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A Framework on the Emergence and Effectiveness of Global Health Networks

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A framework on the emergence and effectiveness of global health networks

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Since 1990 mortality and morbidity decline has been more extensive for some conditions prevalent in low- and middle-income countries than for others. One reason may be differences in the effectiveness of global health networks, which have proliferated in recent years. Some may be more capable than others in attracting attention to a condition, in generating funding, in developing interventions and in convincing national governments to adopt policies. This article introduces a supplement on the emergence and effectiveness of global health networks. The supplement examines networks concerned with six global health problems: tuberculosis (TB), pneumonia, tobacco use, alcohol harm, maternal mortality and newborn deaths. This article presents a conceptual framework delineating factors that may shape why networks crystallize more easily surrounding some issues than others, and once formed, why some are better able than others to shape policy and public health outcomes. All supplement papers draw on this framework. The framework consists of 10 factors in three categories: (1) features of the networks and actors that comprise them, including leadership, governance arrangements, network composition and framing strategies; (2) conditions in the global policy environment, including potential allies and opponents, funding availability and global expectations concerning which issues should be prioritized; (3) and characteristics of the issue, including severity, tractability and affected groups. The article also explains the design of the project, which is grounded in comparison of networks surrounding three matched issues: TB and pneumonia, tobacco use and alcohol harm, and maternal and newborn survival. Despite similar burden and issue characteristics, there has been considerably greater policy traction for the first in each pair. The supplement articles aim to explain the role of networks in shaping these differences, and collectively represent the first comparative effort to understand the emergence and effectiveness of global health networks.

Keywords Networks, global health policy, health policy analysis, tuberculosis, pneumonia, tobacco control, alcohol harm, maternal mortality, neonatal mortality

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. However, scholars have paid them scant attention, so we know little about their origins and the influence they have in global health.

- These networks vary in their capacities to attract attention, generate funding, develop interventions and convince national governments to adopt policies and carry out programmes. This variance may help explain why mortality and morbidity have declined more rapidly for some conditions than others.
- The emergence and effectiveness of global health networks can be understood by considering three categories of factors: features of the networks and actors that comprise them, their policy environments and particular characteristics of the issues they address.

Introduction

There has been more rapid progress in addressing some high-burden health conditions that affect low-income countries than in addressing others. The Institute for Health Metrics and Evaluation (IHME 2013b) estimates that, over the period 1990–2010, deaths in these settings due to measles declined from 631 000 to 125 000, those due to second-hand smoking declined from 548 000 to 421 000 and those due to vitamin A deficiency declined from 349 000 to 120 000. By contrast, the IHME estimates that deaths from self-harm grew from 446 000 to 656 000, those due to diabetes increased from 476 000 to 1.02 million and those attributable to alcohol use grew from 1.06 million to 1.51 million.

Undoubtedly, these differences are due in part to the complexity of the problems and solutions. An effective vaccine exists for measles, bans on smoking in public places help to minimize second-hand smoke exposure, and supplementation and food fortification help address vitamin A deficiency. By contrast, solutions for self-harm, diabetes and alcohol harm are considerably more complicated.

Differences in issue characteristics, however, may not be the sole sources of variance in progress in addressing high-burden health conditions. The effectiveness of the actors who mobilize to address these conditions may also contribute. Networks now exist to confront most conditions that are sources of high mortality or morbidity in low-income settings. Presumably, some of these networks are more capable than others in securing global agreements, attracting funding, producing policies, developing interventions and generating national commitment to scale up these interventions.

Global health networks are cross-national webs of individuals and organizations linked by a shared concern to address a particular health problem global in scope. They may consist of and connect multiple types of institutions, including United Nations (UN) agencies, bilateral donors, international financial institutions, private philanthropic foundations, national governments, international and national non-governmental organizations (NGOs), medical associations, research institutions and think tanks. Some members produce knowledge, others advocate, still others provide funds, develop policy ideas or implement programmes. Many engage in more than one of these activities. They are linked in numerous ways. They exchange information online on promising new interventions. They debate how best to address the condition at global conferences. They organize campaigns, pressing governments and donors to provide resources. They collaborate on randomized-controlled trials.

For some conditions one can identify a formal institution that serves as a primary forum to facilitate collective action: the Roll Back Malaria Partnership and Global Polio Eradication Initiative, for instance. For other conditions, there are multiple mechanisms: for HIV/AIDS there are biennial international conferences, civil society coalitions, a formal UN body (UNAIDS), a financing mechanism (the Global Fund to Fight AIDS, Tuberculosis [TB] and Malaria) and a large bilateral programme (the US President's Emergency Plan for AIDS Relief). For still other conditions, mechanisms are emerging, weak or non-existent, making informal ties crucial for collective action: examples include mental health and surgical conditions.

The proliferation of global health networks represents one of the most dramatic shifts in global health governance over the past three decades. Thirty years ago the world of international health looked considerably different (Walt and Buse 2006). Strong networks of individuals and organizations were in place to address a few conditions: malaria, onchocerciasis, dracunculiasis, polio and several other vaccine-preventable childhood diseases. For most conditions, however, if a global effort existed at all, it took place predominantly via an international organization, usually the World Health Organization, working bilaterally with national governments, rather than through a global network. Yet despite their growth, with a few exceptions (Walt *et al.* 2004; Mamudu *et al*. 2011; Buse and Tanaka 2011), health policy scholars have given global health networks minimal attention. As a result we know little about why and how they have emerged, what effects they produce and what roles they play in the global governance of health. Addressing this knowledge gap is crucial because the quality of global health governance, including that provided by networks, shapes the world's capacity to address pressing health problems.

This supplement examines six global health networks addressing high-burden conditions in low and middle-income countries. The supplement reports findings from studies of networks that address TB, pneumonia, tobacco use, alcohol harm, maternal death in childbirth and neonatal mortality. These studies are part of the Global Health Advocacy and Policy Project, a research initiative funded by the Bill and Melinda Gates Foundation that groups 12 investigators from North American, South American and European institutions.

