6

From global health to planetary and micro global health

Theorising global health's present remodeling and scaling

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Introduction – worlds on the edge

We live in interconnected, yet also radically unequal, insecure, and unhealthy worlds: worlds on the edge. The spread of infectious disease across borders, struggles over access to treatments, and the rise in chronic disease pose highly complex and often unpredictable challenges – realities that are, time and again, couched in the vocabulary of emergency, hinging on a temporality that insists on a break with the past, and a rhetoric of compassion, recovery, and progress even as conditions stagnate or worsen (Pinker, 2018; Easterbrook, 2018). Accelerating environmental change, the visible and invisible wounds of ongoing war and mass migration, and the tolls of poverty and discrimination within precarious health systems all create conditions of dire vulnerability. What algorithms generate insight about the medical and political dimensions of present and coming health challenges, or help navigate questions of accountability (especially those posed by local communities) and our ethical 'response-ability' (Haraway, 2007, p. 89), now and on the horizon?

Reflecting both on recent challenges – in particular, the West African Ebola outbreak (2014–2016) – and on emerging remodelings of the field, this chapter advocates for a critical and people-centred approach both to and within global health. We begin by scrutinising how global health acquired its contemporary configuration, followed by discussing prominent theoretical responses. With this understanding of global health as a plastic and expansive political, economic, and technological work-in-progress, we then consider how the field is being reconfigured through new movements (such as planetary health and humanitarian technology design). As we trace shifting relationships between theory, method, and praxis across scales and time, we examine how successes and failures are far from easy to predict or assess; rather, local worlds emerge as sites of continual experimentation. We therefore argue that an ethnographic focus on evidence and efficacy at the local level raises rather than lowers the bar for thoughtful inquiry and action.

The current moment calls less for the all-knowing hubris of totalising analytical schemes than for a human science (and politics) of the uncertain and unknown (Biehl and Locke, 2017; Petryna, 2015). Ethnography can serve as an 'empirical lantern' (Hirschman, 1998, p. 88) within and beyond theories of health in all their various forms, highlighting how the targets of interventions implode the units and models through which they are conceptualised, producing contrapuntal knowledge of how things are, what sustains their intractability, and how they might be otherwise (Biehl and Petryna, 2013a).

Global health as 'open-source anarchy'

The West African Ebola outbreak was an 'acute-on-chronic' event, in the words of physician-anthropologist Paul Farmer (2011, p. 3): part and parcel of long-smoldering public health crises that humanitarian and global health interventions and politics as usual could not placate (or had even fueled), and with compounding deadly effects that people had to fight, at least initially, by themselves. As Jeremy Farrar, director of the Wellcome Trust, and Peter Piot, who helped to discover the Ebola virus, rightly pointed out, 'the particularly devastating course of this epidemic' could not be attributed to the 'biologic characteristics of the virus' alone (2014, p. 1545). It was, rather, the result of the combination of 'dysfunctional health systems, international indifference, high population mobility, local customs, densely populated capitals, and lack of trust in authorities after years of armed conflict' (Farrar and Piot, 2014, p. 1545; see also Piot, 2013). And, perhaps most importantly, it was 'a highly inadequate and late global response' (Farrar and Piot, 2014, p. 1545). The tragic limitations of this response were all too apparent as Ebola kept crossing borders – the grotesque disparities in risk and outcome between regions affected reflect both our technical prowess and the inequalities built into current world orders and value systems. In the aftermath of the epidemic, the limits of global health have again been exposed as funding and attention has been withdrawn, even as 'suffering certainly continues … in the form of clinical sequelae, lost livelihoods and loved ones, broken communities, food insecurity, and "stigma"' (Richardson, et al., 2017b, p. 80).

So, how did we get here?

Displacing earlier framings, such as colonial-era tropical medicine and postwar international health, the contemporary field of global health brings together a vastly diverse array of actors and interests in elastic relationships, and it has indeed become a big business (Brown, et al., 2006). Informed by various agendas, the World Health Organization, the World Bank, the Gates Foundation, pharmaceutical companies, governments, universities, and innumerable nongovernmental organisations are all working to address pressing health issues worldwide with unprecedented financial and technological resources (Biehl and Petryna, 2013a). Changes in the material and political capabilities of state and non-state actors, and changes in the world of ideas, now have more impact on each other than in the closed, state-centric system that prevailed during the Cold War. In this shifting matrix of actors and institutions, health variously emerges as an object of 'humanitarian reason' – as Didier Fassin (2011) would call it – and as an instrument of economic development, diplomacy, national security, or market expansion. Yet, even though these implicit agendas may collide or produce unintended consequences for communities and their health, global health players can become impervious to critique as they identify crises, cite dire statistics, and act upon these perceived needs. Likewise, declarations of crises' endings, and the attendant scaling back of efforts or shifting in priorities, are often presented as self-evident imperatives (Kenworthy, et al., 2018; Richardson, et al., 2017b).

Although activity in global health has increased markedly as new influxes of funding have entered the field, a concern for limited resources is still widely shared among scholars and practitioners – that is, 'socialization for scarcity' remains widespread, in Paul Farmer's words (Farmer, 2011, p. 254). This concern has partly manifested as an interest in finding cost-effective solutions that can be easily replicated and scaled up across a range of widely divergent contexts. In this vein, much of global health scholarship aims to develop models – more or less hypothetical – of such optimal interventions, and to identify and evaluate programmes that supposedly 'work' and that might lend themselves to replication and scaling.

Accordingly, evidence-based medicine and evidence-based policy have become the default languages for both public- and private-sector actors concerned with identifying problems and measuring outcomes (Adams, 2013a; Storeng and Béhague, 2014). This new landscape of evaluation is displacing the previous goals of interventions, making the provision of actual health services secondary to the development of reliable methodologies and the generation of comparable data. Metrics are presented as objective, value free, and abstracted from social and political contexts. Yet, in reality, as Vincanne Adams and colleagues (Adams,

2016) have noted, they operate as administrative apparatuses that shape health futures by reducing the noise of context and enabling business management rationalisations and decision-making.

The complex juxtaposition of agendas within the field of global health can be vividly seen in the case of treatment access, which has been one of the central tenets of global health activism and a professed goal of interventions since the mid-1990s (Nguyen, 2010). Public–private partnerships are booming and pharmaceutical companies have rebranded themselves as 'global health companies', making older treatments available and expediting access to newer ones (Biehl and Petryna, 2013b). We now see a multiplicity of actors, all vying for resources and influence while setting new norms for institutional response, sometimes providing the public health resources that states and markets have failed to furnish. In practice, the concerns of donors, not recipients, tend to predominate. Often, donors insist on funding disease-specific and technologically oriented vertical programmes at the expense of the public sector. Thus, in settings ranging from neoliberal Mozambique to urban North America, state-of-the-art facilities for HIV/AIDS coexist with dilapidated public hospitals (Pfeiffer, 2013).

Such narrowly targeted interventions may represent more than lost opportunities for investment in broader health systems – they also divert much-needed attention from addressing the complex patterns in which diseases manifest in individuals and populations, or what medical anthropologist Merrill Singer has termed 'syndemics' (Singer, et al., 2017). Co-infections, for example, are highly common, and notably so for the so-called 'Big 3' infectious diseases in global health (HIV/AIDS, tuberculosis, and malaria). And yet, while no one contracts or recovers from such diseases in a vacuum, much remains to be elucidated as to the biological pathways through which these diseases interact within individuals and populations, and how these interactions may complicate attempts at prevention and treatment (Griffiths, et al., 2011; Singer, et al., 2017). Beyond these biological interactions, much also remains to be understood as to how clusters of disease can emerge from sociopolitical environments of particular vulnerability. The vital importance of taking these interactions into account is evident from our recent experience with Ebola, where diminished access to health care during the epidemic led to increased mortality from malaria, HIV/AIDS, and tuberculosis (Parpia, et al., 2016). Similarly, population biologists warned that a 'second public health crisis' might follow Ebola, if concerted efforts to restore vital health services, such as childhood vaccinations for measles, were not made (Takahashi, et al., 2015).

