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DISEASE OUTBREAKS

Navigating uncertainties in preparedness and response

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Introduction

Concern about deadly infectious diseases with local outbreak or pandemic potential has grown significantly, in a world characterised by increasing global mobility and significant social, economic and ecological transformations. In recent years such fears have crystallised in the restructuring of institutional architectures within agencies with a global health remit, alongside initiatives to predict, prepare and respond to epidemics. Underlying the fears of global actors is the reality of limited knowledge about many aspects of outbreaks, coupled with predictions of potentially devastating consequences – both rapidly unfolding and fatal. A better delineation of the contours of uncertainty in global planning and practice is vital, we argue, to understanding the assumptions made about appropriate measures, the allocation of responsibility and the justifications of actions.

The 2013–2015 Ebola outbreak in West Africa was a key episode in galvanising global attention towards disease-preparedness activities, geared towards pre-emptive control in the event of outbreaks. Practices focused on prediction and control concentrate on turning uncertainties into 'risk', through surveillance, modelling, early warning and scenario planning (e.g. WHO 2017). Alongside the scientific uncertainties that are the focus of these efforts, a further source of uncertainty has increasingly come into view for scientific and policy communities: the behaviour of affected populations and the social and political dynamics and geographies of disease 'hotspots'. This has catalysed an increased recognition of social science perspectives and the value of disseminating knowledge about the contexts in which disease outbreaks occur – socio-economic, political and ecological (Leach 2019; GLOPID-R 2019). Thus, a growing recognition of 'context' in the epidemics science-policy space has been a significant development. We argue here that new discourses and practices have emerged around this realisation. These can be detected in initiatives

such as those to standardise risk communication and community engagement, to develop social science protocols to inform outbreak response, or to obtain synthesis briefings from social scientists for frontline workers – in an attempt to make the unpredictable and lesser known spaces of 'social context' more discretely intelligible and legible.

As social scientists working on epidemics we too have beaten the drum about the fact that 'context matters and must be known'. We have actively contributed to this discourse in the hope that it could serve as a bridge to the inclusion of perspectives beyond the biomedical, and in an attempt to avoid potential harm from interventions that might be naive as regards on-the-ground realities. We have led and participated in initiatives to brief epidemic responders on context, such as the Ebola Response Anthropology Platform (www.ebola-anthropology.net) and Social Science in Humanitarian Action Platform (SSHAP) (www.socialscienceinaction. org). And yet we also cannot help but reflect critically on how agencies have employed this knowledge, and how such initiatives can also be viewed as part of a broader suite of technologies to transform uncertainties – in this instance social, political and structural realities – into calculable risks, tamed and streamlined for communication to publics. In the official discourse of preparedness and response, local people have been variously objectified as a source of uncertainty, including now as (behavioural and social) 'context'.

In this chapter, we seek to open up a richer dialogue about the different understandings and experiences of outbreaks and of uncertainty that prevail among global science-policy communities, and the 'communities' that are envisaged as the focus of global-level efforts, informed by, but also self-critically engaged with, these recent efforts to make 'context' and local responses knowable. We address and illustrate the potential contestation between the official response efforts of public health agencies, and alternative ways of knowing and responding to outbreaks, grounded in practice and mobilisation that might be more salient and trusted at local level. We suggest that, while there has been growing attention to these gulfs and how to bridge them in *response* efforts, there has been less attention to *preparedness* efforts and their understanding at local level, and how these might relate to everyday experiences of and responses to uncertainty. But our main concern here is to go further, to reflect on the limits in comprehending the ontological dimensions of uncertainty, particularly as experienced in places where outbreaks are happening, by people whose lives are precarious, with misfortunes and 'emergencies' – health-related and otherwise – that are as likely to be of the 'slow' (Anderson *et al.* 2019) as the acute kind. For people living in these settings, we suggest, it is not 'context' that is salient but the ongoing flow – or text – of social and ecological life, in which a host of everyday uncertainties are constantly faced, with variable outcomes.

