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PATHWAYS TO HEALTH AND SUSTAINABILITY

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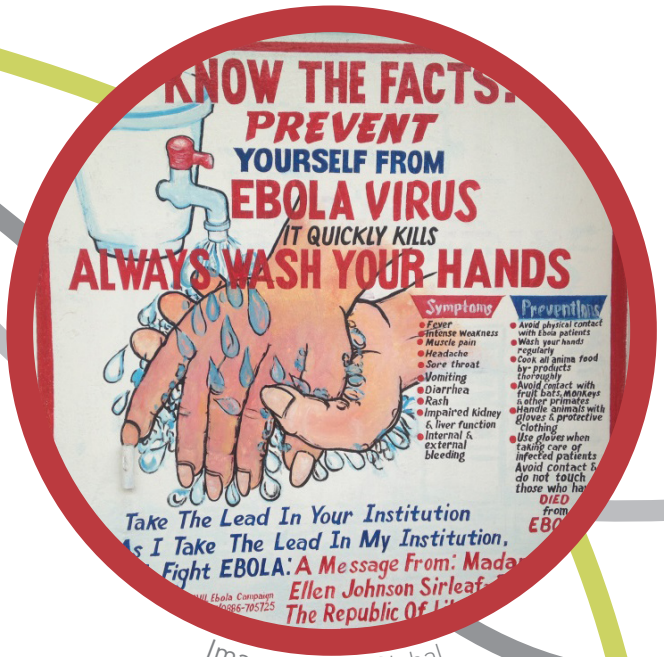

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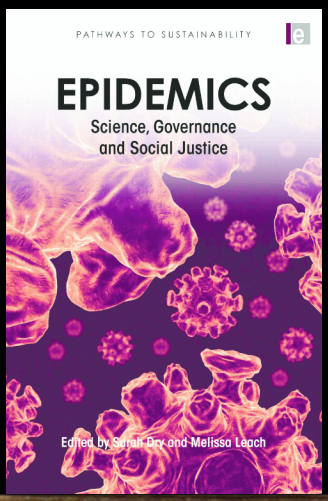

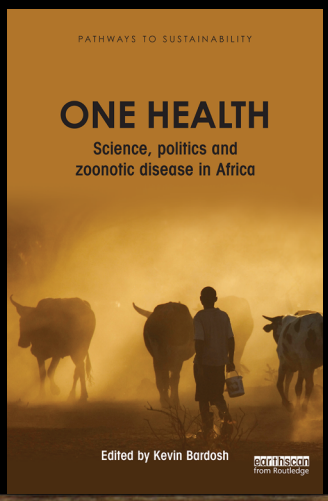

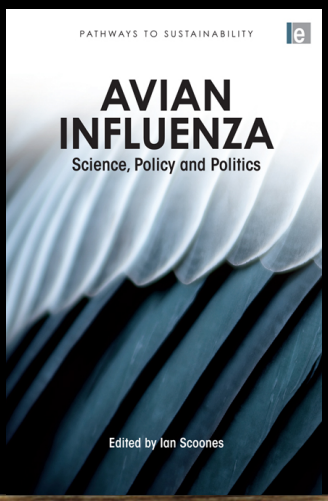

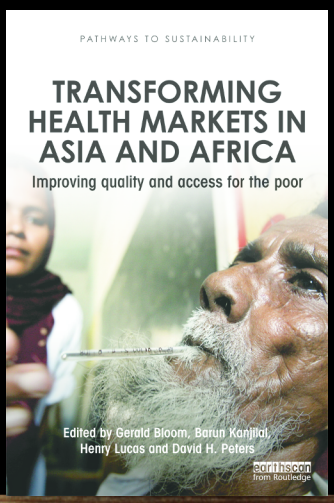

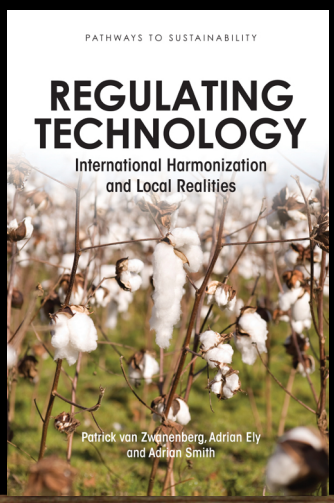

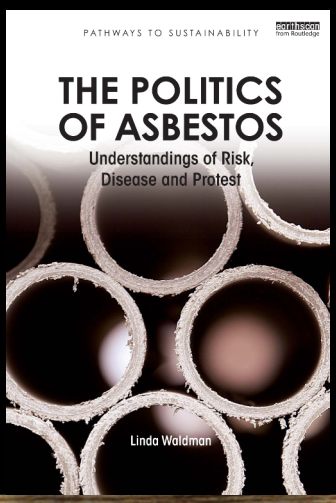

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Introduction

Ian Scoones

This is the second in a series of 'FreeBooks' highlighting the work of the ESRC STEPS Centre, with chapters drawn from our Pathways to Sustainability book series published by Routledge, now numbering nearly 20 books. These FreeBooks are part of a commitment to expose the book series to a greater number of readers through open access provision, in turn encouraging readers to explore the series further. Each book's opening chapter and first 30 pages are already available online, but here we select a series of other chapters in a specially curated selection highlighting some of the major findings that have emerged over the last decade.

Each book in our series draws on, interrogates and extends the STEPS Centre's 'pathways approach' in different ways. The pathways approach provides an approach to understanding complex and uncertain patterns of system change, identifying how different pathways to sustainability are framed by different actors, and how this influences the diversity of options chosen, what directions are taken, how benefits and costs are distributed and what diversity of options are chosen. Politics is central, shaping the knowledge and interests that construct pathways – generating mainstream development paths, while silencing or blocking alternatives. The pathways approach encourages an opening up of understandings and a broadening out of choices, and is elaborated in detail in the book Dynamic Sustainabilities: Technology, Environment, Social Justice, one of the first books in the series.

Across the series, a number of books focus on different dimensions of health and disease, with links to sustainability. Emerging epidemic diseases, particularly coming originally from non-human animals, have dominated policy debates in the past years – from SARS to avian influenza to Ebola. There have been calls to control 'at source' and stamp out such diseases through a range of draconian measures, lest they create havoc for the global economy and spread, particularly to richer, northern settings. Our work has challenged this simplistic narrative, and raised questions around social justice, asking who is affected by such diseases and where. Many such diseases are diseases of poverty, the result of neglect and marginalisation – whether the result of industrial pollution, as in the case of asbestos, or the consequence of exposure to vectors that only occur in certain landscapes, such as trypanosomiasis (sleeping sickness) or Rift Valley fever in Africa.