In this introductory article to the supplement, we present a framework for analysis of global health networks, grounded in social science scholarship. We argue that their emergence and effectiveness are best understood in terms of interactions among three categories of factors: features of networks themselves and the actors that comprise them, their policy environments and the particular characteristics of the issues they address. In the sections that follow we present the theoretical backdrop to this project, lay out the framework, offer propositions concerning factors that may shape network emergence and effectiveness and discuss the project's design. We also introduce the supplement's seven empirical papers: case studies on each of the six networks and an article that compares tobacco control and alcohol harm networks. A concluding article to this

supplement synthesizes project findings and considers directions for future research on global health networks.

Global health networks

Networks are forms of social organization distinct from formal hierarchies–such as states, international organizations and international NGOs–and from markets (Laumann and Pappi 1976; Miles and Snow 1986; Powell 1990; Podolny and Page 1998). Network actors benefit from an exchange of resources that they might not have had access to in the absence of ties among them. They differ from formal hierarchies in their voluntary membership, relatively diffuse systems of authority, and the rarity of a formal contract that binds them together. They differ from markets in having a common purpose oriented towards social change, and in the durable relationships among the actors who constitute them.

The identification and study of networks as a distinct organizational form emerged in sociology, economics and policy studies (Granovetter 1973; Heclo 1978; Powell 1990; Burt 1992; Podolny and Page 1998). More recently scholars in political science, public administration and other disciplines have investigated the governance advantages networks offer compared with hierarchies and markets, as well as their involvement in policy agenda-setting, formation and implementation (Hafner-Burton *et al*. 2009; Isett *et al*. 2011; Lecy *et al*. 2014). Global governance scholars have drawn on network scholarship to identify several network forms operating at the global level (Kahler 2009; Sikkink 2009). These include:

- Global public policy networks (Reinicke 1999), which focus on policy consequences and public goods development and provision. An example is the World Commission on Dams, which established global criteria for dam construction that include social consequences.
- Epistemic communities and knowledge networks (Haas 1992; Stone and Maxwell 2005), which focus on knowledge generation and identification of causal relationships. The most well-known example is the network of climate change scientists.
- Transnational advocacy networks (Keck and Sikkink 1998), which focus on principled ideas and advocacy. An example is a global network of organizations committed to ridding the world of antipersonnel landmines (Cox 2011).

Global health networks are a fusion of these forms as they simultaneously serve policy, knowledge creation and advocacy functions [as Mamudu *et al.* (2011) have observed in their study of a global tobacco control network]. Thus we use the generic term 'network' rather than any of these more specific designators, a practice consistent with the findings of these global governance scholars who acknowledge that each of these network types perform multiple functions.

There are two primary approaches to studying networks [see Kahler (2009)]. One—networks-as-structures—investigates how the structure of ties among individual network nodes (people, states or other entities) and their attributes shape the behaviour of these nodes (Fischer 1982; Galaskiewicz and Wasserman 1994; Wasserman and Faust 1994). The other—networks-as-actors—identifies the network as a distinct organizational form and analyses the intentional behaviour of the network as a whole, usually to understand what effects it produces [see Latour (2005)]. Concerned with network intentional behaviour (Sikkink 2009), we take a networks-as-actors approach, but with attention to the influence of structure.

Members of global health networks seek greater service availability, better social conditions and a stronger enabling policy environment to minimize the burden of the health problems that concern them. They engage in strategic social construction to bring about these changes (Finnemore and Sikkink 1998); i.e. they act instrumentally on principled concerns. This perspective bridges long-standing scholarly disagreements concerning the motivations of actors involved in collective action. Social science scholars working in rationalist traditions have emphasized the instrumental pursuit of self-interest; scholars working in constructivist traditions have emphasized the principled pursuit of normative concerns (March and Olsen 1989). We concur with Finnemore and Sikkink (1998) and Sil and Katzenstein (2010) who argue that pitting rationality against norms represents an artificial distinction. Actors rationally pursue normative concerns in ways consistent with their interests (Mitchell and Schmitz 2013). In the case of global health networks (in contrast to other kinds of networks, particularly ones with commercial motivations) principled ideas 'constitute' their interests, at least in part.

Problem and solution definition are crucial elements of strategic social construction (Gusfield 1963; Kingdon 1984; Stone 1989; Rochefort and Cobb 1994; Benford and Snow 2000; McInnes and Lee 2012; McInnes *et al*. 2012). Problems in the world do not come to receive attention of their own accord; rather, actors, including networks, make competing claims about which problems deserve attention and scarce resources, and advocate to secure these for their particular concerns (Hilgartner and Bosk 1988; Carpenter 2014). Moreover, problems and solutions do not define themselves (Stallings 1990). Rather, as part of scientific, policy and advocacy processes, actors advance competing positions concerning how problems should be understood and which solutions should be enacted. Some framings of the issue are more likely than others to lead to attention and resources. Particularly crucial is that a problem comes to be seen as a product of human action amenable to change, rather than a consequence of nature, accident or fate; otherwise it will be ignored as intractable (Stone 1989).

Network emergence and effectiveness

Two questions ground this project. The first concerns emergence: why do networks more easily crystallize surrounding some global health issues than others, and once formed why do some flourish while others stagnate? The second concerns 'effectiveness': why are some networks better able than others to change the world in the direction of the collective preferences of their members?

Global governance scholars, despite paying growing attention to networks, have focused little on how they form. Understanding whether, why and how they emerge is crucial if we wish to understand their role in changing the world, particularly because early decisions on matters such as governance, membership and focus may be difficult to reverse and have lasting consequences (Pierson 2000). For instance, in one

of the few studies on global network emergence, Lake and Wong (2009) show that Amnesty International's central role in helping to crystallize a global human rights network has led to this network's focus on Western, liberal understandings of rights—especially those for prisoners of conscience—rather than a broader set of social and economic concerns.