Amid these calls for integration, however, multiple and fragmentary global health interventions remain more the rule than the exception, consolidating what anthropologist Susan Reynolds Whyte and her colleagues (2014) working in Uganda call 'projectified' landscapes of care. While enabling much-needed access to AIDS treatment, for example, the amalgamation of public–private interventions can endow states with new (sometimes abusive) powers while also diversifying claims to citizenship. We are left with what legal scholar David Fidler (2008, p. 260), would call an 'open-source anarchy' around global health problems – a policy space in which new medical technologies, ideas, strategies, rules, distributive schemes, and the practical ethics of health care are being assembled, experimented with, and improvised by a wide array of deeply unequal stakeholders within and across countries (Biehl, 2007).

Within this increasingly crowded landscape, the supposed beneficiaries of interventions are too often hidden from view, and appear either as having nothing to contribute or as unabashedly, uncritically receptive. While there have been some efforts to engage civil society and activists, a strong biomedical orientation remains pervasive, casting community engagement as politically necessary but 'scientifically' irrelevant (Biehl, 2007). As hopes for a magic bullet reign and the power of 'data' is ever more leveraged and fetishised, the visions of technocrats tend to outweigh other forms of practical and meaningful evidence. For example, 'technocratic ways of thinking' (Richardson, et al., 2017a, p. e255) in epidemiology may constrain the collection, use, and interpretation of data, yielding models that reinforce a biomedical paradigm in which individuals and their 'choices' are key drivers of disease spread, and obscuring the role of other crucial social and institutional drivers. Relatedly, as technocrats seek 'gold standard' practices that can be universally applied, emphasis has grown on interventions that can be readily packaged for many settings

and assessed according to easily measured outcomes; such outcomes offer an illusion of precision, but may not predict the interventions' potential elsewhere, or reflect their true impact on communities (Adams, 2016). As even Angus Deaton, the recent Nobel laureate economist, has emphasised: 'Randomized control trials have been given a free pass in the name of rigor. But there are no magic bullets and there are no gold standards' (Deaton, 2012; see also Deaton 2013).

The human populations that constitute the subjects of health and development plans, however, are not flat and homogeneous – nor are they the source of problems or so-called cultural obstacles. Epistemological breakthroughs do not belong to experts and analysts alone; people's practical knowledge can help break open and transform paradigms (Biehl and Petryna, 2014). The Ebola crisis illustrates how core determinants of health resist technical and theoretical quick fixes, as it was ultimately sociocultural knowledge that proved crucial to enacting effective control efforts (Amon, 2014). Intended to minimise disease transmission, for example, curfews and quarantines failed to take into account historical and contemporary tensions between peoples and governments in Guinea, Sierra Leone, and Liberia, backfiring so spectacularly that in August 2015, Liberian troops ended up shooting at people protesting such draconian and ill-conceived measures. Social scientists on the ground have shown why curfews and quarantines were received so poorly, even violently; why rumors about Ebola needed to be taken seriously rather than dismissed as illogical or paranoid; and why bereaved families hid bodies, rather than surrendering them for sanctioned burial (Frankfurter, 2014). The recognition of history, politics, and culture productively liberate people from the decontextualised, faceless, and pliable role of 'victim' (Edelstein, et al., 2015; Global Citizen, 2015). As Amon describes in his analysis of the global health response to HIV/AIDS, behaviours that are officially denigrated as 'noncompliance' or 'ignorance' are often the result of 'structural and human rights barriers that … affect attempts to act on the information gained' (Amon, 2013, p. 102). If policy is to seriously engage with human rights – especially as 'the most fundamental principle of rights [is] that all individuals should be treated equally and with dignity' (Amon, 2013, p. 107) – 'people-centred' evidence for policy is vital (Biehl and Petryna, 2013a).

Moreover, a focus on the institutional cultures of various organisations themselves highlights how much of the responsibility for the epidemic lay not with culture itself – as if culture were something bounded, inherently irrational, or dangerous – but with particular decisions and disagreements within and among a global class of supposed saviors and scientific forecasters. Indeed, to this latter point, Eugene Richardson and colleagues argue that we should not only indict missing health care and governance infrastructures, but also an 'impoverished discursive infrastructure of contemporary public health … [that] implicate[d] marginalized individuals as sources of outbreaks' (Richardson, et al., 2017a, p. e255) and thus lent support to the rigid enforcement of containment strategies.

At stake, then, is not just technopolitical preparedness but also critical social scientific preparedness. As Andrew Lakoff notes, retrospective assessment of failures in global health is often followed by official vows to be better prepared for the next emergency (Lakoff, et al., 2015; Lakoff, 2017). So, what should such scientific preparedness look like? If we take seriously the role of science and the conceptual categories it produces in guiding the course of global health assessments and interventions, we must then also consider global health theories and their relationships to praxis with greater scrutiny. Richard Horton, editor-in-chief of *The Lancet*, has called for 'radical changes in behavior' in governance at the global scale (Horton, 2014b, p. 2186) – and this call could be extended to knowledge-making as well. To unpack nonmedical determinants – a lack of emergency preparedness, the capacity of frail or nonexistent health systems, myopic funding mechanisms, and slow-coming political action – we need to move out of our comfortable disciplinary silos and produce empirically rich, comprehensive, 'historically deep and geographically broad' (Farmer, et al., 2013, p. 2) analyses of the power constellations, institutions, processes, and ideologies that impact the form and scope of disease and health processes. This work can aid us in imagining how to develop human and institutional capacities that go beyond the repetition of history and that can help to defend, in a spirit of radical political openness, what Albert Hirschman (1971, p. 37) calls 'the right to a non-projected future as one of the truly inalienable rights of every person and nation'.

Theorising global health

If global health has emerged as a prominent sphere of action and intervention, its consolidation as a field has called for new kinds of scrutiny (Janes and Corbett, 2009). A number of important critiques have emerged, destabilising assumed global health architectures and imperatives, and challenging our sense of what counts as 'global'. While unearthing the dominant epistemic and political modes that enable global health operations, social theorists have also thought critically about what kinds of interventions are actually workable, desirable, or ethical in the face of widespread disease, new vectors and disasters, toxic environments, and deadly health disparities (Biehl and Petryna, 2014; Das, 2015). Attending to these inquiries helps us to better grasp what is at work and at stake in contemporary global health, and to push our methods and analytics to better account for messy entanglements on the ground.

A first body of critique understands global health as a neocolonial or post-colonial imperial project. Historian of science Warwick Anderson, for example, not only argues that biomedicine is 'constitutively colonial' (2014, p. 381), but questions how too-easy binaries of domination and submission miss the complex post-colonial 'contact zones' in which relations of power unfold in multiple, shifting, and contested ways. Against the linear march of a triumphant narrative of globalisation, he attends to how global health both perpetuates and obscures colonial dynamics and to how global 'flows' rarely circulate smoothly. Such critiques resonate with the recent Ebola epidemic. Long before the outbreak erupted, the colonial legacy of the 'rubber plantation model of international health' shaped dramatic inequality in access to knowledge as well as resources (Dahn, et al., 2015). As early as 1982, scientific research warned of Ebola risk in the region, yet these findings – based on research carried out on the bodies of Liberian rubber workers by German scientists and published in a European journal – were never brought back to Liberia. The 'flows' of research were less 'flows' than lopsided allocations.