Attention to the dynamics of different levels, forms and realities of uncertainty raises questions about whose versions of uncertainty dominate in imaginaries of future outbreaks, and corresponding global response and preparedness strategies. Moreover, it is essential to consider whose knowledge and experiences count in preparing and responding, as well as whether uncertainties related to disease outbreaks

are always resolvable. Are alternative processes possible for formulating international planning frameworks, ones that are more open to considering different forms of knowledge and more attentive to views 'from below' that might reveal alternative priorities and ways of being-in-the-world? Or is a more radical departure necessary, where a new process for organising international responses does not rely foremost on roadmaps developed remotely from national and local-level realities?

The framings and dynamics of uncertainty at the global level

Conventional epidemic response institutional architecture is based on the 'outbreak narrative' that highlights particular aspects of an epidemic and is blind to others (Dry and Leach 2010). The outbreak narrative is a 'formulaic plot that begins with the identification of an emerging infection, discussion of global networks through which diseases travel, and a chronicle of the epidemiologic work that results in disease containment' (Wald 2008: 2). This 'outbreak narrative' focuses on particular disease dynamics – 'sudden emergence, speedy, far-reaching, [and often] global spread' – and on particular types of response – 'universalised, generic emergency-oriented control, at source, aimed at eradication' (Leach *et al.* 2010: 372). This narrative tends to prioritise the 'global citizen' at risk of contagion, disproportionately referring to citizens of the global North. This global bio-security paradigm is characterised by a move from public health technologies of prevention to preparedness, deploying particular military and security techniques for the 'construction of potential futures' in the realm of disease threat (Lakoff 2008: 401). Preparedness involves a complex and rapidly developing set of concepts, architectures and practices aimed at creating a 'vigilant alertness for the onset of surprise' and an 'anticipatory imagination' among policy-makers (Lakoff 2017: 20).

   At the global level, at least three different forms of uncertainty can be delineated with respect to 'expert' scientific knowledge and outbreak responses. Firstly, in a situation where an actual outbreak of a known disease has occurred, there are uncertainties that arise in terms of how the disease will unfold, which populations will be most affected, how people might behave in response and what the overall effects will be. Secondly, considering a particular disease with epidemic potential, there are uncertainties regarding where the next outbreak will occur and how this might develop, such as whether efficient human-to-human transmission might occur. Thirdly, there is the situation of extreme unknowns: which Disease X might emerge in the near future, how organisms might be mutating and how preparedness can be maximised.

   All three forms of uncertainty, as states of limited knowledge, are acknowledged by scientists. Discussions about 'closing the gaps' in scientific understandings frequently form the focus and grist of numerous expert meetings, such as those convened on the WHO priority diseases (WHO 2019a). The paradigm of evidence-based response is held as the gold standard approach for guiding action, and as such there are calls for urgent research to address outstanding questions, with the assumption that risk mitigation can be replaced by risk elimination as

evidence becomes more complete. In pursuit of prediction in order to manage and reduce risk, preparedness and response architectures prioritise technologies of control, with practices concentrated on turning uncertainties into risk, such as surveillance and modelling of disease, and scenario planning. These involve the intensified collection and use of public health and epidemiological data, supported by clinical and laboratory information, as well as novel (e.g. digital) means to collect and share it.[1] The common framework is to move from 'reactive' to 'predictive and proactive' approaches to pathogens. R&D is also prioritised, with the assumption that vaccines, immune therapies and novel drugs are the 'game-changers' in the control of risk, and should be fast-tracked through human trials and into production.

These control-driven approaches are understandable, given the urgency associated with outbreak response. The stakes are often high and public health and response professionals are under intense scrutiny and pressure to intervene definitively and with assurance. While scientists might readily acknowledge the knowledge gaps among themselves, and discuss the tensions of balancing scientific uncertainties and difficulties with prediction against the need to act, this openness is not readily expressed beyond their professional community. A lack of certainty creates particular discomfort among public health professionals in discussions of 'risk reduction' messages directed at the general public and the media.