Effectiveness refers to the extent to which networks are able to change the world to meet their members' perceptions of what reality should look like (Woolcock and Narayan 2000; Sikkink 2009). Typically for a global health network that means an improvement in population health. Drawing on concepts commonly used in scholarship on performance evaluation and the policy process, we examine network effectiveness by considering outputs, policy consequences and impact (Weiss 1972; Wholey 1983; Sabatier 2007). Outputs are the immediate products of network activity, such as guidance on intervention strategy, research and international meetings. Policy consequences pertain to global and national policy processes including international resolutions, funding, national policy adoption and the scale-up of interventions. Impact refers to the ultimate objective of improvement in population health. Detecting network influence is more difficult as one moves from outputs to policy consequences to impact. It may be relatively straightforward to show that members of a network were responsible for organizing a global meeting, developing an intervention, proposing a policy or helping to secure funding. However, discerning the role of these network activities in improving population health is considerably more complex, because socioeconomic, political and epidemiological factors also contribute. In the case studies, we are attentive to the multiple influences beyond network activity that may be shaping outputs, policy consequences and impact.

Although our focus is on explaining the emergence and effectiveness of networks, in the concluding article we also consider their legitimacy. Most members of global networks take it to be proper and unproblematic that they act to address the issues that concern them. They may view their scientific expertise, claims to act on behalf of others or their outputs as sufficient grounds to justify their actions. Democratic theorists and social scientists do not take the legitimacy of actors involved in global governance, including networks, for granted (Dahl 1999; Anderson and Rieff 2005; Grant and Keohane 2005; Koppell 2010). Rather, they debate the principles we should use to determine who has a right to exert global power, and investigate why networks and other actors differ in the degree of legitimacy they are afforded. Political scientists critique the legitimacy of global actors on a variety of grounds, including being unrepresentative, acting as a global, technocratic elite (Heins 2008) and advancing the agendas of wealthy donors without regard to local needs (Hertel 2006; Jordan and van Tuijl 2006). Global health governance scholars have raised the same questions about the legitimacy of global health actors in particular (Gostin and Mok 2009; Lee 2010; Youde 2012).

A framework on the emergence and effectiveness of global health networks

Social scientists concerned with collective action use a common set of categories to examine the behaviour of actors involved in governance, although they employ different terms to refer to these categories (Heclo 1978; Stone 1989; Finnemore 1996; Keck and Sikkink 1998; Sabatier 1998; Wendt 1999; Marsh and Smith 2000; McAdam *et al*. 2001). We draw on their ideas and our data to present a conceptual framework for analysing global health network emergence and effectiveness (Figure 1), which guides all the project's papers. One category, which we call 'network and actor features', concerns factors internal to the network involving strategy and structure, and attributes of the actors that constitute the network or are involved in creating it. This category pertains to how networks and the individuals and organizations that create and comprise them exercise agency; the presumption is that actors make a difference, and that they vary in their capacities to transform the world. A second category, which we term 'policy environment', concerns factors external to the network that shape both its nature and the effects the network hopes to produce. The presumption is that networks do not operate in a vacuum; rather, they, and the changes in the world they desire, are shaped by forces outside them. The third category, commonly referred to as 'issue characteristics', concerns features of the problem the network seeks to address. The idea is that issues vary on a number of dimensions that make them more or less difficult to tackle.

It may be that either issue characteristics or elements of the policy environment largely determine global policy and public health outcomes. For instance, one might argue that greater global policy traction on TB than pneumonia (see later) is due to an issue characteristic: the fact that TB is caused by one pathogen while pneumonia is caused by many, making the former easier to detect and address. Or this difference may be due to features of the policy environment such as the fact that there were explicit indicators in the Millennium Development Goals for progress on TB but not pneumonia. Alternatively, networks and the actors that comprise them may be the driving forces: a particularly well-governed network may be able to overcome certain unfavourable issue characteristics and make progress even in a difficult policy environment. A way of considering whether network features or other categories of factors are most influential is to pose a counter-factual: in the absence of the network, would mortality and morbidity trends have been any different? Put another way, in a world in which health still was governed largely by the World Health Organization and its member states (one more reminiscent of the 1950s), would we see the same disease burden patterns?

Researchers on this project are open to the possibility that factors from one category fully or largely determine outcomes; however we begin inquiry with an alternative perspective: no category dominates, and emergence and effectiveness are the results of interactions among factors in all three. Moreover, rather than being independent and distinct categories, each shapes and constitutes the others (Sewell 1992; Finnemore 1996; Wendt 1999; Marsh and Smith 2000). For instance, as the number of deaths from a condition increases (an issue characteristic), UN member states may agree to global goals to reduce its burden (a change in the policy environment), prompting champions concerned about the condition (actors) to organize a network focused on addressing the issue. The creation of a formal governance structure for the network (a

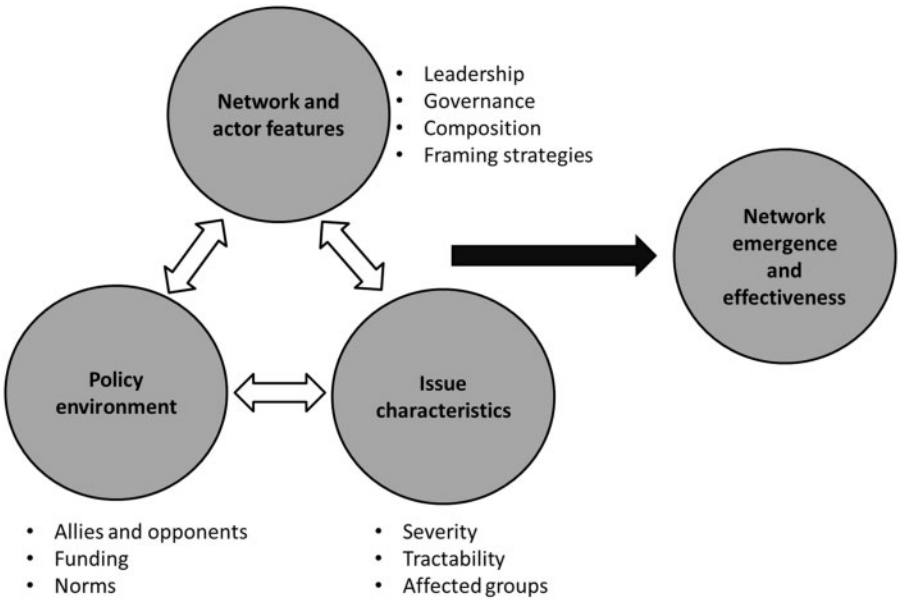

Figure 1 A framework on the emergence and effectiveness of global health networks