Where Anderson productively argues for a more multifaceted view of colonialism and post-colonialism, Jean and John Comaroff (2012), too, work to decentre global sovereignty, rejecting the conflation of 'the global' with the 'Euro-American'. 'Theory from the South', in the Comaroffs' telling, not only flips the West/non-West binary but destabilises it, casting the global South as 'a harbinger of history-in-the-making' (2012, p. 13). And indeed, countries in the global South are actively altering global health agendas for their own ends, through South–South partnerships, the circulation of generic pharmaceuticals, the contestation of trade and patent agreements, and the opening up of new markets (Cassier and Correa, 2008; Rajan, 2017). As in the case of Brazil (Biehl, 2007, 2013; Biehl and Petryna, 2013b), these countries are at once implicated in the broader landscapes of global health, and are forging novel dynamics for health care between markets, states, and citizens.

A second line of critique explores how global health reflects and shores up a capitalist neoliberal world order. Anne-Emanuelle Birn, for example, highlights how global health concerns merge with geoeconomic interests, increasingly under the purview of private-sector actors (Birn, 2014; Birn and Dmitrienko, 2005). The capacities and interests of public multilateral health agencies give way to an 'asymmetry of power' between private-sector actors and public interests, and philanthropic efforts to improve health and quality of life may in fact reinforce the very inequities they seek to overcome (Birn, 2014). Such arguments also dovetail with what Naomi Klein (2007) has called 'disaster capitalism', when, in moments of health emergency, the chaos of crisis is harnessed to implement controversial neoliberal policies while 'shock' prevents citizens from mobilising resistance. As both Klein and anthropologists Anne Lovell (2011) and Vincanne Adams (2013b) observed in the aftermath of Hurricane Katrina, the less obvious effects of disaster capitalism include the creation (and destruction) of infrastructures and mechanisms of social displacement and eviction, which get prolonged as a way of life while bureaucratic processes reproduce (rather than dismantle) conditions of vulnerability.

Physician-anthropologist Paul Farmer is one of the most vocal critics of the structural violence wrought by neoliberalism, taking on poverty and disease through a community-based approach that blends

technological intervention with a focus on making health systems work. Farmer and Partners In Health (PIH), the organisation he cofounded, understand diseases as loci where biology, environment, and medicine have gone awry, and their notion of intervention accordingly tackles the structural conditions that perpetuate disease (Keshavjee, 2014). During the recent Ebola outbreak in Liberia and Sierra Leone, PIH-affiliated scholars argued forcefully that 'policies that pit[ted] prevention against care' (Cancedda, et al., 2016, p. S156) were counterproductive – while they aimed to prioritise prevention, they actually served to deter sick individuals from seeking health care and undermine community trust, thereby hampering efforts to identify, isolate, and treat Ebola-infected patients. PIH practitioners thus attempted to balance their approach to reflect emphasis on both prevention of new infections and caring for infected patients to improve their outcomes (Cancedda, et al., 2016). Furthermore, they challenged foreign interventionist approaches to the epidemic, hiring approximately two thousand local community members, including Ebola survivors, as community health care workers and contact tracers to work alongside two hundred foreign medics (Partners in Health, n.d.). Such hiring practices facilitated local trust and helped build up a more accessible community health care network that has persisted after Ebola subsided and foreign/silo interventions ended (Cancedda, et al., 2016; Richardson, et al., 2017a). Farmer's and PIH's work serves as a kind of critique in action, rejecting economic orthodoxies and taking a social justice approach to patient care.

A third critique of global health takes a more Foucauldian approach, focusing on the new regimes of governmentality and biosecurity reconfiguring discourse and practice around health and risk. As scholars like Andrew Lakoff and Stephen Collier (2008, p. 16) have argued, biosecurity in the realm of global health troubles traditional regulatory boundaries, as biological threats move without regard to borders, and globalisation becomes 'a key source of pathogenicity'. In this 'emergency modality of intervention', approaches shift from prevention to preparedness, creating new modes of surveillance and intervention, and encouraging technical responses without much concern for ongoing living conditions (Lakoff, et al., 2015; Lakoff, 2017). While these are compelling and important arguments on the level of institutional biosecuritisation, this critical body of work largely tends to overlook local perspectives, leaving little space for asking how people exist amidst, and lodge their own lived critiques of, such regimes of biosecuritisation. Furthermore, the trope of security functions through a largely Westernised notion of governmental operants and biopower. What other forms of securitisation exist elsewhere, and what clashes occur when they come into contact via global health interventions?

An emerging body of scholarship based on research undertaken in the global South offers an important swerve here, hinting at how critiques of governmentality might more fully account for the social and political. Katherine Mason's ethnographic work on SARS control efforts in Shenzhen, China, illustrates some of the 'microprocesses by which biosecurity discourses become intertwined with existing local discourses about who carries disease, who is dangerous, who belongs, and who does not' (Mason, 2012, p. 114). She evinces how an increasingly biosecuritised discourse around infectious disease outbreaks in China mutually legitimates and reinforces existing discrimination against migrant workers. In a similar vein, Brazilian public health and legal scholar Deisy Ventura explores how, in Brazil, 'the securitisation of the response to Zika turned the *Aedes aegypti* mosquito into public enemy number one' (Ventura, 2016, p. 3). She argues that the depiction of disease as a 'security threat' can also have other effects, including panic, haste, suspicion, and discrimination, as certain populations are labeled as vectors or 'at risk'. Such securitisation, Ventura argues, fosters a proliferation of surveillance techniques to prevent the spread of disease, exerting control not only over the microbial pathogens themselves but also over the myriad vectors that carry them (in other words, persons and goods). Moreover, the 'risk' Ventura foresees in her analysis dooms global health to ongoing periods of 'war' and 'truce' as opposed to a systematic practice addressing the infrastructural roots of socially determined health outcomes (Diniz, 2017).

A final sphere of critique has approached global health as a form of transnational humanitarianism. Perhaps best exemplified by the work of Fassin (2011), these critiques see global health as an extension of

a broader form of humanitarian reason, which has become a dominant form of moral thinking in the West. Fassin (2012) cautions against taking the 'idea' of global health for granted, interrogating the assumptions of both 'global' – ultimately neither universal nor ever truly worldwide – and 'health' – where the politics of life are never a given. Attentive to how compassion in the face of suffering can be depoliticising, and to the ways humanitarian intervention has become an increasingly important form of global governance, Fassin and others rightly trouble our complacency about acting 'in the name of humanity', and highlight the inequality and violence that accompanies care (Redfield, 2013; Ticktin and Feldman, 2010; Han, 2012; Stevenson, 2014).

Yet, while critiques of global health as humanitarianism can nuance our thinking about rationality, interventionism, and morality, in certain forms their uptake can also elide the very possibility of engagement itself. Grossly oversimplifying the anthropological engagements with suffering, poverty, violence, and affliction as akin to critical and heroic impulses towards universal humanity and salvation (Robbins, 2013; Ticktin, 2014), such approaches can themselves produce a kind of myopia, missing ethnographic ambiguities and the complexities of how projects are actually conceptualised, implemented, and worked out, or desired by people themselves. Scholars like Farmer, engaged in the practical work of delivering care on the ground, highlight the deep ambiguities that coexist with new potentials and impasses, while also refusing to disengage from action in the face of radical injustice, despite inevitable double binds and ethical gray zones. Analytical distance too easily becomes a sanctioned form of moral detachment that dooms people differently than humanitarian reason – but dooms them nonetheless. The challenge here is to restore to the social sciences a sense of moral purpose and practical solidarity that might animate both critical thought and social action (Wilkinson and Kleinman, 2015; Briggs and Mantini-Briggs, 2016; Biehl and Locke, 2017).

The plasticity of global health

Given the historical landscape of global health and the tensions raised by the critiques outlined previously, what should we make of ongoing attempts to remodel the field?

