers and activists who shared an understanding of tobacco use as a public health threat, the industry as the vector of disease and governments as having an obligation to enact anti-tobacco legislation (Gneiting 2016; Gneiting and Schmitz 2016). The coalition expanded beyond its original core to include regional and national networks and extensive civil society involvement. It was influential in securing adoption of a global framework on tobacco control, in marginalizing the tobacco industry and in promoting the national adoption of anti-tobacco measures. In contrast, the alcohol harm network has consisted largely only of researchers, linked by an understanding of alcohol harm as a threat to public health (Schmitz 2016; Gneiting and Schmitz 2016). They have faced other groups that view the issue not as a public health but as an individual behavioural or medical problem (Schmitz 2016). Narrow network composition as a result of a lack of consensus across like-minded groups on the nature of the problem has hampered advocacy and is one reason for inadequate resources and national policies to address alcohol harm.

Framing strategies and political composition also help to explain the differential effectiveness of tuberculosis and pneumonia networks (Berlan 2016; Quissell and Walt 2016). A perception of tuberculosis as a social threat and the existence of a medical specialty led to the formation of institutions to address the disease as early as the mid-1800s, a process that continued through the 20th century. These institutions in turn shaped the formation in the 1990s of a strong coalition linking researchers, donors, advocates and political leaders who understood tuberculosis to be a global public health emergency and DOTS a promising strategy to address the disease. In 2001, this coalition was formalized in the form of the Stop TB Partnership. The network's strength enabled it to take advantage of opportunities for generating attention and resources—including the MDGs, the creation of the Global Fund to Fight AIDS, Tuberculosis and Malaria and HIV-TB co-infection—and to influence cross-national policy adoption and the scaling-up of interventions. In contrast, a pneumonia network, consisting predominantly of researchers and program officers in the health sector, has been slow to coalesce and only emerged as a consequential actor in global health in the past several years. Several factors stood behind this slow coalescence (Berlan 2016): pneumonia was

never understood to be a social threat; it did not inspire the formation of a medical specialty dedicated to address it; disagreements over intervention strategy, while less stark now, fragmented the community of individuals concerned with the disease; and efforts to address the disease have at certain points been subsumed under broader child survival initiatives. Problems with coalescence and framing, among other factors, have meant that while global efforts to address pneumonia have proceeded, the network has only been a secondary force in shaping attention to the disease, in promoting national policy adoption and in facilitating mortality decline (Berlan 2016).

The paired comparisons reveal tensions between constructing unifying frames and building broad coalitions, and networks have struggled to balance the two challenges. The maternal survival network linked its social justice demands with child survival concerns to expand the set of actors demanding action on both maternal and child mortality, although tensions between the two sets of actors persist (Shiffman and Smith 2007; Shiffman 2010; Smith and Rodriguez 2016). The WHO TB Department, sustaining a focus on DOTS as a solution and a central role in the Partnership's governance structure, has faced challenges from NGOs and other organizations that question the value of such an intervention strategy and concentration of power in the face of emergent multi-drug-resistant strains and HIV-TB co-infection (Quissell and Walt 2016). The network's future effectiveness will undoubtedly depend on its ability to modify its public positioning of the issue and governance mechanisms in ways that keep these challengers on board, without losing frame coherence. The tobacco network's public health framing of the issue has brought it cohesion and influence in national policy matters such as smoke-free environments; to make progress on other issues such as taxation it may need to broaden the public health frame to recruit non-health sector allies, potentially unsettling the network's unity (Gneiting 2016). The pneumonia network has faced an ongoing struggle to sustain an identity for the issue amidst a broader child survival initiative (Berlan 2016). Progress on newborn survival and alcohol harm may depend on an expansion beyond the health sector of the coalitions backing the issues, which in turn may require these networks to construct framings of the issue that extend beyond the public health positionings that they have emphasized to date (Schmitz 2016; Shiffman 2016).