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Our work points to response approaches that are attuned to local settings, particularly in poorer countries in the Global South. In the context of limited state capacity and the increasing marketization of health services, yet with the advent of much greater access to information technologies, questions are raised about appropriate delivery systems that can reach the poor and marginalised. A central theme in our work on health and disease has been a focus on the integrated, overlapping causes of disease. Disease emergence is influenced by ecology, economic conditions, patterns of inequality, land use and settlement, as well as social, cultural and political factors. Responding to disease and building sustainable health systems is about tackling such complexities head on. The 'One Health' approach – that links ecosystem, veterinary and human health – is central to the approach advocated in a number of these books.

Since 2006, the STEPS Centre has done a great deal of work with our international partners on health and disease themes (steps-centre.org/health-disease). An early review paper set the terms of debate (Bloom *et al.*, 2007), followed by work on epidemics, initially around avian flu and then swine flu (Scoones and Forster 2008; Forster 2009) and later around Ebola, drawing on long-term field engagement in West Africa. Our work on Ebola was linked to a wider information sharing platform and initiative which won the ESRC's International Impact Prize in 2016.

Earlier work on asbestosis in the UK, India and South Africa highlighted issues of rights and social justice, asking who gets sick and why – themes central to all of STEPS health work. Working with a wide group of collaborators, the research on rethinking health systems in complex, marketized settings in the developing world has been pioneering, helping to carve out a new policies and practices (Peters and Bloom 2012). This links to other STEPS work on regulating technologies, which focused on antibiotic use and delivery in Argentina and China (Ely, Smith and van Zwanenberg 2008). The STEPS-led Dynamic Drivers of Disease in Africa Consortium has carried out cross-disciplinary work across Africa examining disease emergence and response is an array of settings, and has strongly advocated a One Health approach to policy (Cunningham, Scoones and Wood 2017).

This collection draws on four books in the series, together addressing three themes central to understanding how pathways to sustainability emerge in response to health and disease challenges. The three themes are:

Social justice (who wins or loses from disease and how health policy is focused) Politics

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(how health and disease responses are framed, both locally and internationally) and Governance (how health policies are defined, and how health technologies are regulated and controlled).

The six chapters in this FreeBook are introduced in the following sections. This introduction also refers to other relevant chapters, not included in the FreeBook for reasons of space.

Social Justice

The first chapter in this volume, 'Towards Conclusions: Science, Politics and Social Justice in Epidemic Accounts and Responses', is taken from the book Epidemics: Science, Governance and Social Justice. In the chapter, Sarah Dry and Melissa Leach point out that there are many silences in dominant narratives around disease and health policy. People living with disease often do not get a look-in when policies are being constructed. Such policies are driven by often elite scientific, commercial or government interests, and too often ignore questions of inequality and social justice. Dominant narratives, which often identify particular diseases as 'exceptional', mobilise huge amounts of money and energy, and so shape the institutional and political landscape, creating certain pathways in disease response and excluding others.

A number of features of such dominant narratives are identified in this chapter. One is a focus on disease eradication: a strong, powerful, top-down response, using all the benefits of science. Another is a focus on short-term, emergency responses, which can be mobilised around an outbreak. As Dry and Leach note: "Exceptionalism, eradication, security and uniform global responses to short-term explosive outbreaks travel together through the policy juggernaut". Located in global circuits of power, and presented as modern and scientific, such policy frames have enormous influence, propagated as they are through international institutions, multinational business and science-policy networks.

Such framings of course miss other perspectives. The chapter highlights, for example, the dynamics of co-infection, where people, especially those who are poor, are infected by multiple diseases that interact synergistically. A single disease focus is therefore misleading; the case of HIV and TB is a very significant example of this. Diseases and

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people interact in context, and in relation to different occupations and livelihoods, and so not all people will get infected. Again, issues of inequality and social justice come to the fore, as it is those who are marginalised, without a voice, who often suffer the most. Indeed, such people may be much more likely to suffer from infections which are not on the global radar: diarrhoeas, gut parasites or pneumonia may have much higher impacts on the poor, and not even touch the lives of the rich.

But, as the authors point out in this chapter, pointing to local communities as somehow 'in balance' with disease ecologies, and able to adapt and respond in resilient and flexible ways, misses the point too. Such narratives that glorify community, indigenous knowledge and flexible, local responses fail to account for the structural inequalities that generate what Paul Farmer calls 'structural violence', and so neglect the processes of marginalisation and deep social injustices that create disease vulnerability and poor health in the first place. The processes of myth-making, and the generation of policy narratives through particular institutional, professional and political practices, thus shape inequalities, too often hiding real underlying causes from view and silencing alternatives.

This process is very powerfully illustrated in Chapter 2 of the same book (not included in this FreeBook), which focuses on the culling of pigs in Cairo, Egypt following the global outbreak of H1N1, 'swine flu'. The Egyptian government ordered a mass cull of pigs, fearing that swine flu virus would spread to the country and affect humans, despite no evidence of H1N1 infection in Egyptian pig populations, and great uncertainty around transmission pathways. The result was an attack on the livelihoods of a minority group, the Zabaleen – Christian garbage collectors – who use pig populations in the city to manage waste. The Zabaleen have a long history of marginalisation, and in the context of attacks against Christians more broadly, this move, ostensibly framed as one responding to scientific risk, was seen as sectarian and discriminatory.

The vilification and isolation of marginal groups as causes of the spread of disease is a common response. And Egypt's policy followed on from blame being laid on smallholder pig producers in Mexico for the original outbreak, when large-scale industrial units in the US and Mexico were the original cause. Presenting the response as one based on science and risk assessment is another common feature, one that often acts to sideline alternative perspectives and views. In this case the alternative narrative,

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articulated by garbage collectors themselves, is that pigs are clean, and not the carriers of disease, and that their role in processing vast quantities of garbage is essential for effective hygiene and health in the city.

In this case, it was the confluence of science and religion in a tense atmosphere of conflict and institutional discrimination that generated the state response, one that proved ill-advised, and ultimately 'unscientific'. Interests matter, and structural inequalities frame responses. This is again illustrated brilliantly in The Politics of Asbesbtos: Understandings of Risk, Disease and Protest by Linda Waldman. A comparative study of the UK, India and South Africa highlights some major differences in how risks from asbestos are constructed. This comes down to political cultures, levels of prior investment, commercial interests and legal liabilities and court processes. In other words, power and politics. The chapter explores across the cases how risks are defined, how uncertainties are treated and how ambiguities emerge.