network feature) may facilitate inter-organizational co-operation that brings about the development of a new intervention (an issue characteristic), reduced deaths (another issue characteristic) and a new global agreement (a feature of the policy environment) to eradicate the condition in a particular time frame. In this example network features, the policy environment and characteristics of the issue are in flux, continually shaping one another, and jointly shaping outcomes. Such an interactive perspective takes social outcomes to be contingent rather than determined: things quite easily could have turned out differently.

Rather than a starting point, the framework is an emergent product of this research project. We began our investigations with a set of presumptions concerning the factors shaping global health network emergence and effectiveness, drawn from scholarship on collective action and our initial understanding of the six cases. We derived the framework largely inductively, refining it several times over the course of the project based on new data and consultation of additional scholarship. Although the articles that follow, including the conclusion to this supplement, draw on it, suggest refinements and consider its usefulness and limitations, our research does not constitute a 'test' or demonstration of its validity. Rather, the framework should be understood as an evolving set of categories and propositions whose usefulness and validity can only be evaluated by research beyond this particular project.

Network and actor features

The first category of factors that may shape network emergence and effectiveness are features of (1) the networks themselves and (2) the individuals and organizations that comprise them (network formation, of course, would be shaped only by the latter). Scholarship on collective action points to four features that may be particularly influential: leadership, governance, composition and framing strategies (Table 1).

The existence of effective 'leaders' (Factor 1) may be one reason networks crystallize in the first place, and why, once they appear, they are able to achieve their objectives. Such individuals may be crucial to defining the issue in a way that resonates with a broad array of potentially interested organizations, in bringing these organizations together, and once linked, in guiding them to effective collective action. James Grant, the former executive director of UNICEF, is often cited as someone who exercised effective global leadership in health in these ways, specifically for child survival. Public policy and management scholars have long recognized the importance of effective leaders in agenda setting and organizational effectiveness, as well as their rarity. Such leaders possess distinct features (Kingdon 1984; Doig and Hargrove 1987; Schneider and Teske 1992). They have a claim to a hearing; they are persistent; they are well connected and have excellent coalition-building skills; they articulate vision amidst complexity; they have credibility that facilitates the generation of resources; they generate commitment by appealing to important social values; they know the critical challenges in their environments; they infuse colleagues and subordinates with a sense of mission and they have strong rhetorical skills.

A second factor that may shape network effectiveness is 'governance' (Factor 2). Governance concerns how an organization steers itself to achieve goals its members agree to (Buse and Walt 2000). Provan and Kenis (2008) identify three primary modes of network governance: (1) shared, where most or all network members interact on a relatively equal basis to make decisions; (2) lead organization, where all major network-level activities and key decisions are co-ordinated through and by a single participating member and (3) network administrative organization, where a separate entity is set up specifically to govern the network and its activities. It is not that one mode is better than others: the question is whether the mode is congruent with particular characteristics of the network. For instance, a small network whose members trust

Table 1 Factors that may influence network emergence and effectiveness, and presumed direction of causality

Category	Factor	Presumed direction of causality	Explanation	Example
Network and actor features	1. 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.	Strong leadership for neglected tropical diseases facilitates network emergence, attention and funding in past decade.
	2. Governance	+	Networks are more likely to be effective if they have appropriate governing structures capable of facilitating collective action and resolving disputes.	Absence of guiding institutions on pneumonia contributes to neglect of disease until mid-2000s.
	3. Composition	+/−	Networks that link diverse actors are more likely to generate creative solutions to problems but also to be hampered by disagreements.	Alcohol network dominance by scientists limits advocacy efficacy; diversity in TB network leads to disagreements over goals.
	4. 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.	Positioning of TB as an emergent threat to citizens of industrialized societies sparks global action in late 1980s.
Policy environment	5. 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.	Tobacco industry lobbying may both limit network effectiveness and also inspire more mobilization.
	6. 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.	Emergence, decline and resurgence of global network committed to provision of family planning services.
	7. 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.	Maternal survival network strengthens following inclusion of issue in MDGs, but remains reluctant to take on safe abortion.
Issue characteristics	8. Severity	+	Network emergence and effectiveness are more likely surrounding problems that are perceived to have high mortality, morbidity or socioeconomic costs.	Data on malaria's disease burden and disruptive economic effects facilitate network emergence in 1950s and again in 1990s.
	9. 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.	Evidence on efficacy of community-level interventions facilitates expansion of newborn survival network.
	10. 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.	Networks stronger to address HIV/AIDS from MTCT than from intravenous drug use; PLWHA a backbone for AIDS advocacy.

one another and agree upon goals may be destroyed if a single individual or organization with a particular agenda comes to dominate it; a large network whose members lack trust in one another and who disagree on goals may need a lead organization to bring about effective collective action. The quality of leadership (the first framework factor) will influence whether networks are able to put in place appropriate governance mechanisms, and shape whether these mechanisms function well: for instance, strong individual leadership may in some instances be in tension with shared governance.

A third feature is 'composition' (Factor 3). A network may be homogenous, consisting exclusively of scientists from high-income countries. Or it may be diverse, linking scientists, advocates, funders, policy makers, programme implementers and others from low-, middle- and high-income countries. Studies have shown that diverse groups achieve better outcomes than uniform ones because they improve collective understanding and problem solving, among other benefits (Hong and Page 2004; Page 2007); the same may be true of networks. On the other hand, heterogeneity may hamper cohesion and increase the likelihood that networks disagree on objectives.