The paired comparisons and case studies also reveal the influence of historical and political context, and of issue characteristics, on network framing and coalition-building decisions. The perceptions of tuberculosis as a social threat and of DOTS as an effective intervention strategy (framework factor 9: tractability) preceded the formation of the Stop TB Partnership. The Partnership leveraged these perceptions to its advantage in framing the issue and recruiting allies (Quissell and Walt 2016). Evidence on tobacco's lethality (framework factor 8: severity) and the existence of an industry that denied the fact and sought to expand markets (framework factor 5: allies and opponents) catalysed tobacco control network expansion and the framing of the industry as the vector of disease (Gneiting 2016). Women's rights norms advanced during the UN Decade for Women and development norms advanced by the MDGs (framework factor 7: norms) influenced maternal network expansion and the social justice framing of the issue (Smith and Rodriguez 2016).

In addition, the paired comparisons and case studies demonstrate the influence of factors beyond framing and coalition-building strategies on network effectiveness. For instance, the FCA's and Stop TB Partnership's formal, centralized governance structures (framework factor 2: governance) were more effective in facilitating collective action than the decentralized institutions established by alcohol harm and pneumonia proponents (although prior to formalization, the FCA as an ad hoc coalition influenced negotiations surrounding the FCTC, indicating that informal arrangements are not incompatible with agenda-setting power) (Berlan 2016; Gneiting 2016; Schmitz 2016; Quissell and Walt 2016). Tobacco control and tuberculosis networks also benefited from entrepreneurial champions (framework factor 1: leadership)—prominent individuals who were instrumental in bringing together actors and generating global agreements to address these issues—a feature that alcohol harm and pneumonia networks lacked (Berlan 2016; Gneiting 2016; Schmitz 2016; Quissell and Walt 2016). Another crucial factor was financing (framework factor 6: funding). For instance, extensive donor funding for maternal survival has been both a dependent and independent variable—a product of maternal survival network advocacy but also a facilitator of the entry of new organizations into this field and of network expansion (Smith and Rodriguez 2016). The dearth of funding for alcohol harm to date has hindered the growth of this network.

Network legitimacy

The proliferation of networks raises a question about their legitimacy: by what authority do they exert power? Some network members may wonder why this issue need be raised, presuming that their public-spirited aspirations and positive effects on health provide sufficient justification for their initiatives. Scholars writing on the legitimacy of civil society organizations (Atack 1999; Avant *et al.* 2010), however, argue that there are additional dimensions to legitimacy, including the extent to which these actors have significant representation from marginalized populations. Democratic theorists, too, offer strong reasons for not taking legitimacy for granted, contending that the right to exert power is contingent not just on performance—what they term output legitimacy—but also fair process, inclusive deliberation and transparency—or input legitimacy (Dahl 1971; Daniels 2000; Schmidt 2013).

On output and input legitimacy grounds, there are several reasons to consider these networks legitimate actors in global health governance. First, they raised attention to and resources for high burden health conditions that national governments might otherwise have neglected or failed to address adequately. Second, they brought considerable expertise to bear on these problems; in their absence, we would know much less about their scope and how to address them. Third, they added new voices—including some from civil society—to policy processes that might otherwise have been dominated by national governments and international organizations.

However, there are also reasons to raise questions. First, elites from Northern institutions have controlled many of these networks; in the majority, Southern institutions have had limited representation and even more so for citizens of Southern countries—the often marginalized individuals most

affected by the problems that these networks seek to address. Second, these networks in some instances contributed to the fragmentation of global and national health governance, hampering the creation of cohesive global health strategies and strong national health systems. For instance, critics complained that separate newborn survival efforts splintered child survival initiatives (Shiffman 2010); that distinct national tuberculosis control programs contributed to fragmented care for patients with HIV and TB co-infection (Friedland *et al.* 2007); and that a specific focus on maternal mortality detracted from a broader women's health and rights agenda (Yamin and Boulanger 2014). Also, with the possible exception of the tobacco control network, these networks have not fundamentally challenged the structure of power in global health governance: rather, they have sought to carve out their own spaces within that structure.