Scientists might acknowledge that the dynamism of complex interacting biological and ecological systems make it likely that limits to forms of scientific knowing in regard to 'priority diseases' will persist, on the shifting sands of new and emerging uncertainties. In designing responses and engaging with publics, health professionals also increasingly recognise that social worlds cannot be ignored – from individual beliefs about disease and health-seeking behaviours to diverse cultural logics and conditions of life and livelihood that affect relevant social relations and responses (Bedford *et al.* 2019). But, as we now show, this attention is often framed in terms of 'behaviour' and 'context' – and as further sources of uncertainty that in turn need to be tamed and controlled.

The uncertainty of behaviour and context

The 2013–2015 West African Ebola outbreak helped focus a spotlight on the uncertainties associated with social factors, as well as the dangers of action that is 'context-blind', even in a situation of great urgency and high mortality and a virus capable of epidemic spread. Social scientists working with local populations in efforts such as the Ebola Response Anthropology Platform highlighted the social processes and concerns shaping viral transmission patterns; care and burial practices; local innovations and institutions in addressing the outbreak; and the relationships and learning among community members and health workers, and the histories and political economies shaping these (e.g. Wilkinson *et al.* 2017; Richards 2016). Communicated to response agencies through accessible briefings in near-real-time, and then the subject of global reports and reflections (e.g. GLOPID-R 2019), these efforts have contributed to greater appreciation of local social dimensions

of epidemic response. This has been termed 'behaviour' of affected populations by response agencies, although there is increasing recognition that this domain of 'context' includes cultural logics, social responses, political factors and media reports, and that the formal outbreak response itself can shape rumours and local reactions that in turn will shape the evolution of the outbreak. Many scientists now reflect more openly on contextual factors and local responses as a major form of uncertainty in attempting modelling and other forms of prediction.

For global agencies, this growing appreciation of 'behaviour' and 'context' presents a new set of uncertainties that must now be grappled with in responding to, but also preparing for, outbreaks. To date, the dominant approach to dealing with this unruly contextual space has focused attention on 'risk communication' and 'community engagement' (e.g. WHO 2018: 14). Agencies and initiatives such as the WHO's new Health Emergencies programme are rapidly commissioning social science tools, methods, protocols and procedures to support these emphases, as well as to make social contexts legible and manageable.[2] While contributing to such efforts through initiatives such as SSHAP,[3] we have also been at pains to point out the narrow and over-simplistic ways that 'communities', 'communication' and 'social context' are addressed (Leach 2019).

Central to our argument, however, is also the way that such approaches once again 'close down' on uncertainties – attempting to reduce them to predictable and manageable risk (Leach *et al.* 2010). In this regard, there is a push to get a more complex understanding of context onto the radar of response agencies and modellers, including an understanding of the dynamic, non-linear interactions between different social, political and ecological processes that shape disease emergence and outbreaks. Two examples of recent outbreak responses – Nipah in Bangladesh and Ebola in the DRC – show advances in appreciating local social realities, yet also the persistence and limits of reductive approaches to the uncertainties of behaviour and context.

Outbreaks linked to Nipah virus in Bangladesh have brought to the fore the disjunctures that can exist between scientific and local understandings of disease events. Interdisciplinary research assisted in uncovering human–bat contact as central for 'spillover' to people who drank raw palm sap contaminated by bat secretions (Luby *et al.* 2006). Yet, since collection of palm sap was a key livelihood strategy, and consumption of the sap was also a widespread social practice, interventions to address the risk of transmission had to consider that local people would not simply stop harvesting sap as a consequence of the sharing of new scientific facts. Innovative adaptations of methods of sap collection to reduce risks took this into account and low-cost interventions were advocated (*ibid.*). Furthermore, careful social science research revealed that people held distinct beliefs regarding illness causation – such as that the bodily symptoms had been sent by Allah – which did not concur entirely with a germ theory (Parveen *et al.* 2016; Blum *et al.* 2009). People were sceptical of the links that professionals were making to palm sap, as their observed experience over time did not accord with the idea that consumption caused fatal illness. They were thus not initially inclined to change their behaviour.