Only in South Africa was a firm stand taken, with asbestos production banned. Again this was down to politics, with the labour unions in this case providing a strong lobbying force, and the government trying to present itself as of and for the people in the post-apartheid era. In the UK, asbestos has long been accepted as dangerous, even if 'modern, safe and cheap' as a building material, but such risks were deemed controllable through regulation. In many countries, the costs of taking a more stringent stance were seen as prohibitive, as so much building stock had asbestos. Where were people going to live? And if, say, asbestos roofing was banned, where would the material go?

This mainstream narrative, that asbestos was important and risks could be controlled, silenced alternative views, voiced in particular by those who had heavy exposure to the material. Particular occupational risks – for example of laggers – are potentially significant, yet are not appreciated by the generalised narratives pushed by the building and insurance industries, and adopted by many governments. This raises questions of how risks are defined and how science is deployed. With UK laggers starting to collect their own information on disease incidence, alternative knowledges come into the picture, potentially shifting the balance of the debate.

But how can a more democratic and inclusive approach to science and risk come into play, when the playing field is so uneven? Social justice concerns – whether around H1N1 in Egypt or asbestosis in the UK – need to be central to both science and the

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operation of science-policy institutions if pathways to sustainability – that include health and well-being for all – are to be achieved.

Politics

Politics are central to health policy, despite the appearance that simple, objective scientific criteria dominate. This is a theme that comes out across the books. The book Avian Influenza: Science, Policy and Politics explores the international response to avian influenza outbreaks in the mid-2000s, asking whether the existing global institutional architecture is fit for purpose. A series of 'outbreak narratives' defined the response to avian flu – emerging from veterinarians, arguing that addressing the cause (chickens and ducks) was central; from public health professionals, arguing that the major risks were to humans, and stopping spread was essential; and from disaster and emergency planners, arguing that pandemic preparedness, including ensuring on-going surveillance and installing robust response systems, was the most important factor. Through a mapping of the diversity of actors involved in the response, a confusing picture emerges. Some dominant interests are important – not least northern governments desperate to ensure that a major pandemic did not occur, along with industry players eager to supply the drugs and vaccines as part of a technocratic solution to the challenge – and able to sway the debate.

All of these narratives and interests once again ignore alternatives, articulated by local people. In the second chapter of this FreeBook, 'On a Wing and a Prayer: Avian Influenza in Indonesia', Paul Forster offers a fascinating glimpse of the context in one country affected by the disease. At the national level there was a bewildering array of actors involved in the response, associated with an array of narratives casting blame and suggesting solutions. As the chapter explains, however, "The rationalist, science-led approach of the tried-and-tested international response to infectious animal disease, which assumes a Weberian bureaucracy operating in the context of a liberal democracy, runs aground in Indonesia". The notion of a public good, let alone a global one, is highly contested, refracted through a complex history of ethnic politics and stratified societal divides. In the context of the decentralisation of government powers and the lack of capacity of many state agencies, combined with the lack of political leverage of key ministers, and a culture of policy that protects those in power and hides failure, a response as recommended by the international agencies was never going to happen.

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A political economy of poultry production impinges on this situation, involving both well-connected big business players and a plethora of smaller informal actors outside the regulatory reach of the state. This means that no matter how willing and well-intentioned, approaches to culling of poultry, the regulation of movement and vaccination and other animal health campaigns inevitably fall short. Layered on this was a politics around sovereignty and the ownership of the virus, with the then health minister refusing to allow samples to be taken for international drug and vaccine development efforts. None of this should be a surprise. While the context of decentralisation in a vast and geographically dispersed country is perhaps particular to Indonesia, other features – including a lack of political incentives, limited bureaucratic capacity and the political economy of business interests – are common elsewhere, as shown in other chapters from Vietnam, Thailand and Cambodia in the same book.

How global interests affect the politics of disease responses is illustrated in the chapter 'Beyond Biosecurity: The Politics of Lassa Fever in Sierra Leone' by Annie Wilkinson, from the book One Health: Science, Politics and Zoonotic Disease in Africa. Lassa fever virus is defined as Category A by the Centers for Disease Control. This means it is a potential weapon of terror, and so a biosecurity hazard. This 'securitisation' of the disease has major implications. Funding has flowed in large amounts to what was previously seen as a neglected disease of poor people living in West Africa. Once it was considered a priority pathogen, Lassa garnered global attention, and so huge investments in drugs and vaccines to stop its spread, as it came to be seen as an existential threat both to US troops in combat situations, but potentially US publics too, if in the hands of the wrong people. Biotech companies became involved alongside US universities in the search for biomedical interventions, focusing innovation efforts in a single direction. But, as the chapter documents, relying solely on biomedical solutions "overlooks the realities and perspectives of the people at risk of the disease", and such interventions notionally focused on such settings are likely to have limited effect.

The mutual construction of science, technology and policy processes is again explored in the following chapter in this FreeBook, 'Contested Histories: Power and Politics in Trypanosomiasis Control', also taken from *One Health*. The chapter focuses on the history of interventions around trypanosomiasis control, and with this the tsetse fly vector, in southern Africa. Ian Scoones documents the contested histories over a century of vector control attempts, and the politics and power relations at their core. A range of

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interventions have been applied, from 'scorched earth' wildlife extermination to massive chemical spraying campaigns to the release of sterile males to the use of baits and traps, as well as attempts to find appropriate drugs and vaccines to stop the vector or control the disease. None have worked completely, and all have been advocated by particular groups, each with their favoured control methods. The chapter comments that this history "reminds us of how prevailing institutional politics and entrenched interests remain very much embedded within narrow scientific and practitioner networks... [while] the story is often told in terms of scientific 'facts' and economic 'models', but it is one where science is deeply conflated with competing power, prestige, control and authority".

Governance

In the context of rapid marketization, with high degrees of informality and with a pluralised health system with diverse providers, both public and private, what institutional and governance systems ensure that health services reach the poor, and assure sustainability? This is the question posed in Transforming Health Markets in Asia and Africa, and the chapter 'Making Health Markets Work Better for Poor People' sets out a series of conclusions by Gerald Bloom, Barun Kanjilal, Henry Lucas, David Peters and Hilary Standing.

Conventional responses, based on western experiences and models, often do not work, where the divide between public and private provision is blurred; where there are large informal and highly segmented markets providing health goods and services; where regulatory control is limited, and where policy implementation is patchy. This describes most of the world, and nearly all the world where poor people live (including in richer, Northern countries).

If we accept this reality, what then are the institutional and governance responses required? The chapter lays out a number of them. At the core is the need to build trust in institutions, such that regulatory regimes gain legitimacy in the eyes of ordinary people, who then see such institutions as responding to their needs. Information asymmetries often seriously undermine effective responses, and Bloom et al. suggest innovative approaches to the use of information and communication technologies, allowing pharmacists or consumers to check options in an open way, again enhancing

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trust and making responses more effective. All this must be combined with a much deeper understanding of informal, segmented, plural market systems in developing countries, where multiple players interact, linking the private and public sectors in complex ways. This sort of setting is not amenable to a standard, western response and requires innovation in governance systems, including in institutional forms and regulatory approaches.