The larger issue is the place of these networks in the governance of global and national health: to what extent do the deficiencies of international organizations and national governments in addressing pressing health problems justify their existence; to what extent do they exert power without legitimate authority? There may be some truth in both perspectives.

Discussion

The studies demonstrate that while other factors were influential, the networks played central roles in raising global attention for tobacco control, alcohol harm, maternal survival, newborn survival, tuberculosis and pneumonia. This finding is not an obvious one. The networks might have failed in their efforts. Or attention might have emerged entirely due to other factors, such as the individual rather than networked activity of involved actors, the influence of powerful nation-states or donors, growth in the severity of the problems, and new solutions.

As we suggest in the introductory paper, one way to consider network effects is to envision the counter-factual: in the absence of these networks, would attention to these conditions have appeared anyway and to the same degree? There is no way to know with certainty, as we cannot re-run history and compare a world lacking these global health networks with the world we live in. However, we can consider what level of attention might have emerged if maternal survival proponents had not launched a global safe motherhood initiative in 1987; if tobacco control proponents had not pressed for the creation of a global treaty or national level compliance with the provisions of the FCTC; if newborn survival network members had conducted no research on interventions appropriate for low-income settings; if the Stop TB Partnership had never coalesced; if alcohol harm researchers had left the issue to providers focused on individual treatment; if pneumonia network members had not publicized data demonstrating that the disease was the world's leading killer of children. Possibly other forces may have converged to produce the same agenda-setting effects. However, it seems reasonable to presume that this is unlikely and that the networks accelerated policy change, if not always to the extent they hoped for.

The conceptual framework proved to be useful in identifying the factors that gave these networks global agenda-setting power and that shaped their emergence (Table 6), although additional studies should assess whether the framework includes all major variables and whether the three framework

Table 6 Factors behind network emergence and effectiveness^a

Category	Factor	Role of factor in network emergence	Role of factor in network effectiveness
Network and actor features	Leadership	Individual champions helped to spark network formation by bringing together actors previously working in isolation (all six cases)	Strong individual leaders provided vision for networks, enabling them to flourish and to raise attention for the conditions they addressed (tobacco control; tuberculosis)
	Governance		Formalized and centralized governance arrangements facilitated network collective action, although in some instances hampered their adaptability (tuberculosis; tobacco control)
	Composition		Diverse membership—especially inclusion of political leaders outside the health sector—enhanced network influence (maternal survival; tuberculosis; tobacco control)
	Framing strategies	Deficiencies of existing issue frames influenced decisions to organize a network and choices on initial framing (alcohol harm; maternal survival; tobacco control)	Cohesive frames—including clear problem definitions, coherent solutions and compelling reasons to act—unified networks and enhanced their effectiveness (tobacco control; maternal survival; tuberculosis)
Policy environment	Allies and opponents	The existence of strong opponents inspired network mobilization (tobacco control; alcohol harm)	Industry counter-strategies obstructed network efforts (alcohol harm; tobacco control); Allied global movements brought additional attention and resources (tuberculosis—support from the AIDS movement)
	Funding		Donor funding provided resources that facilitated network expansion (tuberculosis; tobacco control; maternal survival; newborn survival)
	Norms	Existing expectations that states and other entities address the issue or related issues, catalysed network formation (maternal survival; tuberculosis; tobacco control)	Global normative expectations, particularly those advanced by the MDGs, catalysed network expansion and action (maternal survival)
Issue characteristics	Severity	Evidence on the scope and neglect of a condition spurred network formation (all six cases)	Networks successfully developed and deployed evidence on severity to generate resources and attract allies (all six cases)
	Tractability	New policy solutions or evidence that a problem was potentially surmountable facilitated network formation (tuberculosis; newborn survival; pneumonia)	Networks successfully developed and deployed evidence on solutions, resulting in augmented attention and resources (newborn survival; tuberculosis; tobacco control)
	Affected groups	Evidence of neglect of a particular population group spurred network formation (newborn survival; maternal survival; pneumonia)	Evidence of neglect of a particular population group facilitated network expansion (newborn survival; maternal survival)

^aCases where the factor worked in a decisively positive direction for the network or condition are in parentheses. An empty box does not imply that the factor is irrelevant. Rather, it indicates that we did not find strong evidence that it played a major causal role in the six cases we selected for investigation.

categories are the most useful way to arrange inquiry. This factor identification function is in line with the purpose of frameworks: to organize research by providing the most general list of variables that need to be considered for theory generation (Ostrom 2007; Sabatier 2007). Future research on global health networks should aim toward such theory specification.