Local beliefs needed to be taken into account in 'risk communication' and the development of public health messages (*ibid*. 2016). For scientists leading an outbreak response under time pressure and media scrutiny, unexpected local responses that do not appear to accept scientific findings or respond in expected ways to risk reduction measures are cause for disquiet as they appear to counteract strategies based on medical facts. Again, much has been done in such cases to work with local people to shift 'behavioural' risk factors, such as with respect to the care of relatives with Nipah infection in ways that respect prevalent expectations and moral economies of care, while still being attentive to public health concerns about risk of transmission (Islam *et al*. 2013; Blum *et al*. 2009). Vaccine and immunoglobulin developments might be sought as a way to bypass or neutralise the vagaries of human behaviour, but it is likely that the dynamics of this disease, and the responses to it, will remain unpredictable.

The Ebola outbreak in North Kivu and Ituri in the DRC (ongoing since August 2018) has focused attention on the context of conflict as an extreme form of social and contextual uncertainty, and one even less likely to be amenable to strategies of control. In the second largest Ebola outbreak after the West African pandemic, a vaccine that was fast-tracked for trial and development has been available and has, by most accounts, reduced the impact of the outbreak. But despite these conventional approaches to controlling disease, the political realities have necessarily shaped the humanitarian response. This response has incorporated the importance of 'understanding context', along with many of the lessons learned from the West African pandemic. For example, social science analysis has been effectively generated remotely by networks like SSHAP, and on the ground by institutions such as CASS (*Cellule Analyse Science Sociale* – the Social Sciences Analysis Cell).[4] Another advance has been collaboration between field agencies and SSHAP in the analysis of community feedback data: this community feedback is gathered, analysed and communicated to response teams. This is important because the response generates social uncertainties as much as the disease itself, and shapes the perceptions and actions of affected populations.

Yet the DRC Ebola response has also opened up a myriad of uncertainties that cannot be contained by community engagement. Military action has curtailed humanitarian access in particular locations and times, and concerted attacks on Ebola treatment centres by armed groups have reduced the effectiveness of the response. In SSHAP discussions this has raised the importance of peacebuilding and political economy expertise in social science analyses.

Even more importantly, the uncertainty of chronic conflict has permeated people's everyday lives. Under continuous threat of physical violence, people seek to prioritise the immediate need for physical security over Ebola-related activities. An example of this was the 'Ebola strike' that occurred in October 2018, when many community members halted Ebola activities in protest at the lack of security. An historical political marginalisation vis-à-vis a central government that is also unable to protect people generates distrust of health services and enables plausible explanations of Ebola as a government plot. Conventional methods of case

management – listing contacts – become fraught with difficulty, as fear and mistrust towards the response make the act of giving that information highly risky. As the main method of the Ebola vaccine on trial was ring vaccination, the incompleteness of these lists of contacts had an important impact on the efficacy of vaccination. For much of the response, the number of Ebola deaths at home (rather than in treatment centres) of people who were not on the case management contact list was high, reaching up to a third of cases (WHO 2019b). In addition, Congolese citizens wonder why Ebola is prioritised over other health priorities in an already limited health system. In turn, this mistrust is exacerbated by the disruptive Ebola economy, and the unequal access to finance and resources that have accompanied the response among fragmented local political authorities. Thus, the roll-out of the response has inevitably generated a new set of deep uncertainties between local socio-political dynamics and response activities.

While these examples represent stories of success in the institutionalised appreciation of social issues, and measures to deal with the uncertainties of behaviour and context, the attempts are limited in various respects. In both cases, the initiatives remained part of a managerial framework that aimed to reduce uncertainty to risk, and was unable to do so. Furthermore, social science inputs have to date been 'layered' on top of the response architecture, rather than contributing to transforming the philosophy or the constitution of the response itself.

Alternative experiences of uncertainty: the view 'from below' and the text of life

For agencies, the unpredictable influence of social and political realities on outbreak responses has thus come to be packaged as 'context'. Yet what are the experiences of those actually living this 'context', for whom it is, in effect, not context but the text of life? This experiential reality is not uncertainty that needs to be reduced and rendered into risk, but is manifested as an ongoing flow of situations, to be lived with and negotiated. Nor are these uncertainties fully amenable to elimination through knowledge, since they are part of the lived, embodied fabric of social, ecological and political life – what one might term 'ontological uncertainties'.