In what follows, we examine two distinct ways in which modes of conceptualising and acting in global health are shifting, as actors and institutions in the field search for alternatives. These two emerging frameworks – planetary health and humanitarian design – emphasise dramatically different scales of study and intervention, from the massive scope of geophysical and ecological change represented by planetary health (Horton, et al., 2014a), to the micro-worlds of humanitarian design (Redfield, 2016; Collier, et al., 2017). These differing scalar narratives function, as Nicholas King has argued, to 'invoke places and spaces at different geographic scales to explain events, enlist allies, and attract attention' (King, 2004, p. 63); and indeed, these narratives have been powerful in mobilising interest and material support. Following Bruno Latour's critical analysis of how the scale of health problems is reformulated to advance certain modes of science and health interventions (1983), we might therefore ask: what are the scientific premises at work here, and how might this shift approaches to intervention? Much remains to be seen as these initiatives continue to unfold, but we trace here how these frameworks aspire to and conceptualise change in global health, and how they represent both continuity and disjuncture with their preceding paradigms.

Planetary health

Planetary health has emerged recently and with great fanfare as an extension of, or successor to, the field of global health. Judith Rodin (2015), President of the Rockefeller Foundation, idealistically termed it a vision of 'public health 2.0 – one that goes beyond the boundaries of our existing global health framework to take into consideration the natural systems upon which human health depends.' The manifesto outlining the goals of planetary health states that what is at stake is nothing less than the creation of 'a

social movement to support collective public health action at all levels of society – personal, community, national, regional, global, and planetary … our vision is for a planet that nourishes and sustains the diversity of life with which we coexist' (Horton, et al., 2014a, p. 847). This new field sets out to provide a unifying framework for research and action that broadens the scope beyond the traditional ambit of human health and health care to include all the political, economic, social, environmental, and technological systems that impact human interactions with (and impact upon) Earth's geophysical and ecological systems. As signaled by its name, which invokes the grandeur of the cosmos, planetary health sets out to 'work at large scales, both spatially (from regional to global) and temporally (anticipating the effects of current trends across generations)' (Frumkin and Myers, 2017).

This turn to integrating environmental concerns with more conventional approaches to global health has been slowly gaining influence over time. Since the 1990s, the importance of interconnections between human health and the social, physical, and biological environments was advanced in academic circles through various eco-health and ecosystem approaches to public health (Wolf, 2015). In the 2000s, this movement gained further traction in international policy circles, as the One Health framework (which advocates for approaches that acknowledge interconnections between human, animal, and environmental health) was officially recognised by large organisations such as the United States' Center for Disease Control, the World Health Organization, the World Bank, and the United Nations. Growing concern for environmental sustainability among the broader international development community is also reflected in the transition from the Millennium Development Goals development era of 2000–2015 to the present era, guided by the Sustainable Development Goals and their concern for the 'triple bottom line … a combination of economic development, environmental sustainability, and social inclusion' (Sachs, 2012, p. 2206). Alongside this, concern over the implications and extent of human influence upon the environment has become increasingly widespread in the academic and popular discourse, as reflected by the rapid rise of the term 'Anthropocene' in recent years (Steffen, et al., 2011). Planetary health draws upon these coalitions of interest, but has benefited from a particularly concerted push to establish it as a distinctive field and framework for action. With funding from the Rockefeller Foundation and the Wellcome Trust, the field of planetary health has rapidly expanded – new academic journals dedicated to the field have been launched (including a subsidiary of *The Lancet*), and almost 20 universities have introduced programmes or classes in planetary health (Frumkin and Myers, 2017).

While it remains to be seen how exactly this surge of interest in planetary health research will manifest itself in new knowledge and on-the-ground interventions, we may nonetheless examine how planetary health intersects with some of the main critiques of global health. In its emphasis on envisioning and implementing more sustainable modes of living and organising, planetary health explicitly sets out to provide a counter-vision to a capitalist neoliberal world order and call into question patterns of overconsumption and unrestrained extraction (Horton, et al., 2014a). Other shifts in discourse, however, are less inherent to the planetary health framework and may represent potential areas for concern. Although planetary health sets out to advance principles of equity and inclusion, James Fairhead and colleagues (2012) point out that environmental issues have sometimes been conduits for colonial or neocolonial expressions of unequal power dynamics. They argue that 'notions of "green" (and what, and who, is green or not) come to be defined and mobilized in particular ways' (Fairhead, et al., 2012, p. 239), leading to contested policies such as 'green grabbing', or appropriation of resources for environmental ends that may involve significant alienation of afflicted communities. Such policies, they suggest, reflect an 'economy of repair' where powerful actors and states presume 'that unsustainable use "here" can be repaired by sustainable practices "there", with one nature subordinated to the other' (Fairhead, et al., 2012, p. 242). Careful attention will thus be required to guard against such potential exacerbation of existing global inequities as policies are pursued under the planetary health rubric.

Moreover, although framers of planetary health have called for transformation of the closed and hierarchical nature of knowledge production (Horton, 2013), robust institutional backing for this agenda has

not been forthcoming. Decrying the production of knowledge from within disciplinary silos in academia, Richard Horton argues that,

> Planetary health demands more open knowledge systems – where valid knowledge comes from many societal sources, where universities are organized according to the problems society faces … and where the products of research are available to all and in forms that meet the needs of diverse public communities.
>
> *Horton, 2013, p. 1012*

However, although similar calls for more interdisciplinary and democratic processes of science making have been made before, they have often met with both epistemological and institutional obstacles (Brondizio, et al., 2016).

A retrospective analysis of the One Health framework that prefigured planetary health may offer some insight. Meike Wolf argues that although the One Health framework aspired towards integrated and interdisciplinary knowledge, in practice it was limited by a 'traditional biomedical model' of disease emergence and transmission that focused primarily on 'improved medical education and care as a solution to the problem of emerging zoonotic diseases' and neglected to situate human-animal encounters in a broader sociopolitical and cultural context (Wolf, 2015, p. 6). Studies that have attempted such contextualisation are relatively rare – a useful exemplar of possibilities in this line is Hannah Brown and Ann Kelly's work on viral hemorrhagic fever transmission, which elaborates the interactions between viral pathogen, animal reservoir, and human hosts and situates these biologically embodied encounters within a social context of care-giving and a historical context of post-colonial economies (Brown and Kelly, 2014). In doing so, Brown and Kelly point out the limitations of 'conceptualizing expertise as falling into discrete domains' and argue that 'a robust multi-dimensional approach to public health interventions rests on drawing together distinct ways of knowing rather than integrating different objects of knowledge' (Brown and Kelly, 2014, p. 294). Careful attention to, and integration of, insights from across the natural and social sciences will be crucial to ensuring that planetary health lives up to its aspirations to 'emphasize people, not diseases, and equity, not the creation of unjust societies' (Horton, et al., 2014a, p. 847; Brondizio, et al., 2016).

One of the key challenges for a more integrated science of planetary health is the current emphasis on 'large scales'. While this is necessary to call attention to the grand scope of the geophysical processes at work, and may even evoke a beneficial sense of shared purpose for some, care must be taken to attend to scales at which health is far from a shared experience. The threats of anthropogenic environmental change are sometimes presented as collective afflictions that can therefore spark collective action – as sociologist Ulrich Beck famously argued, 'poverty is hierarchic, [but] smog is democratic' (Beck, 1992, p. 36). As many subsequent critics of Beck have argued, however, this narrative of universalised environmental risk deflects attention from what we know about environmental hazards, which are often unequally distributed and disproportionately affect vulnerable communities with low socio-economic status (Brulle and Pellow, 2006). Reflecting on climate change in particular, historian Dipesh Chakrabarty suggests that 'the crisis … will be routed through all our "anthropological differences" … [thus] there is no corresponding "humanity" that in its oneness can act as a political agent' (2012, p.14). And indeed, current emergencies in health – from the Zika virus in northeastern Brazil to the water contamination in Flint, Michigan – speak to how bodies, infrastructures, technologies, and evidence are unequally shared and lived.