In several ways, the case studies provide us direction toward this end. First, they reveal the role of history in shaping network outcomes, suggesting the need for a dynamic theory that clarifies how early decisions influence network emergence and effectiveness. Prior efforts to address these conditions influenced how the networks crystallized, the forms they took and their initial framing of the issues; network crystallization and the initial framings in turn shaped network evolution; and the networks' evolutionary patterns influenced their effectiveness. Second, the case studies point to the capacity of networks to shape political priority even in the face of historical barriers, adverse policy environments and difficult issue characteristics—suggesting the need for a theory that incorporates not just structural influences

but also agency. Third, the case studies identify the core factors that gave these networks the capacity to prompt political change, influences that potentially might ground a theory of network agency. Among these were strong evidence on severity—no network emerged or was effective without this; convincing frames encompassing clear problem definitions, coherent solutions and compelling reasons to act and coalition-building strategies that extended beyond the health sector.

These three points suggest that we might usefully characterize networks as engaged in strategic social construction that is path dependent—an idea that may prove valuable for theory development on global health networks. The idea of path dependence (Collier and Collier 1991; Mahoney 2000; Pierson 2000) pertains to the strong influence of initial decisions on subsequent developments, a result of increasing costs to change over time. The idea of strategic social construction (Finnemore and Sikkink 1998; Khagram *et al.* 2002) refers to the capacity of actors, acting instrumentally on principled concerns, to shape social reality. Strategic social construction that is path dependent implies that

forces connected both to structure and agency influence global health outcomes. It suggests that network effectiveness is historically conditioned but not historically determined: strategic networks can transcend historically imposed barriers and inattentive networks can squander historically provided opportunities. Future research on networks oriented toward theory development would do well to examine how historical precedent and structural forces, on the one hand, interact with individual and organizational agency, on the other, to produce global health outcomes. Crucial questions (Box 2) include:

- Why did global health network proliferation begin in the 1970s and 1980s?
- Is there a particular configuration of factors that most commonly stands behind network emergence?
- Are networks more effective if they proceed in stages, first building a tight coalition of like-minded actors and then loosening the framing of the issue to create a broader alliance extending beyond the health sector?
- Why are some global networks better able to produce national effects than others? How does the quality of linkages with national networks shape this capacity?
- What ethical considerations should be used to assess the legitimacy of global health networks?

As the empirical studies in this supplement demonstrate, global health networks addressing specific conditions and issues have emerged as major actors in the global health field, serving central agenda-setting roles. They are not likely to lose relevance any time soon, even as global health actors attempt to consolidate efforts surrounding a few common goals such as universal health coverage. These networks are products of their historical conditions but once created they alter the global health landscape that they join. We can expect that they will continue to do so, and that more networks will appear on issues and conditions still to be identified. For all these reasons, global health networks deserve our ongoing research attention.

Ethical approval

We cleared the study protocol through the Institutional Review Boards of American University, Syracuse University and the University of New Mexico, which granted the study exempt status, as it focused on public policy and was deemed to pose minimal risk to informants.

Acknowledgements

We are grateful to the Foundation and to all the individuals who agreed to be interviewed for this study. We thank Anne Buffardi for her valuable comments on a draft of this paper. We also express appreciation to Carol Medlin, who provided valuable input on the design of the project. J.S. thanks American University and the Population Reference Bureau for providing time and resources to complete this work.

Funding

This work was supported by the Bill and Melinda Gates Foundation (OPPGH4831).

Conflict of interest. None declared.

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