The final feature is 'framing strategy' (Factor 4) (Snow *et al*. 1986; Benford and Snow 2000; McInnes and Lee 2012; McInnes *et al*. 2012): how network actors publicly position an issue in order to attract attention and resources. Networks may differ in their capacities to discover frames that work. HIV/AIDS communities have been particularly adept at this: when HIV/AIDS was understood as a public health problem afflicting only certain population groups it had difficulty attracting resources; when advocates reframed it as an exceptional disease that posed an existential threat to humanity, politicians began to pay attention (Prins 2004; Harris and Siplon 2007).

Policy environment

Internal features of networks are not the only factors that may shape emergence and effectiveness: the external policy environment may also matter. Three environmental factors may be particularly influential (Table 1): allies and opponents, funding and global norms.

Actors outside the network represent potential 'allies and opponents' (Factor 5). If there are many groups whose interests align with a network's goals (for instance women's rights groups potentially concerned about maternal mortality), that network is more likely to expand and be effective than one that faces a dearth of potential allies, as these groups may shift from being part of the policy environment to becoming part of the network itself. The relationship between opponents and network emergence and effectiveness is not as straightforward. Some issues have clear opponents: for instance tobacco control advocates face a powerful tobacco industry. Although opponents may seek to discredit the network, their existence may fuel a fire that facilitates network mobilization. At the same time, networks addressing relatively uncontroversial issues such as newborn survival avoid having to allocate energy to fighting organized opposition, but have no clear organizational adversary that inspires mobilization. Another dynamic is that opponents may seek to become allies, as the food industry is attempting to do in the nutrition arena. The question concerning opponents, then, is not whether they facilitate or hinder networks but what combination of beneficial and adverse effects they have.

'Funding' (Factor 6) also shapes network emergence and effectiveness. Although development assistance for health grew from $6.9 billion in 1990 to $35.9 billion in 2014 (IHME 2015), resources remain insufficient to address the many health problems low-income countries face, and networks must compete to secure these. More funding for an issue may enable a network to flourish: organizations will be attracted to work on the issue, and champions can use resources to establish secretariats and global gatherings that link these organizations. On the other hand, a network set up at the behest of donors and dependent on their funding may be perceived as less legitimate than those that emerge from grassroots activism, and may collapse if donors re-allocate funding to other causes.

Networks respond not only to tangible aspects of their environment, such as allies, opponents and funding, but also to less tangible elements, including 'norms' (Factor 7)—standards of appropriate behaviour for actors with a given identity (Katzenstein 1996; Meyer *et al*. 1997; Finnemore and Sikkink 1998; Wendt 1999). The starkest examples of influential norms in global health are those that the health-related Millennium Development Goals advanced (Fukuda-Parr and Hulme 2011). These goals raised expectations that states, international organizations and other global actors act to reduce burden from that subset of global health problems selected for inclusion (HIV/AIDS, malaria, TB, maternal mortality and child mortality). The existence of these norms undoubtedly facilitated the expansion of networks dedicated to the achievement of these goals, in part because states and other global actors saw these networks as allies in meeting international expectations. Norms may also influence networks in another way: by providing network members with an opportunity to graft their demands onto what is already considered acceptable practice. For instance the existing humanitarian norm of non-combatant protection allowed landmine activists, via passage of a global treaty, to delegitimize a means of warfare that primarily targeted civilians (Price 1998). Norms can also present obstacles to the achievement of network aims. For instance supporters of safe abortion confront widely held beliefs that this procedure takes the life of a child.

Issue characteristics

In addition to internal network and external environmental factors, the nature of the issues networks address also potentially affects network emergence and effectiveness (Stone 1989; Keck and Sikkink 1998). Issue characteristics matter for two reasons. First, some problems are inherently more complex than others, making these particularly challenging for networks to address and shaping the likelihood networks will emerge to take them on. Second, not all issue characteristics are given: networks shape how issues are understood (McInnes *et al*. 2012; McInnes and Lee 2012), and vary in their capacity to do so in ways that affect their own growth, levels of political support and achievement of goals.

Three issue characteristics merit investigation as potentially influential on network outcomes (Table 1). First is the problem's 'severity' (Factor 8). Robust networks are more

likely to emerge when problems lead to high mortality and morbidity, economic damage or social disruption—or are perceived to do so. Second is the problem's 'tractability' (Factor 9). Individuals and organizations are more likely to act on problems perceived to be soluble (Stone 1989). Establishing short causal chains to explain the appearance of the condition and assigning responsibility to particular individuals or organizations for its emergence (rather than to abstract structural causes) raise perceptions that a problem is tractable (Stone 1989; Keck and Sikkink 1998). An element of tractability is a solution's political acceptability. Networks are more likely to be effective if they propose action that does not threaten existing interests—a reason taxes on products such as tobacco have encountered considerable industry resistance. Third is the nature of the 'affected groups' (Factor 10). Networks are more likely to emerge when these populations are easy to identify. For some problems, including various forms of industrial pollution, identifying who is affected is not straightforward. Also, groups that inspire sympathy, especially those understood not to be responsible for acquiring the condition, are more likely to inspire network mobilization (Stone 1989; Schneider and Ingram 1993). In addition, positive network results are more likely if affected populations are able to mobilize on their own behalf, a capacity dependent on individuals being readily identifiable, living long enough and having sufficient political power to do so. People living with HIV/AIDS, for instance, including those from high-income countries, have been a backbone for a global AIDS movement, facilitating its growth, effectiveness and perceived legitimacy.

Factors especially relevant for emergence

All 10 factors may shape network effectiveness and emergence in some form; however, they may do so in different ways: the existence of an opponent, for instance, may spark a network's emergence but hamper its effectiveness. Moreover, some factors may influence emergence more than others. Three factors may be especially influential: 'leadership', because effective champions may be needed to guide crystallization, 'severity', because networks may be unlikely to form unless problems are perceived to be serious and to warrant public action and 'tractability', because network formation may be improbable if the problem is perceived to be insoluble.