No longer a mere backdrop, environmental materials and infrastructures (from water management, sewage, and road systems, to birth control methods and pesticides) actually assume a central, often agentive role, interacting with communities in ways unaccounted for, and many times harmful (Barreto, et al., 2016; Bellinger, 2016). Even as we debate the necessity of transitioning to new modes of production and consumption, we still inhabit a 'chemical infrastructure' that forms the embodied 'legacy of a passing industrial capitalist age' (Nading, 2017, p. 145). Characterising these environmental effects on human

bodies, however, poses notable challenges to toxicological research and epidemiological studies of causality. Confounding previous scientific intuitions, nonlinear relationships between exposure dose and effects, as well as significant health effects at very low doses, have been observed for many common environmental chemicals (Vandenberg, et al., 2012). Attention to temporality matters, as certain early periods in life may form 'critical windows' for development and thus influence health trajectories in later life; cumulative exposures over time also matter (Ben-Shlomo and Kuh, 2002). Work in this realm thus calls for greater scrutiny of both the distribution and accumulation of these exposures as well as what Margaret Lock has termed 'local biologies', (1993; 2017), or how bodies and suffering can vary according to historical and social conditions.

These epidemiological uncertainties and uneven exposures call for forms of evidence-making that are able to marry scientific rigor and political legitimacy, towards the goal of 'actionable knowledge' (Graeter, 2017, p. 141). Such practices are difficult to formulate, as afflicted individuals and communities are often either unable to marshal resources for systematic and sustained scientific inquiry, or find that the evidence they collect is officially disregarded, leaving them in a state of precarity (Shapiro, 2015). An indication of how evidence-making in planetary health might move forward, however, comes from Stefanie Graeter's work on industrial heavy metal pollution in the Mantaro Valley of Peru (2017). Graeter ethnographically traces a multi-year collaboration between the Catholic church and scientists working to document heavy metal contamination, arguing that this process of institutional 'accompaniment' was vital not only in its material support for research on these afflicted communities, but in its imbuing of 'scientific practices with moral credibility and trust' (Graeter, 2017, p. 121), thus yielding evidence that was suitable for leveraging political action. Graeter thus calls our attention to how new spaces for knowledge-making and action can emerge where precarity is actually a mobilising force and where 'those of no account are counted' (Rancière, 2001); only by insisting upon such spaces may we restore the place of the poor in the political and scientific community.

Humanitarian design and micro-worlds in global health

While planetary health draws attention to supra-state phenomena and how the technological triumphalism of the industrial era has led us to the brink of disaster, the second framework emerging in global health – that of humanitarian design – brings attention to where states are absent or weak, and suggests that technological tinkering might provide some temporary relief. Design thinking began as a bundle of strategies and methods for engineers, architects, and urban planners looking to 'incorporate constituent or consumer insights' (Brown and Wyatt, 2010, p. 29) into products or solutions; but in the 1990s it began to burgeon into broader usage, as a framework for promoting creative innovation in business as well as academic sectors. In recent years, design thinking has crossed over into the sphere of social innovation, with influential design training institutions such as IDEO.org (the non-profit subsidiary of a large Silicon Valley-based international design consultancy) and the Hasso Plattner Institute for Design at Stanford (usually known as the d.school) launching initiatives that tout the transformative potential of design thinking for development and social innovation. This approach, which has also been termed 'human-centred design' by IDEO.org, places significant emphasis on the importance of user perspectives and feedback to the design process, and is therefore often presented as an antidote or alternative to technocratic top-down approaches to development interventions. This movement has gained the support and attention of prominent actors and institutions in the global health field; in 2013, Melinda Gates and Paul Farmer both cited 'human-centred design' as the innovation that was changing the most lives in the global South (Schwittay and Braund, 2017).

Recently, new global health initiatives have been launched that draw on the popular momentum of human-centred design to spur innovation. In 2014, the UK Department for International Development and IDEO.org co-launched Amplify, a challenge fund for design projects addressing eight development

challenges, including women's safety, enhancing early childhood development, and reducing stigma around disabilities. Around the same time, the international non-profit PATH (together with the United States Agency for International Development, the Gates Foundation, and the Norwegian Agency for Development Cooperation) launched the Innovation Countdown 2030 initiative to 'identify, evaluate, and showcase high-impact technologies and interventions that can transform global health by 2030' (PATH, n.d.). Both of these initiatives reflect a contemporary belief in the power of innovation to increase impact – as economist Larry Summers and epidemiologist Gavin Yamey put it, 'today's health tools alone won't get us there … we'll need tomorrow's tools as well, including new medicines, vaccines, diagnostics, and other innovations' (PATH, 2015, p. 5). They also represent, however, a challenge to the structures and premises of mainstream innovation, which is depicted as a 'model running out of steam because it is too costly, elitist, and rigid and fails to address even basic socioeconomic needs' (PATH, 2015, p. 4). Amie Batson, PATH's Chief Strategy Officer, proclaimed that 'innovators are everywhere, not just in well-funded labs and technology companies in wealthy nations … today's innovation ecosystem is diffuse, with smart ideas coming from every corner of the globe and across every sector and discipline' (PATH, 2015, p. 8).

The forms of 'inclusive innovation' championed by Amplify and IC2030 aim to include marginalised communities in the innovation process, either through specifically developing products and services for their use, or through support for more local, grassroots innovation efforts (Schwittay and Braund, 2017; PATH, 2015). Both initiatives deliberately sought to solicit and seriously consider submissions from the global South, as a way of affirming a commitment to decentralising knowledge production – and in so doing they also seem to engage the critique of global health as a neo-imperial enterprise. This departure from traditional models is for the moment certainly incomplete. Schwittay and Braund (2017) point out that Amplify still maintained a somewhat conventional development structure wherein key positions of gatekeeping influence were located in the global North, with projects subject to vetting and selection by a committee comprised of IDEO.org designers in North America, DFID managers in London, and unnamed subject experts.

The perpetuation of hierarchies of expertise in humanitarian design initiatives has led some to dismiss these initiatives as a new form of 'soft cultural imperialism' (Johnson, 2011, p. 463). Nevertheless, Schwittay and Braund argue that the apparent reflexivity of Amplify and similar initiatives with regard to diverse sites of knowledge production may represent a genuine and potentially significant turn towards a more humble approach towards development and global health, suggesting that '[Amplify] can be seen as an approach to international development whose practitioners wonder whether they are asking the right questions where others have ready-made answers, [and] who examine the assumptions that most development interventions take for granted' (Schwittay and Braund, 2017).

The direct outcomes of this turn to humanitarian design – the products and services developed through these processes of 'inclusive innovation' – have likewise been subject to both critique and cautious defense. In particular, the proliferation of small-scale devices aimed for use in situations of disaster or extreme poverty – such as point-of-use water purifiers, rapid diagnostic kits, and other highly portable medical monitors – have provoked intense debate among social scientists (Moran-Thomas, 2013). Some scholars argue that these 'micro' devices create and function within 'microworlds'; that is, they operate on needs at both an individualised and individualising level (Redfield, 2016). This is inherent to their purpose and function; they are created for easy use and distribution so that they may provide some degree of relief in the face of defunct or absent state infrastructures and larger systems of care. But in so doing, do they end up drawing too much attention to individual or micro-level frames for causality and interventions in global health, and thereby undermine attention to larger questions of structural violence and state responsibility? And what should we make of the 'ever-closer entanglement of markets and morals' (Schwittay and Braund, 2017) that accompanies many of these devices, produced as they are under the umbrella of social entrepreneurship? Does this represent a covert triumph of neoliberal and technocratic logics under humanitarian guise?