In the growing, but still marginal, advocacy to include local people's own perspectives in outbreak preparedness and response, there has been little attention to people's lived experiences or embodiment of uncertainty. Yet exploring people's experiences and responses to uncertainty in the form of everyday threats to health and life could provide an alternative view on how preparedness and response might be understood and mobilised 'from below'. Such enquiry would explore what could be learned from those who live with multiple uncertainties in areas affected by infectious disease outbreaks. It would ask how people draw on formal and informal institutions, forms of public authority, social relations and practices as they anticipate and respond to health and other threats on a daily basis – not as some hangover of 'traditional' past beliefs, but in social responses to new forms of adversity that come about amid social, ecological and political transformations. It could reveal

and support ways for people to harness their own resources and practices, in new hopes and possibilities for socially-sensitive epidemic preparedness and response. In these ways, appreciation of lived, ontological uncertainties could become part of an alternative epidemic 'preparedness from below'.

While this is still an open field of enquiry,[5] its salience is suggested by ethnographic examples from diverse settings, which also point to some of its key dimensions. Such work highlights how ontological uncertainties are woven into people's everyday lives and existential realities, becoming particularly relevant in circumstances of precarity – whether related to subsistence, violence or disease. Thus in post-invasion Iraq, Al-Mohammad and Peluso explore people's lives in uncertain, violent spaces as the 'rough ground of the everyday' (2012: 42). The horizon of lives of people in conflict are not determined solely by 'contextual' categories, such as kinship, tribalism, religion or sectarianism, but rather as 'living-in-action – that is, as phenomenologically, experientially, and sensibly grounded' (2012: 44).

Uncertainties in precarious everyday lives carry particular temporalities. Thus Paul Richards' work shows that Hausa farmers do not deal with the uncertainties of subsistence farming by looking forward and planning, and then rolling out those plans. While a technique like intercropping may seem like premeditated design, it is by virtue of the performance of sowing and the difficulties that arise in the emergent moment that the choice of seeds and their spatial location is chosen (Richards 1993: 67). In illness a similar emergent temporality unfolds in the pursuit of care: the emergent symptoms, the social meaning attached to them (that often go beyond the biomedical) and the available and desirable avenues of care are a form of navigation, rather than it being a case of those who are ill following an established route of a health-seeking pathway, as James Fairhead *et al.* (2008) have shown for infant health in Guinea. Improvisation in the present can also draw on past repertoires: thus, Mende villagers' implementation of locally managed quarantines in the 2013–2015 Ebola outbreak re-mobilised principles and authority relations (such as placing youth as guards on bush paths) that had been used in the 1991–2002 civil war, as well as in twentieth-century outbreaks of smallpox and measles.[6]

In dealing with uncertainties of violence and disease, people may strive for further autonomy and control, aiming to 'create and find some continuity in their lives, in the face of hostile circumstances and their own vulnerability' (Jenkins *et al.* 2005: 11). Yet such desire for control does not necessarily translate into a desire for certainty, or the medicalisation of illness. For example, Marita Eastmond highlighted a preference of refugees in Sweden to frame their ailments as a product of traumatic lives outside the medical concepts imposed by bureaucratic systems, as a way to emphasise their normality and ability to work (Eastmond 2005). Further, people may seek to resist the certainty of an unwanted outcome, such as a medical diagnosis with a poor prognosis. Thus Nyole people in Uganda often prefer to open up possibilities for healing by seeking counsel from alternative health providers, and if these fail, through divination in rituals, which in turn can open up particular social explanations (Whyte 1997). In precarious circumstances it might be more

comfortable to live with ongoing uncertainties than with the certainty of a bad outcome.

In other extreme circumstances, the uncertainties of a world where there is 'too much death and too much loss' can generate a resignation in which violence, or the loss of life, is accepted and awarded a particular meaning (Scheper-Hughes 2008: 29). Nancy Scheper-Hughes (1993) speaks of the difficult decisions that poor mothers in north-eastern Brazil had to make when resources were so scarce that their attention to the survival of some infants would mean letting the weakest die. Scheper-Hughes depicts this as an act of resilience, as people struggle to affect the elements they can control in a particular moment while living in precarious environments – in other words, caring for those children who show a 'knack for life' (1993: 446), while letting go of those who do not.