The book includes numerous interesting cases from Asia and Africa where these local realities are interrogated. This is also done in the book Regulating Technology: International Harmonization and Local Realities. Chapter 9 (not included in this FreeBook), by Chenggang Jin and colleagues, looks at the regulation of antibiotic use in China and Argentina – highly contrasting countries with different policy and regulatory settings, but where similar questions arise around the over-prescription of antibiotics, resulting in growing risks of antibiotic resistance. In rural Shandong and Hubei in China, antibiotics are provided by a range of suppliers, and over-use is frequent. This reflects a mismatch of understandings of the drugs' safe use and efficacy, and mere self-regulation on the part of those who prescribe. The incentives to hand out more antibiotics than necessary are exacerbated in both countries by commercial incentives and the demands of patients to be given something, even if it is not useful. While price controls on drugs, combined with requirements to use generics, have had some effect, the reach of regulatory control in informal systems is always limited. This suggests a very different approach to regulation, one that emerges from the ground up, with patients, pharmacists and others taking control. This in turn requires not assuming that a regulatory state can solve everything; instead, new systems of governance need to emerge.

The theme of rethinking governance is picked up in the final chapter in this FreeBook, 'Imagined Futures: New Directions for One Health', from the book *One Health: Science, Politics and Zoonotic Disease in Africa*. Here Kevin Bardosh explains how the "dynamics of power and politics shape the origin, distribution and consequences of zoonotic infections, as well as the assemblages of research and policy processes that accompany them". More effective governance will emerge, the chapter argues, only with a shifting of conceptual boundaries in health policy from a focus on pathogens to politics. Dominated by medical doctors or veterinarians, health policy is often distorted by a single disease focus, without seeing the bigger picture: a theme running right through the contributions to this FreeBook.

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Realising better health and wellbeing on the ground, especially in poorer countries, requires linking science, technology and participation in new ways. Rather than the standard technology transfer approach – a techno-economic fix to problems – a more systemic approach is needed, and this requires insights from local people living with and responding to disease on a day-to-day basis. Rather than 'big data' and 'big systems', 'small data' and 'localised systems' may be needed, the chapter argues. This should not rely on a romantic notion of 'community', but instead a reconfiguration of state and citizen relationships as part of a shift in governance responses.

Plural forms of knowledge and expertise must be accepted as central to any governance system: many knowledges count, not only biomedical knowledge and techno-scientific expertise. Rethinking governance requires "realigning bulky bureaucracies, shifting incentives for research, building capacities and multi-sectoral partnerships, prioritizing the needs of the poor [and] understanding contexts". This is not easy. Donor-driven agendas, powerful elite science, fragmented national policy systems, weak capacities for implementation and influential commercial interests all run against a more horizontal, integrated 'One Health' agenda.

However, as all the contributions to this FreeBook show, building new pathways to health and sustainability require some major shifts in thinking and practice. These must take inequality and social justice seriously, and must make politics and political economy at the heart of any response that reshapes governance responses. For such perspectives on health and wellbeing – and preventing the emergence and spread of disease, whether of zoonotic origin or not – should be at the centre of any sustainable development agenda, and are a vital step to realising the Sustainable Development Goals.

References

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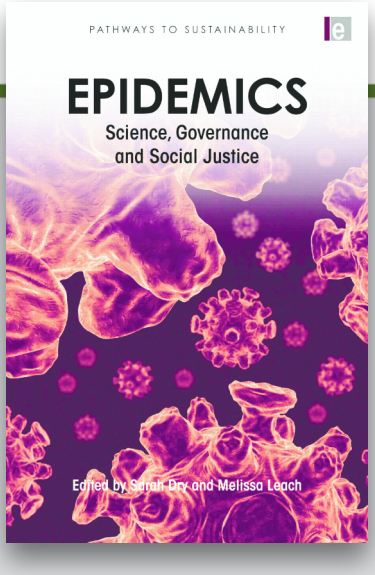
CHAPTER

1

TOWARDS CONCLUSIONS

SCIENCE, POLITICS AND SOCIAL JUSTICE IN EPIDEMIC ACCOUNTS AND RESPONSES



This chapter is excerpted from

Epidemics: Science, Governance and Social Justice

edited by Melissa Leach and Sarah Dry.

Learn more

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SCIENCE, POLITICS AND SOCIAL JUSTICE IN EPIDEMIC ACCOUNTS AND RESPONSES

Excerpted from *Epidemics: Science Governance and Social Justice*

Sarah Dry and Melissa Leach

The voices of those who suffer from epidemics are notably absent from much writing on the subject. Many of our contributors have noted the relative silence of the people who experience epidemics most directly: those who are infected, those who live close to an area of infection and those who are involved in responding. This silence is not simply metaphorical but actual. It is reflected even here, in a collection of accounts committed to presenting neglected and marginal accounts. We hear second-hand from those who live in areas where Lassa fever is endemic and avoid going to get injections because they fear they will contract the disease. We hear, from the perspective of a WHO epidemiologist, how he inspired terror in an old woman dying of Ebola, to whom he appeared, in his white isolation suit, as 'either God or the devil'. We hear from an HIV-positive woman in South Africa who describes how it 'depends on the heart of the doctor sometimes' whether she gets an extension of her disability grant: 'If the doctor has got your sympathy then he can do that.' On the other side of the equation, we hear from a doctor in the same setting that deciding who gets these grants is 'like you are God; you just have to look at the person's face and decide about whether they qualify or not'. Finally, we hear from the garbage collectors in Egypt who were stigmatized and whose pigs were slaughtered in response to H1N1 that 'they attacked us as if we were criminals'. But beyond these brief snatches, it is hard to hear the voices of those who are experiencing epidemics directly.

This paucity of first-hand accounts is instructive. Like microbes, words can be made to seem to travel with effortless ease, costing little to nothing to transport and reproduce. In fact, like microbes, words require an initial point of contact between the speaker and the outside world: a conversation, an interview, a letter, an announcement, a publication. Reaching across multiple scales of time and place to the place where these encounters can finally occur takes time, money, expertise and care, just as responding to epidemics themselves does. We begin our conclusion with this observation to bring our attention to the ultimate goal of this volume, and the research that has gone into it: to help ensure that our understandings of and responses to epidemic diseases are more like conversations and less like directives. This means listening closely to those who suffer, in order to better understand the diverse dynamics involved in epidemics and the specific

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Excerpted from *Epidemics: Science Governance and Social Justice*

circumstances that make each outbreak, and each infection, different. It then means continuing the conversation by responding with programmes that are adaptive to the particular circumstances of a given outbreak.