Project design

Case studies of six networks addressing high-burden health problems that affect low- and middle-income countries are the foundation for this project. The six problems are grouped into three matched pairs: TB and pneumonia, tobacco and alcohol harm, and maternal and newborn survival. Below we explain the logic of the project design, case selection and pairings. The supplement includes papers on each of these six networks and a comparative analysis of tobacco and alcohol networks. The tobacco–alcohol comparison adds value to the individual case studies by highlighting how differences in initial network formation have powerful long-term consequences for global health networks and their ability to advance their causes.

Case selection

Social scientists debate the merits of small-n vs large-n studies (King *et al*. 1994; Yin 2003; George and Bennett 2004; Gerring 2004; Lieberman 2005; Brady and Collier 2010). Small-n studies permit in-depth exploration of cases, facilitating the tracing of causal mechanisms and the identification of new causal factors. They are particularly useful for theory building. Large-n studies permit comparison of multiple cases, facilitating assessment of average causal effects and generalization to populations. They are particularly useful for theory testing.

Because they leverage the advantages of both, a growing number of social scientists call for medium-n studies (Ross 2003; Rihoux and Ragin 2009). That is the logic of this project. Our in-depth exploration of six cases enables us to identify factors that may be shaping global health network emergence and effectiveness and to suggest how these factors do so. Our comparison of the six cases, and of changes across time within each case, allow us to draw inferences concerning how influential these factors may be within a broader population of problems around which networks might form.

Seawright and Gerring (2008) delineate seven case-selection types for qualitative research. We employ two of these: diverse (across health condition categories) to maximize generalizability; and most-similar (within health condition categories) to increase capacity to make causal inferences. The strategy of diverse case selection calls for choosing cases that encompass a broad range of categories in the population of interest to enhance generalizability of results. Applied to global health, there is a large population of concerns—several hundred at least—that might inspire network creation (Figure 2). Within that population there are different categories. Among the three most prominent are diseases, risk factors (including behavioural and environmental, among others), and particular groups of individuals. To enhance representativeness we have selected two concerns from each of these three categories: TB and pneumonia (diseases); tobacco use and alcohol use (behavioural risk factors) and pregnant women and newborn babies (groups). Our selection strategy enhances the likelihood that our findings apply to a broader population of concerns than just a specific category. There are at least three major categories of concerns that might (and have) inspired network mobilization that we have not studied: interventions (such as family planning and immunizations), health systems (such as workforce and financing) and risk factors that are environmental in nature (such as industrial pollution and climate change). This exclusion limits our capacity to generalize to omitted categories.

The most-similar case selection logic (Przeworski and Teune 1970; Seawright and Gerring 2008) calls for picking cases that are similar on all measured independent variables 'except' the independent variable of interest. Doing so facilitates assessment of whether the independent variable of interest is causally connected to the outcomes of interest. 'Within' each of the three categories we use a most-similar case selection strategy. Noting that perfect control is impossible and that in the course of inquiry we are likely to discover unanticipated differences across compared cases (Tarrow 2010), we minimize variance on issue characteristics (control variables), facilitating analysis of the relationship of network and actor features (the independent variables of interest) to observed variance in network

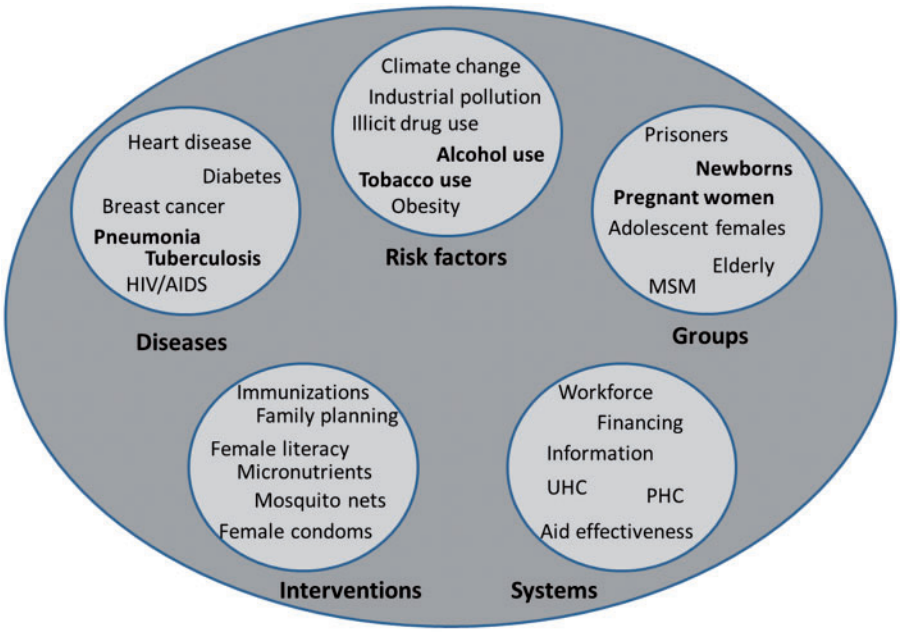

Figure 2 A selection of global health concerns that might spur network mobilization (Problems in bold are those we analysed).

emergence and effectiveness (our outcomes of interest). Specifically, we select problems of roughly comparable burden, one of which has received greater global policy attention than the other. Then there are additional considerations within each category we use to minimize variance on issue characteristics.

With respect to diseases: there are communicable and non-communicable types, and within communicable those that affect different systems in the body. We selected two communicable diseases that affect the respiratory system: TB and pneumonia. Tuberculosis and pneumonia have a comparable mortality burden: in 2013, 1.1 million tuberculosis deaths overall versus 935,000 pneumonia deaths among children under five alone (World Health Organization 2014b; Liu *et al*. 2015). Yet there has been greater progress on TB: 180 countries now implement a strategy called directly observed treatment short-course (DOTS), and around 46 million people were successfully treated between 1995 and 2010. By contrast, only 60% of children affected by pneumonia see a doctor and only 31% receive antibiotics (WHO and UNICEF 2013); moreover, half of the cases could be prevented by two vaccines, yet as of 2011 these were reaching only 42% and 6% of children, respectively. (International Vaccine Access Center 2013). The empirical puzzle, then, is why despite comparable burden has TB seen greater policy traction, and what role has network activity played in this outcome?