Such examples highlight that experiences of disease and other forms of 'misfortune' in everyday life cannot be understood solely at an individual level – or as a matter for unified 'communities' – but are embedded in social relations. Thus 'care, and also neglect and violence, ravel and unravel the entanglings of lives with other lives' (Al-Mohammad and Peluso 2012: 45). For Nyole people in Uganda, the explanation of misfortune, including illness, goes beyond the body and the self and also lies in uncertainties about the intentions and actions of others – living, dead or supernatural (Whyte 1997).

In light of this, activities that are linked to narrow or immediate material concerns (such as farming or health-seeking), can only be understood as part of a wider 'performance' of social life, with all its uncertainties (Richards 1993). Richard Jenkins *et al.* suggest further that as a result of our human capacity to imagine futures and possible worlds and our desire to control particular outcomes, new uncertainties emerge:

> A blessing and a curse of human cognition is our talent for the complex imagination of options, alternatives, possibilities and 'what ifs'. Confronted by the routine uncertainties of the environment and the actions of other humans, individual and collective decision-making in the attempt to establish some predictable control over matters-at-hand necessarily involves imagining options, alternatives and so on. The result is at least as likely to be further uncertainty as anything else (Jenkins *et al.* 2005: 28).

Towards alternative approaches to disease outbreaks amid uncertainties

Such explorations of everyday uncertainties and how people negotiate them amid precarious lives start to open up different, and richer, understandings of uncertainty as it relates to disease outbreaks. These understandings involve moves from context to text; from epistemology to ontology; from individual/community perspectives to social relational ones; and from narrow temporalities (the immediate outbreak, the future plan) to multiple ones, as past, present and imagined future dynamics inform

each other. Perhaps above all, they suggest that uncertainties are not always amenable to being reduced to risk, and managed and controlled – and that, furthermore, attempts at control may simply spawn further uncertainties.

The reality of a multitude of forms of uncertainty, temporalities and experiences does not mean that we should dismiss the urgency of outbreak response, or suggest that efforts to research pathogens, engage with models and predict and indeed prepare for epidemics are not important. Understanding everyday uncertainties and their implications for epidemic preparedness and response must emerge from continuous engagement, as responses to such lived uncertainties can be revealing of local efforts that are of relevance for outbreak preparedness – for instance, as forms of local mobilisation were in response to Ebola in West Africa (Parker *et al.* 2019). While we recognise the limitations of foregrounding 'coping strategies' in settings where the 'staff, stuff, space and systems' for combating infectious outbreaks are sparse on the ground (Farmer 2014: 39), it is nevertheless important to ask whether different, and more inclusive, processes are possible. Thus, several provisional conclusions can be drawn at this point.

Conclusion

As we have argued, the dominant narratives and approaches of global public health and humanitarian agencies have privileged formal science and epidemiological knowledge over local models of disease and response, and have emphasised 'blueprint' and 'roadmap' approaches to preparing for and managing outbreaks. While recent efforts have seen greater attention to multiple types of uncertainty, the emphasis is on reducing these to manageable risk through better scientific knowledge, scenarios and surveillance.

Increasingly, the uncertainties associated with complex social, ecological and political processes, both 'potential' (affecting future outbreaks) and 'actual' (as they unfold in the dynamics of current outbreaks) are seen as important (Samimian-Darash 2013). Yet the dominant response has been either to reduce these uncertainties to a narrow set of risk communication and community engagement issues, and/or to treat them as a 'social context' to be rendered legible and manageable through narrow forms of 'social science intelligence'.