Anthropologist Peter Redfield offers a measured analysis that seeks to temper a quick rush to dismissal even as it also offers cautionary guidance. Tracing the use of Band-Aids – a micro-device that has become synonymous with the idea of a temporary and ultimately inadequate solution – Redfield argues that the 'problem with Band-Aids is primarily one of scale and application … it follows that a critical response should not simply expose such deficiencies, but also explore them in relation to any desired alternative' (Redfield, 2017). A hasty critique that condemns 'micro' devices merely because of their small scale and temporary nature, he argues, 'run[s] the risk of trading one fetish for another: assuming that the real path to the future always lies in familiar "macro" technologies and planning' (Redfield, 2017). Similar to Schwittay and Braund, Redfield suggests that the turn towards 'micro' devices or to a 'micro global health', as we call it, might, in some instances, reflect a potentially productive disenchantment with larger projects; perhaps, even, a heightened willingness among some practitioners to 'hold in view the messiness and complexity of any project of change, ultimately recommending to proceed with caution' (Schwittay and Braund, 2017).

Conclusion: peopling global health and multiplying theory

As we chart a path forward, seeking to avoid analytic myopia, moral detachment, and ready prescription, what might guide us in proceeding with due caution in global health's remodeling field? While all the spheres of critique mentioned previously point to the uneasy stakes of global health and its agendas, forms of research and practice, and consequences, none can fully account for the highly complex and uneven ways they unfold on the ground, nor the difficulties of engaging at all. A critical attitude and an empirical lantern is in order. That is, we advocate for charting the lives of individuals and institutions over time, chronicling people's varied interpretations of their conditions, all the while denaturalising operational categories. Doing this will require illuminating the concrete ways meso- and macro-level actors (and, increasingly, micro ones) impinge on local environments and lifeworlds and scrutinising how they become part of both new global regimes and people's struggles for survival and normativity in health (What is health?, 2009; Canguilhem, 1978). Close attention to the particular realities and to the various technologies and metrics in which they are cast highlights the productive and fraught coexistence between global health systems design and the alternative models people craft for 'engaging the real … [and for] worlding the world', as Clifford Geertz put it (2007, p. 222). They attune us to the places where global inequities and ideologies – neocolonialism, neoliberalism, governmentality, humanitarian reason and design – are reified, and also to the limits of those categories and the initiatives and items they are enveloped in.

Ethnography can thus capture the active embroilment of reason, life, and ethics, offering entry points into the plasticity of systems, theorisers, and norm-makers themselves and leaving space for pursuing new forms of critical and socially meaningful work in global health. Instead of withdrawing to a dispassionate 'armchair' position and easy cynical dismissal, this kind of work inhabits the tension between a critique *of* and a critique *in* global health, sustaining a space for inquiry and action, understanding *and* doing.

People and the worlds they navigate and the outlooks they articulate are more confounding, incomplete, and multiple than dominant analytical schemes tend to account for. The 'peoples' of global health tinker with alternative spaces of the 'global' in the pursuit of '*a* health' – troubling the inequalities of geopolitics and the hollow conceptions of truth and justice in preposterous social orders. Drawn to the unsettling of rationalities and ingrained commonsense, the critical global health we advocate for eschews a sense of theory as a totalising enterprise or as the privileged domain of elite knowledge-makers self-appointed to speak on behalf of benighted populations. Rejecting the division between those who know the world and those who must simply struggle to survive it, and upholding an equality of intelligences, our ethnographic forays can chronicle lived tensions between theory and practice and invoke both alternative conceptual frameworks and new kinds of imagination.

Ethnographic theory emerges from and in conversation with people and world-making practices, with various ways of knowing and relating. It is a way of staying connected to open-ended social processes and

unknowns – a way of counter-balancing the generation of certainties and foreclosures by other disciplines. Keeping interrelatedness, precariousness, uncertainty, and curiosity in focus, our theorising is never detached from praxis, but directly shapes and channels anthropology's entanglements in processes of transformation. In this way, theory is multiple and multiplies, a 'tool box' that can be actionable, in the world and in our writing: 'it has to be used, it has to work' (Deleuze, 2004, p. 210; Biehl and Locke, 2017, p. 32). It is these immanent negotiations (of peoples, institutions, technologies, evidence, social forms, ecosystems, health, efficacy, and ethics) – in their temporary stabilisation, production, excess, and creation – that animate the unfinishedness of ethnography and critical global health.

References

Adams, V. (2013a) 'Evidence based global public health: subjects, profits, erasures', In: J. Biehl and A. Petryna (Eds.) *When People Come First: Critical studies in global health*, Princeton: Princeton University Press, pp. 54–90.

Adams, V. (2013b) *Markets of Sorrow, Labors of Faith: New Orleans in the wake of Katrina*, Durham, NC: Duke University Press.

Adams, V. (2016) *Metrics: What counts in global health*, Durham, NC: Duke University Press.

Amon, J. (2013) 'The "right to know" or "know your rights"?: human rights and a people-centered approach to health policy', In: J. Biehl and A. Petryna (Eds.) *When People Come First: Critical studies in global health*, Princeton: Princeton University Press, pp. 91–108.

Amon, J. (2014) 'How not to handle Ebola', available at www.cnn.com/2014/09/12/opinion/amon-ebola-outbreak/ (accessed on 6 March 2018).

Anderson, W. (2014) 'Making global health history: the postcolonial worldliness of biomedicine', *Social History of Medicine*, 27(2): 372–84.

Barreto, M.L., Barral-Netto, M., Stabeli, R., Almeida-Filho, N., Vasconcelos, P.F.C., Teixeira, M., Buss, P., and Gadelha, P.E. (2016) 'Zika virus and microcephaly in Brazil: a scientific agenda', *The Lancet*, 387(10022): 919–21.

Beck, U. (1992) *Risk Society: Towards a new modernity*, translated by M. Ritter, London: Sage.

Bellinger, D. (2016) 'Lead contamination in Flint: an abject failure to protect public health', *New England Journal of Medicine*, 374: 1101–3.

Ben-Shlomo, Y. and Kuh, D. (2002) 'A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives', *International Journal of Epidemiology*, 31(2): 285–93.

Biehl, J. (2007) *Will to Live: AIDS therapies and the politics of survival*, Princeton, NJ: Princeton University Press.

Biehl, J. (2013) 'The judicialization of biopolitics: claiming the right to pharmaceuticals in Brazilian courts', *American Ethnologist*, 40(3): 419–36.

Biehl, J. and Petryna, A. (2013a) 'Critical global health', In: J. Biehl and A. Petryna (Eds.) *When People Come First: Critical studies in global health*, Princeton: Princeton University Press, pp. 1–22.

Biehl, J. and Petryna, A. (2013b) 'Legal remedies: therapeutic markets and the judicialization of the right to health', In: J. Biehl and A. Petryna (Eds.) *When People Come First: Critical studies in global health*, Princeton: Princeton University Press, pp. 325–46.

Biehl, J. and Petryna, A. (2014) 'Peopling global health', *Saúde e Sociedade*, 23(2): 376–89.

Biehl, J. and Locke, P. (2017) 'Introduction: ethnographic sensorium', In: J. Biehl and P. Locke (Eds.) *Unfinished: The anthropology of becoming*, Durham, NC: Duke University Press, pp. 1–40.

Birn, A.-E. and Dmitrienko, K. (2005) 'The World Bank: global health or global harm?', *American Journal of Public Health*, 95(7): 1091–2.

Birn, A.-E. (2014) 'Philanthrocapitalism, past and present: the Rockefeller Foundation, the Gates Foundation, and the setting(s) of the international/global health agenda', *Hypothesis*, 12(1): e8.