With respect to risk factors: among others there are environmental risks, which comprise an increasingly high burden of disease in low- and middle-income countries, as well as those pertaining to individual behaviour, such as sexual activity, nutritional intake and use of addictive substances. We selected two addictive substances: tobacco and alcohol. Although tobacco is associated with about twice the global mortality burden, the two represent roughly equal burdens with regard to lost disability-adjusted life years (DALYs): tobacco use has been second among all risk factors (157 million DALYs lost), increasing by 3% from 1990 to 2010; alcohol use has been fifth (139 million DALYs lost in 2012), with an increase of 32% over the same time period (IHME 2013a; World Health Organization 2014a). Another similarity is that control proponents face powerful industries resisting their efforts. Yet tobacco control has experienced much greater progress. The major accomplishment in tobacco control is the 2003 adoption of the landmark WHO Framework Convention on Tobacco Control. It currently has 180 member parties and has led to significant resource mobilization (World Health Organization 2013b). By contrast, the main agreement on alcohol—the Global Strategy to Reduce Harmful Use of Alcohol—was not adopted until 2010, is non-binding, and has no resources dedicated to its implementation (Room 2013). Another indicator of differential priority is the fact that the World Health Assembly adopted reduction targets of 30% for tobacco use, but only 10% for alcohol use (World Health Organization 2013a). The empirical puzzle, again, is why despite comparable burden has tobacco control had greater global policy traction than alcohol control, and what role has network activity played?

With respect to groups: these vary in degree of political empowerment, as well as in the set of conditions that are the primary causes of ill health. As one project goal is to understand outcomes for neglected groups and conditions, we are more interested in politically disempowered than empowered groups. We selected two of the former, who are at risk from a similar set of conditions—complications arising from the birth process. These groups are pregnant women and newborn babies. There are many similarities between the two groups. Both suffer high mortality and morbidity: ~3 million deaths annually to babies under one month of age (UN Inter-agency Group for Child Mortality Estimation 2013); ~300 000

deaths annually to women due to childbirth complications (World Health Organization *et al*. 2012) and many times that number in terms of injuries (Hardee *et al*. 2012). Also, unlike tobacco and alcohol control, there is little organized opposition to the goals of lowering maternal and neonatal mortality. In addition, there are global agreements for both: MDG 5 includes maternal mortality reduction; MDG 4 on child survival implicitly encompasses neonatal mortality reduction.

Yet the two issues have had differing global policy trajectories. A global maternal survival initiative emerged in 1987 and the issue remained a relatively low priority among global health organizations for two decades; however, since the early 2000s global policy priority has grown dramatically, and there is now a UN programme run from the Secretary-General's office with a central objective of reducing maternal mortality. By contrast, newborn survival has been slow to gain traction among global organizations and national governments despite a concerted effort since 2000 to place this issue on their agendas. The empirical question, once again, is why despite so many similarities between these two issues has maternal survival gained comparatively greater policy traction over the past decade?

While conducting our research we discovered two complications that make it more challenging to assess the relationship between network activity and outcomes. First, strong control over issue characteristics is difficult to establish even 'within' categories, and some of these characteristics may play a major role in explaining variance in policy trajectories. For instance, the fact that there is evidence for some positive health benefits for alcohol but not tobacco may help explain the greater difficulty in gaining global policy traction for alcohol control. Second, the policy trajectories for each of our cases have not been as decisively positive or negative as we originally presumed. With respect to the positive cases, the TB network has had difficulty adjusting to address new multi-drug resistant strains, and the tobacco network has encountered obstacles in encouraging national adoption of policies. With respect to the negative cases, a pneumonia network, after difficulties getting off the ground in the 1980s and 1990s, began to crystallize in the mid-2000s, and the alcohol network built an evidence-base that contributed to the adoption of the Global Strategy to Reduce the Harmful Use of Alcohol. The starkest difficulty pertains to the maternal and newborn survival comparison. When we selected these two cases for consideration in 2007, it appeared that newborn survival was the more successful of the two: it was gaining global attention despite having formed as an initiative only 7 years prior; meanwhile it was not at all clear that a maternal survival initiative would be able to transcend two decades of difficulties. Analysis of evidence surrounding developments over the past 8 years forced us to reverse our assessment of the relative success to date of these initiatives.

These complications notwithstanding, the most-similar case selection logic still has considerable analytical utility. Had we chosen to compare problems that differ markedly in issue characteristics—for instance, TB vs neuropsychiatric disorders, tobacco use vs iodine deficiencies or maternal vs geriatric conditions—we would have had to consider a vastly greater number of issue characteristics that might be responsible for explaining differences in policy trajectories, making it all the more difficult to identify the role of networks. These complications do, however, require us to consider the implications for drawing causal inferences on network influence.

Methodologies for the studies

Each of the six case studies uses the same process-tracing methodology. Process-tracing involves drawing on multiple kinds of data in order to uncover mechanisms that link causes with effects (Bennett 2010; Beach and Pedersen 2013). Each case study pieces together the history of a global health network, with attention to its policy environment and characteristics of the issue, in order to understand the factors that have facilitated or inhibited network emergence and effectiveness, and policy and public health change. We selected a case study process-tracing methodology, because it is better suited to achieving this objective than other approaches such as structured surveys or econometric analyses. This is true because the defining feature of a case study is that it considers a phenomenon in its real-life context, thereby giving it the capacity to reveal underlying causal mechanisms and processes (Yin 2003).