This chapter presents some cross-cutting themes and conclusions about epidemics based on this book's engagement with science and knowledge, policy and politics, and equity and social justice. These themes, drawn from our case studies, also follow on from multidisciplinary discussions at the Epidemics project workshop, held at the STEPS Centre at the University of Sussex, in December 2008. They include the effects of disease exceptionalism on interventions, myths of the local and the global, and the shaping of and shaping effects of – narratives. Throughout, we consider what factors tend to cluster together in dominant narratives, and which have acquired pre-eminence and power in scientific, policy and popular debate, using examples from our case studies. We also address what issues and questions emerge from alternative narratives, and why both scientists and policy-makers might need to pay these more attention. In this light, we draw our conclusion to a close by considering what is missing from the volume and what directions future research and research/policy engagements might take.

Disease exceptionalism

A striking feature of the dominant narrative in several of our case studies is that of disease exceptionalism. Labelling an epidemic disease exceptional serves to justify unusual or especially forceful interventions that might otherwise be considered wasteful, overly intrusive, or too expensive and complicated. This tactic provides a rebuttal to any potential querying of a response: this disease is so deadly, infectious or novel, the argument goes, that we must respond as we have not before. There is an interesting and seemingly paradoxical twist here: in several cases, diseases that have been labelled exceptional have helped to shape pathways of response that remain in place in global and national health institutions where they are then applied to subsequent outbreaks. In effect, these diseases become foundational, generating the grooves and ruts that global health policy will follow in years to come. We first discuss exemplar diseases that have been particularly strongly labelled as exceptional in dominant narratives, before reflecting on the effects that this pathway shaping has on global health responses

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Excerpted from *Epidemics: Science Governance and Social Justice*

more generally.

With its long history and powerful tradition of activism, AIDS is the grandfather of 'exceptional' epidemic diseases prominent today. Taken together, the global scale of HIV infection, the incurability of the infection, a long latency period that facilitates the spread of the virus, and the existence of hyperendemic areas with very high prevalence conspire to create a perfect epidemic storm that makes AIDS, the argument goes, unlike any other disease we are facing (see MacGregor and Edström, this volume, for a fuller discussion). This exceptionalist account has co-evolved with the epidemic over time. Organized and well-funded patient activists, initially based in the United States but subsequently present globally, have played a prominent role in lobbying for funding and attention for the disease since its emergence in the 1980s. These activists were successful in mobilizing support for an AIDS response on an unprecedented scale. Drawing on human rights discourse, they argued that because of the danger of the disease and the stigma associated with the primary means of transmission of the disease – intravenous drug use and sex – special interventions were required to reach those most vulnerable to the disease and to ensure that their rights to privacy and treatment were not disregarded. Today, the exceptionalist account of AIDS is articulated forcefully by people such as Peter Piot, who until recently was Executive Director of UNAIDS. Piot has compared the severity of the threat from the epidemic to that of nuclear war or global climate change, arguing that similarly exceptional responses are therefore needed.[1] The challenge for people like Piot has been to maintain this sense of urgency over the nearly three decades that have elapsed since the disease was first recognized.

As both MacGregor and Edström have explored in their contributions, AIDS exceptionalism and the particular forms it has taken have meant that voluntary counselling and concerns over patients' rights have been prioritized over testing and medical interventions in some cases. For reasons both of them discuss, the needs of many people infected with HIV or suffering with AIDS may not be best met by these approaches, which were developed in resource-rich countries with robust health systems.

While AIDS remains the disease for which the exceptionalist narrative is most prominent, other diseases considered in this book also demonstrate the tendency. The Ebola virus has often been described as exceptional in its infectiousness and

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Excerpted from *Epidemics: Science Governance and Social Justice*

its virulence. The high mortality it inflicts on sufferers, who often experience horrific deaths, make it exceptionally frightening in a more direct way than the slow deaths of AIDS patients. That Ebola virus seems to emerge at random intervals from the forests of Central Africa, where its animal reservoir remains a mystery, adds to its aura of special danger; the enigmatic virus seems to stand for the next great pandemic disease, lurking in dense undergrowth, ready to strike at any random moment. This image of the Ebola virus has accompanied most outbreaks of the disease but the 1995 Kikwit outbreak has special salience (see Leach and Hewlett, this volume). That outbreak, where 252 out of a suspected 316 people infected with the disease died, proved an important milestone in the careers of many leading figures in the field of infectious disease policy today, many of whom contributed to response efforts (Hall et al, 2008). It also helped determine the structure of GOARN, the WHO's rapid response network, as well as giving impetus to the revision of the WHO's International Health Regulations (Heymann et al, 1999; Leach and Hewlett, this volume). In both cases, the unpredictable emergence of the virus, its contagiousness and high mortality rates, and the speed of death in those who succumbed to it, served as implicit models for a system of monitoring and surveillance tuned to just such 'fast-twitch' events.

The importance of the outbreak at Kikwit shows how institutional pathways, such as GOARN and the revised IHR, depend partly on historical contingency – certain actors who happened to be at the outbreak proved influential in the subsequent shaping of policy – as well as on a long-standing tendency to fear such unpredictable, fast and bloody diseases more than slower, less dramatic outbreaks. Lassa fever, which shares many of the same virological features as Ebola, does not kill as many of those who become infected. Locally, however, it infects, and therefore kills, many more people than Ebola. And yet Lassa fever does not register with the same urgency as Ebola, since its case fatality rate is much lower and its animal reservoir is known. As understanding of the virological and biomedical profile of Ebola grows, it may prove to be less threatening and this strand of exceptionalism may peter out. Yet early experiences with Ebola continue to fuel cycles of fear, with both scientific and policy priority granted to rapidly identifying and responding to unpredictable zoonotic outbreaks with potentially devastating consequences.

A third, and very different, example of disease exceptionalism is to be found with SARS. While HIV/AIDS and Ebola are made to seem exceptionally dangerous or

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devastating, SARS has been described as an exceptional test for a transformed international health governance structure, a test which was successfully passed. SARS, then, is exceptional in that it both tested new governance structures, such as GOARN, and showed them to be working well, thus helping to justify the vision of global health that they instantiated. This thesis, articulated forcefully by David Fidler, has also, perhaps unsurprisingly, been part of the story that the WHO tells about itself (Fidler, 2004). 'The international response to the SARS outbreak', write David Heymann and Guénaël Rodier of the WHO, 'tested the assumption that a new and emerging infection … could be prevented from becoming epidemic.' They conclude that, while it is early to tell at the time of writing, the answer is most likely 'yes', since 'all known chains of transmission' of the disease had been interrupted within four months of the first global alert about the new disease (Heymann and Rodier, 2004).