Briggs, C.L. and Mantini-Briggs, C. (2016) *Tell Me Why My Children Died: Rabies, indigenous knowledge, and communicative justice*, Durham, NC: Duke University Press.

Brondizio, E.S., O'brien, K., Bai, X., Biermann, F., Steffen, W., Berkhout, F., Cudennec, C., Lemos, M.C., Wolfe, A., Palma-Oliveira, J., and Chen, C.T.A. (2016) 'Re-conceptualizing the anthropocene: a call for collaboration', *Global Environmental Change*, 39: 318–27.

Brown, H. and Kelly, A.H. (2014) 'Material proximities and hotspots: toward an anthropology of viral hemorrhagic fevers', *Medical Anthropology Quarterly*, 28(2): 280–303.

Brown, T. and Wyatt, J. (2010) 'Design thinking for social innovation', *Development Outreach*, 12(1): 29–43.

Brown, T.M., Cueto, M., and Fee, E. (2006) 'The World Health Organization and the transition from "international" to "global" public health', *American Journal of Public Health*, 96(1): 62–72.

Brulle, R.J. and Pellow, D.N. (2006) 'Environmental justice: human health and environmental inequalities', *Annual Review of Public Health*, 27: 103–24.
Cancedda, C., Davis, S.M., Dierberg, K.L., Lascher, J., Kelly, J.D., Barrie, M.B., Koroma, A.P., George, P., Kamara, A.A., Marsh, R., and Sumbuya, M.S. (2016) 'Strengthening health systems while responding to a health crisis: lessons learned by a nongovernmental organization during the Ebola virus disease epidemic in Sierra Leone', *The Journal of Infectious Diseases*, 214(S3): S153–63.
Canguilhem, G. (1978) *On the Normal and the Pathological,* translated by C. Fawcett, R.S. Cohen (Ed.), Boston: D. Reidel.
Cassier, M. and Correa, M. (2008) 'Scaling up and reverse engineering: acquisition of industrial knowledge by copying drugs in Brazil', In: B. Coriat (Ed.) *The Political Economy of HIV/AIDS in Developing Countries: TRIPS, public health systems, and free access*, Cheltenham, UK: Edward Elgar, pp. 130–49.
Chakrabarty, D. (2012) 'Postcolonial studies and the challenge of climate change', *New Literary History*, 43(1): 1–18.
Collier, S.J., Cross, J., Redfield, P., and Street, A. (Eds.) (2017) 'Little development devices/humanitarian goods'. *Limn*: 9.
Comaroff, J. and Comaroff, J. (2012) *Theory From the South: Or, how Euro-America is evolving toward Africa*, Boulder, CO: Paradigm Publishers.
Dahn, B., Mussa, V., and Nutt, C. (2015) 'Yes, we were warned about Ebola', available at www.nytimes.com/2015/04/08/opinion/yes-we-were-warned-about-ebola.html (accessed on 6 March 2018).
Das, V. (2015) *Affliction: Health, disease, poverty*, New York: Fordham University Press.
Deaton, A. (2012) Lecture: 'How can we learn what works in health and development?', Global Health Colloquium, Princeton University, 5 October.
Deaton, A. (2013) *The Great Escape: Health, wealth, and the origins of inequality*, Princeton: Princeton University Press.
Deleuze, G. (2004) 'Intellectuals and power', In: D. Lapoujade (Ed.) translated by M. Taormina *Desert Islands and Other Texts, 1953–1974*, Los Angeles: Semiotext(e), pp. 206–13.
Diniz, D. (2017) *Zika: From the Brazilian backlands to global threat*, London: Zed Books.
Easterbrook, G. (2018) *It's Better Than It Looks: Reasons for optimism in an Age of Fear*, New York: Public Affairs.
Edelstein, M., Angelides, P., and Heymann, D. (2015) 'Ebola: the challenging road to recovery', *The Lancet*, 385: 2234–5.
Fairhead, J., Leach, M., and Scoones, I. (2012) 'Green grabbing: a new appropriation of nature?', *Journal of Peasant Studies*, 39(2): 237–61.
Farmer, P. (2011) *Haiti After the Earthquake*, New York: Public Affairs.
Farmer, P., Kim, J.Y., Kleinman, A., and Basilico, M. (2013) 'Introduction: a biosocial approach', In P. Farmer, et al. (Eds.) *Reimagining Global Health: An introduction*, Berkeley: University of California Press, pp. 1–14.
Farrar, J. and Piot, P. (2014) 'The Ebola emergency: immediate action, ongoing strategy', *The New England Journal of Medicine*, 371: 1545–6.
Fassin, D. (2011) *Humanitarian Reason: A moral history of the present*, Berkeley, CA: University of California Press.
Fassin, D. (2012) 'That obscure object of global health', In: M. Inhorn and E. Wentzell (Eds.) *Medical Anthropology at the Intersections: Histories, activisms, and futures*, Durham, NC: Duke University Press, pp. 95–115.
Fidler, D.P. (2008) 'A theory of open-source anarchy', *Indiana Journal of Global Legal Studies*, 15(1): 259–84.
Frankfurter, R. (2014) 'The danger in losing sight of Ebola victims' humanity', available at www.theatlantic.com/health/archive/2014/08/the-danger-in-losing-sight-of-ebola-victims-humanity/378945/ (accessed on 6 March 2018).
Frumkin, H. and Myers, S. (2017) 'Health at a planetary scale', available at www.politico.com/agenda/story/2017/09/13/planetary-health-challenges-000514 (accessed on 12 February 2018).
Geertz, C. (2007) 'To exist is to have confidence in one's way of being: rituals as model systems', In: A. Creager, E. Lunbeck, and M. Norton Wise (Eds.) *Science Without Laws: Model systems, cases, exemplary narratives*, Durham, NC: Duke University Press, pp. 212–24.
Global Citizen. (2015) 'Introducing "I survived Ebola"', available at www.globalcitizen.org/en/content/introducing-i-survived-ebola/ (accessed on 6 March 2018).
Graeter, S. (2017) 'To revive an abundant life: Catholic science and neoextractivist politics in Peru's Mantaro Valley', *Cultural Anthropology*, 32(1): 117–48.
Griffiths, E.C., Pedersen, A.B., Fenton, A., and Petchey, O.L. (2011) 'The nature and consequences of coinfection in humans', *Journal of Infection*, 63(3): 200–6.
Han, C. (2012) *Life in Debt: Times of care and violence in neoliberal Chile*, Berkeley, CA: University of California Press.
Haraway, D. (2007) *When Species Meet*, Minneapolis: University of Minnesota Press.
Hirschman, A.O. (1971) *Bias for Hope: Essays on development and Latin America*, New Haven, CT: Yale University Press.
Hirschman, A.O. (1998) *Crossing Boundaries: Selected writings*. New York: Zone Books.
Horton, R. (2013) 'Offline: planetary health – a new vision for the post-2015 era', *The Lancet*, 382(9897): 1012.
Horton, R., et al. (2014a) 'From public to planetary health: a manifesto', *The Lancet*, 383(9920): 847.
Horton, R. (2014b) 'Offline: can Ebola be a route to nation-building?', *The Lancet*, 384(9961): 2186.