The case studies used four types of sources: key informant interviews; documents from donors, governments, NGOs and other organizations; published research and observation of professional meetings. Between 2009 and 2014 we conducted 174 key informant interviews with three kinds of individuals: key network actors; external observers of these networks in a position to offer authoritative information about their activities; and network critics. We identified these individuals through publicly available documents, commentaries and consultation with individuals working on the issue—a key informant rather than a sampling selection strategy. We interviewed individuals from United Nations agencies, multilateral and bilateral donors, private foundations, national governments, international and national NGOs, professional associations and research and academic institutions. We informed interviewees that they would not be identified in the text unless they assented to be named. We either recorded interviews and had them transcribed, or if interviewees felt uncomfortable with this practice, took detailed notes. We conducted 36 interviews face-to-face and 138 via telephone or Skype. We developed a semi-structured interview instrument with mostly open-ended questions, which each case study research team then tailored to the issue they investigated. Although we asked some questions of most interviewees (for instance, who he or she thought were the most important individuals and organizations working on the issue), we tailored the selection of questions to each interviewee in order to elicit his or her unique knowledge. The Institutional Review Boards of Syracuse University, American University and the University of New Mexico granted the project exempt status as they deemed it to have a public policy focus and to pose minimal risk to informants.

Additionally, we gathered and reviewed over 1700 published and unpublished documents, reports, and articles on the networks and the issues they address. We identified these materials through archives, organizational websites, consultation with key informants, and PubMed, Google Scholar and other searches. Among the items we collected were internal network reports, external assessments of network activities, internal documents of the organizations that comprise the networks, external assessment of the activities of these

organizations, biographies of key individuals involved in the networks, global resolutions, funding analyses, statistical records, epidemiological and scientific studies, national health plans and national health project assessments. In addition, case study researchers attended several professional meetings involving network members, where they observed deliberations, spoke with individuals and gathered documents.

Once each case study team had completed its interviews and collected documents, they organized these materials into a database, making these available to members of the entire project team. We developed a common set of classifications, based on the broad framework categories of network and actor features, policy environment and issue characteristics, to code materials. Researchers hand-coded data or used NVIVO 9 software (QSR International, Melbourne, Australia), a program that facilitates the analysis of qualitative data.

Case studies that rely heavily on interviews with involved actors are susceptible to bias. To minimize this possibility, we employed several techniques recommended by case study methodology experts to address potential error (Yin 2003; Brady and Collier 2010; Gerring 2012). First and foremost we triangulated among sources. Our information came not just from interviews but also from published sources and independent reports. Second, we did not rely on individual interviews predominantly to check historical accuracy because these were susceptible to recall bias; instead, when interviewees reported a significant event, we checked published literature or reports for corroboration. We also inquired about these events with multiple respondents. Finally, for each report we received feedback from at least three individuals familiar with the history of global efforts to address the issue, including at least two who were members of the networks we studied.

Like the case studies, the methodological approach for the tobacco–alcohol comparison follows the analytical framework outlined in this article. The comparison represents a most-similar design as it considers two cases within the same category (risk factors) with comparable health burden and disease vectors (i.e. industry), which limits the number of potential explanatory factors. We first compared issue characteristics and their role in shaping the emergence of dedicated global health networks. We then described and compared the evolution of both networks, explaining why tobacco control has gained wider global acceptance today.

Peer feedback was critical to this project. The 12 members of the research team provided comments on one another's studies, met for multiple-day workshops as a full or nearly full team on five occasions during the project, and were in contact on a monthly basis via email and telephone. In providing feedback to one another, we took advantage of the diversity of disciplinary perspectives on the research team: anthropology, public health, political science, public administration, policy analysis and business administration.

Each of the research articles that follow draws on concepts from the framework to examine an empirical puzzle concerning some global health outcome connected to network activity. The TB paper (Quissell and Walt 2016) considers why a network that has been successful in advancing a particular intervention strategy (DOTS) now faces difficulties in responding to a changing epidemic and internal political struggles over priorities and governance—key issues for understanding how networks can sustain effectiveness over time. The pneumonia study (Berlan 2016) asks why network formation has been so slow surrounding a disease that is the world's leading killer of children. The maternal survival study (Smith and Rodriguez 2016) examines why, after nearly two decades of disappointing levels of attention to this issue, global attention rose dramatically in the 2000s. The newborn survival study (Shiffman 2016) explores why global and national policy traction has been slow to develop for an issue that inspires sympathy and little opposition. The tobacco control study (Gneiting 2016) analyzes the influence of a global health network as it shifts from promoting the global adoption of the Framework Convention on Tobacco Control to advancing its national implementation. The alcohol study (Schmitz 2016) considers how a network composed mostly of individual researchers was effective in setting the global agenda during the 2000s but now struggles, in the face of a powerful industry, to build a broader coalition that can advance effective national policies against alcohol harm. The comparative tobacco–alcohol study (Gneiting and Schmitz 2016) considers why despite comparable health burden from consumption of these substances, global policy traction has been greater for tobacco. The concluding article (Shiffman *et al*. 2016) synthesizes the project's findings on network emergence and effectiveness, considers the legitimacy of these networks, assesses the utility and limitations of the framework and identifies questions and directions for future research on global health networks.

Summary

Global health networks have proliferated over the past three decades and now exist for most conditions that cause high disease burden in low-income countries. But health policy scholars have given them scant attention. As a result we know little about how networks emerge and what effects they have on the world. We propose that by examining three categories of factors—internal features of networks and the actors that comprise them, their policy environments and characteristics of the issues they address—we can advance understanding of network emergence and effectiveness. The papers that follow draw on these categories to examine networks that have mobilized to address TB, pneumonia, tobacco use, alcohol harm, maternal survival and newborn survival. Collectively, these papers represent the first comparative research effort on the emergence and effectiveness of global health networks.

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Authorship

All authors contributed to the conception of the study, study design, gathering of evidence and drafting of the manuscript. J.S. produced the first draft, and all authors contributed to revisions. All authors have approved the final version of the manuscript.

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.

Conflict of interest statement: None declared.

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