As Bloom writes in chapter 4 of the book 'Epidemics: Science, Governance and Social Justice', SARS galvanized the community of international health experts to lobby for a shared global response, designed and led by scientists. The global threat that SARS seemed to pose provided a justification for a unified response, with scientists from the WHO at the helm. In the face of a disease like SARS, which travelled the international jet ways along with millions of air passengers, national sovereignty concerns over trade or control of biological samples were made to seem at best irrelevant and at worst dangerous. Such concerns threatened to limit sharing of information and access to samples that could slow the response or even help fan the epidemic. Because they were instrumental in helping to control the SARS outbreak, transnational institutional arrangements and procedures such as GOARN and unified, multilateral top-down responses came to be seen as best practice for identifying and responding to outbreaks. But, as should now be clear, not all epidemics will unfold in the same way as SARS. Will the current arrangements be flexible enough to respond to outbreaks of different kinds?

Such a question can be asked of all three cases just described. The exceptionalist elements in the dominant narratives about AIDS, Ebola and SARS have affected not only the responses to these diseases but subsequent responses to diseases – both epidemic and endemic, acute and chronic – more generally. In many ways, the tendency for exceptionalist narratives to shape enduring pathways of response makes sense. These narratives have a great persuasive force, often mobilizing vast amounts of money and energy, which inevitably help to re-make the institutional,

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social and political landscape in which health interventions of all kinds occur. Even when exceptionalist rhetoric leads to the creation of stand-alone institutions, such as UNAIDS, which does not have direct connections with responses to influenza epidemics, for example, this patterning applies. It is the very idea of a stand-alone institution, named after the disease it is meant to address, that leaves its mark in the minds of policy-makers. Similarly, the exceptionalist account of Ebola contributed to the creation of institutions such as GOARN, which then serve to privilege emergency-oriented short-term interventions while neglecting longer-term social and ecological factors.

In this way, dominant narratives tend to cluster together a set of related concepts. For example, disease exceptionalism goes hand-in-hand with disease eradication as a goal. If a disease is so uniquely dangerous, the argument goes, it is not enough merely to control it: it must be eradicated. And, as previously discussed, global responses tend to accompany disease exceptionalism as well, since nothing short of such a broad response will be effective against such a special threat. Short-term, emergency-oriented solutions also accompany this approach. It is much easier to mobilize a response to an exceptional threat if there is a perception of both urgency and the potential for a relatively quick solution. Long wars – against diseases as well as nations – are unpopular. Finally, dominant versions of the concept of health security, with their emphasis on securing borders and protecting a putative global community against highly mobile and highly infectious pathogens, also contribute to exceptionalist approaches, as the cases of SARS, haemorrhagic fevers and avian influenza described in chapters from the book 'Epidemics: Science, Governance and Social Justice' demonstrate. We can begin, therefore, to build a picture of the complementarities between different framings of and responses to epidemic diseases. Exceptionalism, eradication, security and uniform global responses to short-term, explosive outbreaks travel together through the policy juggernaut.

These remarks on disease exceptionalism could be met with the response that it is inevitable that certain diseases become foundational for future policy: to wish otherwise would be to deny the force of history itself. In fact, we would argue that a greater historical memory is needed to fully understand the effects of previous claims to exceptionalism and the responses thereby engendered. The aim is not to deny the past but to recognize its contours and count the differences, as well as similarities, between previous outbreaks and present or anticipated outbreaks. This

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sensitivity might lead us to question whether diseases must compete to be the next exception – or the next emergency – in order to win the money and energy needed to mount an effective response. A valuable topic for future research and policy reflection, therefore, might be which kind of diseases, lobbied for by which actors, are most likely to win such a contest? If many boys cry wolf, who gets heard? From another perspective, who and what gets left out when such powerful organizing ideas as exceptionalism, eradication and emergency alertness travel together?

One indication of what may be missed is given by the growing importance of co-infection in shaping health and disease prevalence. As MacGregor, Edström and Nightingale describe in this volume, co-infection of HIV and TB represents a growing phenomenon of major significance. As Calain and Fidler have demonstrated, a recent episode of XDR-TB in South Africa reveals the limitations of the current privileging of acute rather than chronic diseases in the revised IHR (Calain and Fidler, 2007; see also Dry, this volume). If drug-resistant strains of TB are allowed to develop in HIV-positive patients because the IHR do not recognize the disease as the 'right kind' of outbreak, then the system needs to be re-evaluated. In a related vein, Loevinsohn (2009) has demonstrated in Malawi how multiple health problems co-exist and interact to shape the ways that sufferers and their families think about and deal with a disease such as AIDS. As several of our contributors also observe, people's experiences of health and illness are rarely driven by a single disease, meaning that the priorities of sufferers, their families and communities rarely map neatly onto exceptionalist disease-focused priority goals. As a result, policies can easily miss key interactions, or be locally perceived – and perhaps resisted – as inappropriate. To be sure, it is neither realistic nor appropriate to expect international agencies such as the WHO to manage and respond to all outbreaks of disease, or to address all diseases in a given setting. But what is crucial is recognizing the boundaries of our epidemic response mechanisms – and making explicit any favouring of acute versus chronic diseases. This is especially important in situations where the boundary line between the two is murky. It also clears a path towards recognizing where complementary, health-system or livelihood-focused responses are required to address the multiple health needs of communities affected by epidemics.

Another and related example of what may be missed by disease exceptionalism are disease events that do not count as outbreaks and thus do not register so

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strongly on the global radar, despite causing potentially more deaths and more disruption to livelihoods and communities than the blockbuster diseases. Diarrhoeal diseases and pneumonia clearly exemplify diseases in this category which this book, with its overt focus on epidemics, has not addressed directly. Amongst our cases, we have already noted the tendency for Ebola to eclipse more endemic haemorrhagic fevers such as Lassa fever. Obesity may provide an even more striking example of this phenomenon. Despite a relatively high profile in policy circles and media outlets, as Millstone points out, there are very few examples of successful responses to obesity. One reason may be that despite resembling a 'classic' epidemic in the rapid rise in prevalence, obesity is still considered to be chronic. Less urgency and importance is therefore attached to obesity interventions, despite the evident scale of the problem and the severity of its impact on health (and the work of those calling attention to the obesity 'epidemic'). Similarly, TB does not conform to the model of a disease with discrete and sudden outbreaks. With an estimated one-third of the world's population a carrier of the bacillus, this old disease strains the ability of the global health system to respond. As these cases make clear, the determination of whether a disease counts as epidemic or endemic matters greatly to the kinds of responses that are mounted. Recognizing that this process is partly socially constructed, and that diseases can cross the line between epidemic and endemic multiple times, should point to the importance of designing responses that cover both phases. We can thus begin to move away from an implicit paradigm of eradication, which may not be realistic for many diseases, and towards a sustainable programme of disease management, in 'good' times and bad.