Thus the watershed event of the West African Ebola pandemic led to a reconfiguration of epidemic responses, with 'contextual' knowledge now likely to be incorporated into future interventions. However, there is a strong tendency to include social knowledge around socio-cultural dynamics and political economy within existing managerial technologies, reconfiguring social uncertainties as calculable risks. Social knowledge is then mapped onto the conventional epidemic risk management approach of 'predict, prepare and control'. In parallel to the prediction technologies of epidemic modelling and reading 'virus chatter', vulnerable populations can be identified according to their socio-cultural and demographic characteristics, and recruited for 'participatory surveillance'. In planning responses, social knowledge can be used to identify the role different social groups may play in

enabling or resisting interventions, as well as to design strategies to recruit support. Lastly, in terms of control, vaccination, treatment and drug-testing are rolled out in parallel to social science-informed community engagement activities that aim to enhance uptake and community acceptance. People and the social uncertainties they live with and enact are thus 'tamed' and controlled through activities informed by social sciences, such as public health communication, community engagement, behavioural change interventions or even allegedly participatory approaches, such as decentralised 'surveillance' and community feedback.

Despite the fact that many of these activities have succeeded in enhancing both the impact of epidemic response and its accountability, we have equally argued that this approach is often based on illusory assumptions about the full knowability of 'the social'. Our case studies show that there is a degree of radical and irreducible uncertainty that pervades all social life, but that this can become particularly salient in situations of precarity – and perhaps most heightened where an epidemic is unfolding within a violent conflict. Beyond the limits of social science in depicting social realities, there are limits as regards acknowledging the range and depth of uncertainties and their ontological dimensions. For people living in precarious environments, context is less relevant than how uncertainty is phenomenologically experienced as they navigate the flow, or text, of life through 'structured improvisation' (Scheper-Hughes 2008: 47). Striving for control in the face of uncertainty brings with it the need to imagine other worlds and possibilities, in which we are closely entangled with others. This in turn will almost inevitably generate further uncertainties.

In terms of epidemic response, this can create conflict between the risk-mitigating strategies of the response and the unruly uncertainties and vernacular responses that emerge 'from below'. What are the implications of this for a different kind of preparedness and response? Is there a way of promoting preparedness and response 'from below'? The meanings, practices and place of this, and how to promote it, are a work-in-progress, but some key features can be identified. This alternative approach would not be instigated by external agencies on the basis of maximising the use of social science information about the context. It requires a more respectful and empowering approach, in which people – especially in precarious contexts – shape the core of this response in a more autonomous way. The role of external agencies would be to support and build on these practices, enabling local ideas, innovations, institutions, resources and responsibilities to flourish. Such an approach also requires a more nimble, responsive, adaptive mode, eschewing fixed plans in favour of flexibility, and ongoing iterative adaptation and learning. Further, epidemic preparedness and response 'from below' would need to acknowledge difference and contestation in how diseases and outbreaks are understood and experienced, and the different kinds of politics that emerge, deliberating and co-constructing strategies accordingly. Finally, an approach is needed that responds not just to the immediate needs of a time-bound outbreak, but that also embeds this in people's broader and longer-term needs, including with respect to 'slow emergencies' (Anderson *et al.* 2019). This means an approach that is not just (or necessarily) disease-specific, but that is

also engaged with other priorities around security, livelihoods and the ability to live a meaningful and dignified personal and social life. Embracing such approaches will require a step change among global agencies and science-policy communities, but the current and future challenges of preparing and responding well and humanely to disease outbreaks amid uncertainties demands nothing less.

Notes

1 For example, the Global Virome project and the Global Viral Forecasting aim to listen to the 'chatter' of viruses and other microbes and contain them 'at source'. Programmes like the USAID-funded PREDICT (www.usaid.gov/news-information/fact-sheets/emerging-pandemic-threats-program) and the Eco-Health Alliance (www.ecohealthalliance.org/program/emerging-disease-hotspots) have looked at disease emergence to identify genetics, geographies and species to remain alert to.
2 www.who.int/features/qa/health-emergencies-programme/en/.
3 www.socialscienceinaction.org/.
4 CASS is ground-breaking as it does not sit under the Risk Communication-Community Engagement pillar of response, but under the Strategic Commission of the DRC Ministry of Health, so feeding into all pillars of response.
5 The idea of 'preparedness from below' is being explored through the Wellcome Trust-supported project 'Pandemic preparedness: local and global concepts and practices in tackling disease threats in Africa', co-led by Leach and MacGregor (www.ids.ac.uk/programme-and-centre/pandemic-preparedness/).
6 Personal communication, village chief in Sierra Leone.

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