Janes, C. and Corbett, K. (2009) 'Anthropology and global health', *Annual Review of Anthropology*, 38: 167–83.
Johnson, C. (2011) 'The urban precariat, neoliberalization, and the soft power of humanitarian design', *Journal of Developing Societies*, 27(3–4): 445–75.
Kenworthy, N., Thomann, M., and Parker, R. (2018) 'From a global crisis to the "End of AIDS": new epidemics of signification', *Global Public Health*, 8: 960–71.
Keshavjee, S. (2014) *Blind Spot: How neoliberalism infiltrated global health*. Berkeley, CA: University of California Press.
King, N.B. (2004) 'The scale politics of emerging diseases', *Osiris*, 19: 62–76.
Klein, N. (2007) *The Shock Doctrine: The rise of disaster capitalism*, New York: Picador.
Lakoff, A. and Collier, S. (2008) *Biosecurity Interventions: Global health and security in question*, New York: Columbia University Press.
Lakoff, A., Stehen Collier, S., and Kelty, C. (Eds.) (2015) *Ebola's Ecologies*. *Limn*: 5.
Lakoff, A. (2017) *Unprepared: Global health in a time of emergency*, Oakland, CA: University of California Press.
Latour, B. (1983) 'Give me a laboratory and I will raise the world', In: K. Knorr-Cetina and M. Mulkay (Eds.) *Science Observed: Perspectives on the social study of science*, London: Sage, pp. 141–170.
Lock, M. (1993) *Encounters with Aging: Mythologies of menopause in Japan and North America*, Berkeley, CA: University of California Press.
Lock, M. (2017) 'Recovering the body', *Annual Review of Anthropology*, 46: 1–14.
Lovell, A. (2011) 'Debating life after disaster: charity hospital babies and bioscientific futures in post-Katrina New Orleans', *Medical Anthropology Quarterly*, 25(2): 254–77.
Mason, K.A. (2012) 'Mobile migrants, mobile germs: migration, contagion, and boundary-building in Shenzhen, China after SARS', Medical Anthropology, 31(2): 113–31.
Moran-Thomas, A. (2013) 'A salvage ethnography of the Guinea worm: witchcraft, oracles and magic in a disease eradication program', In: J. Biehl and A. Petryna (Eds.) *When People Come First: Critical studies in global health*, Princeton, NJ: Princeton University Press, pp. 207–242.
Nading, A. (2017) 'Local biologies, leaky things, and the chemical infrastructure of global health', *Medical Anthropology*, 36(2): 141–56.
Nguyen, V.-K. (2010) *Republic of Therapy: Triage and sovereignty in West Africa's time of AIDS*, Durham, NC: Duke University Press.
Parpia, A.S., Ndeffo-Mbah, M.L., Wenzel, N.S., and Galvani, A.P. (2016) 'Effects of response to 2014–2015 Ebola outbreak on deaths from malaria, HIV/AIDS, and tuberculosis, West Africa', *Emerging Infectious Diseases*, 22(3): 433–41.
Partners in Health. (n.d.) 'Ebola', available at www.pih.org/programs/ebola (accessed on 16 April 2018).
PATH. (n.d.) 'Innovation Countdown 2030', available at http://ic2030.org/about/ (accessed on 16 April 2018).
PATH. (2015) 'IC2030 report: reimagining global health', available at http://ic2030.org/wp-content/uploads/2015/07/ic2030-report-2015.pdf (accessed on 16 April 2018).
Petryna, A. (2015) 'What is a horizon? Navigating thresholds in climate change uncertainty', In: P. Rabinow and L. Samimian-Darash (Eds.) *Modes of Uncertainty: Anthropological*, Chicago, IL: University of Chicago Press, pp. 147–64.
Pfeiffer, J. (2013) 'The struggle for a public sector: PEPFAR in Mozambique', In: J. Biehl and A. Petryna (Eds.) *When People Come First: Critical studies in global health*, Princeton, NJ: Princeton University Press, pp. 166–81.
Pinker, S. (2018) *Enlightenment Now: The case for reason, science, humanism, and progress*, New York: Viking Press.
Piot, P. (2013) *No Time to Lose: A life in pursuit of deadly viruses*, New York: W.W. Norton & Co.
Rajan, K.S. (2017) *Pharmocracy: Value, politics, and knowledge in global biomedicine*, Durham, NC: Duke University Press.
Rancière, J. (2001) 'Ten theses on politics', *Theory & Event*, 5(3).
Redfield, P. (2013) *Life in Crisis: The ethical journey of Doctors Without Borders*, Berkeley, CA: University of California Press.
Redfield, P. (2016) 'Fluid technologies: the bush pump, the LifeStraw® and microworlds of humanitarian design', *Social Studies of Science*, 46(2): 159–83.
Redfield, P. (2017) 'On Band-Aids and magic bullets', *Limn*: 9.
Richardson, E.T., Barrie, M.B., Nutt, C.T., Kelly, J.D., Frankfurter, R., Fallah, M.P., and Farmer, P.E. (2017a) 'The Ebola suspect's dilemma', *The Lancet Global Health*, 5(3): e254–6.
Richardson, E.T., et al. (2017b) 'The symbolic violence of "outbreak": a mixed-methods, quasi-experimental impact evaluation of social protection on Ebola survivor wellbeing', *Social Science & Medicine*, 195: 77–82.
Robbins, J. (2013) 'Beyond the suffering subject: toward an anthropology of the good', *Journal of the Royal Anthropological Institute*, 19(3): 447–62.
Rodin, J. (2015) 'Planetary health: a new discipline in global health', available at www.rockefellerfoundation.org/blog/planetary-health-a-new-discipline-in-global-health/ (accessed on 12 February 2018).
Sachs, J. D. (2012) 'From Millennium Development Goals to Sustainable Development Goals', *The Lancet*, 379(9832): 2206–11.

Schwittay, A. and Braund, P. (2017) 'Iterate, experiment, prototype', *Limn*: 9.
Shapiro, N. (2015) 'Attuning to the chemosphere: domestic formaldehyde, bodily reasoning, and the chemical sublime', *Cultural Anthropology*, 30(3): 368–93.
Singer, M., Bulled, N., Ostrach, B., and Mendenhall, E. (2017) 'Syndemics and the biosocial conception of health', *The Lancet*, 389(10072): 941–50.
Steffen, W., Grinevald, J., Crutzen, P., and McNeill, J. (2011) 'The anthropocene: conceptual and historical perspectives', *Philosophical Transactions of the Royal Society of London A: Mathematical, physical and engineering sciences*, 369(1938): 842–67.
Stevenson, L. (2014) *Life Beside Itself: Imagining care in the Canadian Arctic*, Berkeley, CA: University of California Press.
Storeng, K. and Béhague, D. (2014) '"Playing the numbers game": evidence-based advocacy and the technocratic narrowing of the safe motherhood initiative', *Medical Anthropology Quarterly*, 28(2): 260–79.
Takahashi, S., et al. (2015) 'Reduced vaccination and the risk of measles and other childhood infections post-Ebola', *Science*, 347(6227): 1240–2.
Ticktin, M. (2014) 'Transnational humanitarianism', *Annual Review of Anthropology*, 43: 283–9.
Ticktin, M. and Feldman, I. (Eds.) (2010) *In the Name of Humanity: The government of threat and care*, Durham, NC: Duke University Press.
Vandenberg, L.N., Colborn, T., Hayes, T.B., Heindel, J.J., Jacobs Jr., D.R., Lee, D.-H., Tshi Shioda, T., et al. (2012) 'Hormones and endocrine-disrupting chemicals: low-dose effects and nonmonotonic dose responses', *Endocrine Reviews*, 33(3): 378–455.
Ventura, D. (2016) 'From Ebola to Zika: international emergencies and the securitization of global health', *Cadernos de Saúde Pública*, 32(4).
'What is health? The ability to adapt [editorial]', (2009) *The Lancet*, 373(9666): 781.
Whyte, S.R. (Ed.) (2014) *Second Chances: Surviving AIDS in Uganda*, Durham, NC: Duke University Press.
Wilkinson, I. and Kleinman, A. (2015) *A Passion for Society: How we think about human suffering*, Berkeley, CA: University of California Press.
Wolf, M. (2015) 'Is there really such a thing as "One Health"? Thinking about a more than human world from the perspective of cultural anthropology', *Social Science & Medicine*, 129: 5–11.