Myths of the local and the global

Another blurry boundary that many of our case studies have explored is that separating the global and the local. While commentators have grown increasingly critical of easy separations between supposedly global and local realms, this binary framing remains tenacious, even as much analysis – and some policy attention – focuses on building bridges from local to global and vice versa (what has been referred to as 'the instantiation of global assemblages in local social arenas' (Janes and Corbett, 2009, p169)). We admit that such categories are hard habits to kick. In this section, we consider some of the myths that enliven both halves of this

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equation and consider how the narratives in our case study represent their relation. Finally, we highlight some narratives and pathways from our case studies that offer a way to transcend this pairing.

The first thing to note is that there are opposing myths for both the global and the local. To begin with the global: there is, on the one hand, the notion that Western biomedical and techno-scientific tools (such as surveillance systems, drugs and vaccines), in combination with international institutions, such as the WHO in general and GOARN in particular, can control and limit the risk of outbreaks to maintain the achievements of the post-war, antibiotic age. This myth, which has much in common with a health security narrative, animates many of the dominant narratives in our case studies: in particular, the first 'global' narrative described by Leach and Hewlett in relation to Ebola; the dominant 'scientific' narrative in relation to SARS; the cluster of dominant outbreak narratives that Scoones argues have mobilized the international response to avian influenza with its emphasis on risk management and top-down surveillance; the security narrative that Nightingale describes with respect to TB; and, in a form that is inflected with Islamic propaganda, the mainstream narrative used to justify the massive pig culling in Egypt described by Tadros.

In these accounts, the global is presented as powerful, scientific and 'modern' (for which read: Western). It is constituted primarily by expertise that can be mobilized quickly to protect global populations (which, as our case studies have explored, is often a code for inhabitants of industrialized nations). The flipside of this presentation of the global as a positive, protective force is the notion that modernity – constituted by the global systems of transport, communication, and science and technology referenced above – has created a unique contemporary vulnerability to novel threats that have the potential to create unprecedented systemic failures at the global level. Climate change, the global financial crisis, terrorism and pandemic disease are all presented as manifestations of this side of the global. The links between these two versions of the global have been eloquently discussed by, among others, Ulrich Beck, who coined the phrase reflexive modernity to capture the way that one aspect of the global modern – our techno-scientific prowess – has led to another aspect, our vulnerability to novel threats (Beck, 1998, 2008). Our case studies also contain accounts of this aspect of the global. Obesity can be seen as a side effect of industrialization, becoming global as sedentary lifestyles and unhealthy eating spread with other aspects of

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'modernization'. AIDS is another disease whose spread seems to capture the downsides of the increased mobility and sexual freedom that is seen to accompany 'modernization'. Likewise, the high visibility of the response to SARS at airports cemented its image as a disease of modern travel.

In contrast to the dangers of globalization, there are two myths of the local that can be discerned in our case studies. In the first, there is a notion of communities who are living 'in balance' with a disease ecosystem through a combination of cultural and ecological adaptations developed over a long time frame. This myth of the local can be seen in aspects of the third narrative described in the Ebola chapter, where haemorrhagic fevers (both Ebola and Lassa) are accommodated and managed by local populations using cultural practices developed over a long period of cohabitation with the virus. Cases of Ebola are thus not considered as precursors to outbreaks with the potential to 'go global'. Instead, the Ebola and Lassa viruses are simply part of the fabric of life – albeit a hard life – in a given community, claiming lives occasionally before subsiding once more into quiescence. At their extreme – although notably not in the versions that have animated arguments to engage local knowledge and practices in disease responses – versions of this narrative can present a static notion of both 'traditional' culture and ecology, in which disease events are no more troubling than the occasional thunderstorm. While such a narrative accepts the unpredictability of such events, it remains blithe about the potential for systemic effects resulting from such outbreaks.

Rather than an image of a traditional society living in balance with its environment, a second myth of the local presents communities flexibly adapting to change, which enables them to mount a more robust and resilient response to disease threats. This response incorporates traditional knowledge about flora and fauna, as well as the agricultural, economic and social needs and realities of people living in an area subject to outbreaks. The local community's ability to draw on this complex knowledge accrued over generations makes them more resilient, and adaptable, in the face of unpredictable and potentially dramatic changes. Part of what enables local communities to be resilient is that they retain 'traditional' knowledge and remain to some extent outside the global system. This myth of the local can be seen in an alternative narrative that Scoones discusses in relation to avian flu. Here, a focus on the socio-ecological dynamics of the disease and local responses is seen to provide a more flexible, adaptive set of responses to avian

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influenza than the risk management-driven 'outbreak' narrative that has been dominant.

This version of the local can also be discerned in MacGregor's description of the way in which formal requirements for providing 'voluntary HIV counselling' are interpreted in local settings in Cape Town, where resources are extremely scarce. In this case, local counsellors with little training may reduce requirements to 'counsel' patients to mere information giving or the running through of a checklist. In this way, counsellors effectively circumvent the rights-based directive, which emanates from national and ultimately global sources of authority, in favour of a locally pragmatic, adapted response. The effect is that more people are tested, and find out their HIV status, in a region of very high prevalence. Rather than drawing on so-called 'traditional' knowledge, as in the avian flu example, these counsellors are making pragmatic decisions based on their level of training and local perceptions of the relative importance of rights to 'dignity' versus a more immediate goal of controlling the epidemic. While the context is very different, both examples point to the importance of the agency and knowledge of local people in responding to disease events in a flexible way. In as much as the concept of health security is relevant in such examples, it is redefined in localized, 'human security' terms, referring to secure community and individual livelihoods and well-being.

Having outlined these opposing pairs of myths – some positive and some negative – we now consider some examples from our cases of how we might transcend the limiting framing offered by simplistic divisions between global and local and start to describe the true complexity of disease outbreaks. As this last example suggests, one way forward is to consider how the rhetoric of a given response may not be as potent as we think. In a volume that uses narratives as a key conceptual tool, it is important to remind ourselves that official language and justifications, which appear frequently in dominant narratives, may not find much traction in the so-called 'real world' where policies are ultimately enacted. Dry makes this point in chapter 2 of the book 'Epidemics: Science, Governance and Social Justice' on global health governance, noting that while changes to the WHO's International Health Regulations make unofficial information technically equal to official sources, in practice, there are still expert judgements, made by those in positions of power, about what kinds of information, and knowledge, count. This is a necessary feature of any information gathering system. What requires our attention – and perhaps some healthy fresh air – is the way in which

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statements about the importance of local (another way of saying unofficial) knowledge in the new IHR may conceal the true pathways by which information, and decision-making, travel.

Conversely, in MacGregor's work on HIV, we see the limits of a global emphasis on rights in a local context of high disease prevalence and scarce human and financial resources. Though these cases describe opposite effects – on the one hand, we see a potential strengthening of official sources while on the other we see local counsellors taking control – they both demonstrate how the relations between global and local cannot be reduced to a question of either language or politics alone. This understanding can help us to avoid a potential pitfall of relying on a narrative approach: reifying accounts by themselves without attending to the question of which people, operating from within which institutions, are responsible for formulating and promulgating a given narrative.

A third way forward is to acknowledge and explore the myriad 'intermediary' processes and practices through which global and local myths come together in particular social and political settings. Several of our cases begin to do this. Thus from Bloom's chapter in the book 'Epidemics: Science, Governance and Social Justice', we see how global ideas and imperatives around SARS became grounded and interpreted in China amidst the concerns and priorities of early 21st century Chinese state institutions. In the account by Tadros of H1N1 influenza in Egypt, we see governmental and religious organizations jostling to capture global myths and put them to work for long-standing strategic ends. In work extending his contribution to this book, Scoones (2010) shows how global narratives and responses to H5N1 avian influenza have come to mean very different things amidst the diverse political economies, histories and social contexts of Indonesia, Thailand, Cambodia and Vietnam. As these cases suggest, the process of assemblage (Ong and Collier, 2005; Li, 2007) through which ideas, policies, personnel, practices, technologies, images, and architectures of governance and resources are brought together, constantly crosses spatial scales, confounding any separation between the local and the global, and implicating national institutions – including those of the state – in new ways.

Not all myths are created equal, and these so-called global and local myths are not equally represented in our case studies. Representations of epidemic diseases tend to draw on and perpetuate global myths, especially in the dominant

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narratives our contributors have outlined, while the local framings described in several of the alternative narratives seem to be more comfortable with accepting a level of endemism. While we feel it is critical to foster improved attention to local concerns, we are wary of falling into the trap of simply exchanging global myths for local ones. As our case studies demonstrate, it is impossible to separate local from global concerns, at the level of microbes, or politics, or intervention. How might disease narratives that take a multi-scale perspective, drawing together the near and the far, the fast and the slow, be fostered and put into circulation?

Shaping of narratives and their shaping effects

Recognizing that not all myths and narratives are created equal focuses attention on the processes that shape such inequality. What kinds of pressures enable some narratives to become and remain dominant – to grab scientific, public and policy attention – while others remain marginalized and even hidden? In this section, we briefly consider some of the key processes which the cases have identified as important in shaping narratives, especially dominant ones. We then address how some of the disease narratives in our case studies have shaped responses to diseases (and what the unintended consequences of this have been), as well as the paths described in other narratives that have not been taken.

In part, the relative power of epidemic narratives reflects the position and status of their proponents on an international stage. However, the case studies also indicate how a range of political, institutional and cognitive pressures may interlock in processes of governmentality (Burchell et al, 1991, p2) so that certain views become linked with more diffuse power relations. As Dry's chapter from the book 'Epidemics: Science, Governance and Social Justice' explored, today these relations implicate complex architectures extending across international and local scales, and encompassing public, private and hybrid institutions. Power dynamics, perhaps inevitably, encourage and enable powerful institutions to pursue strategies that maintain the status quo. Eradicating a disease or controlling an epidemic or at least claiming to do so – is a powerful way of asserting political authority, whether this is the authority of an international health regime or of a national political one. Bloom's discussion of the SARS case alludes to this, where the Chinese government was initially reluctant to acknowledge the epidemic

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because of the implied threats to national authority and sovereignty. Yet once the disease was in the open, interests in maintaining strong state authority and social control, and disease eradication, have gone hand-in-hand – and reports suggest that this has continued in the tough state-orchestrated response to H1N1 influenza (Wong, 2009).

Political-economic interests are also at stake in the shaping of narratives, and in their relative power. The case of obesity illustrates this particularly starkly. Millstone shows how the junk food industry has actively constructed and promoted narratives that portray obesity as an individual lifestyle problem, unrelated to the 'obesogenic' food and advertising environment that the industry has helped create, to avoid blame and protect its commercial interests. The political economy of international funding flows also emerges as key, if not in the initial shaping of narratives, then certainly in sustaining them. Thus in the case of avian influenza, Scoones notes the huge amounts of public cash which have been invested in the standard, global surveillance, early warning and rapid response repertoires of the main agencies. As Calain (2007b) has argued of global public health and surveillance more generally, there are strong financial and economic pressures in play to maintain certain styles of response and their associated funding streams.

Institutional pressures are also at work, whether in international agencies, government or civil society organizations. Thus in exploring narratives produced and perpetuated by international agencies, for instance, our case studies have shown the 'institutional fit' between global outbreak narratives around various diseases and the WHO, and AIDS exceptionalist narratives and UNAIDS. The remits, structures and practices of particular institutions make certain kinds of narrative and response logical and feasible, while closing out others. As Scoones argues in the case of avian influenza, for example, the organizational mandates of international agencies such as the WHO and FAO are not geared up to deal with ignorance and surprise; the very existence and status of the agencies is dependent on the idea that outbreaks and their effects can be known about and thus rendered amenable to management. In these circumstances, planning procedures that are oriented towards risk management through outbreak containment at source are appealing and come to dominate. Bureaucratic procedures – in the way that outbreak alert and response programmes are organized – interlock with and support such framings. Over time, such responses and their supporting narratives can become routinized, as the 'repeated practices and behaviours' that constitute

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institutions (North, 1990).

Added to these political, economic and institutional pressures are professional, disciplinary and cognitive ones. In several of the case studies, we have seen how particular disciplinary cultures shape narratives – with those centred around biomedicine and epidemiology, and their emphasis on disease-focused, often quantitative assessments, coming to dominate. Understandings from ecology, history, social sciences and local knowledge are thus squeezed out. Yet different disciplinary and professional traditions inspire alternative narratives. In the case of Ebola, for example, Leach and Hewlett's contribution shows how anthropological perspectives have been key in shaping narratives about the integration of local knowledge, and environmental and ecological sciences are helping to generate a fourth narrative centred on disease–ecological dynamics. Several of our cases have addressed the interplay between professionalized knowledge and expertise, and the unofficial knowledge held by members of the public, including people living with diseases and the frontline health staff who interact with them. The relatively weak power of unofficial expertise in shaping those disease narratives which become dominant, and yet their value – especially in contributing to alternative narratives which acknowledge longer-term social–disease–ecological dynamics and social justice concerns – has been a recurring theme. Finally, as the cases of Ebola, SARS, H1N1 influenza and obesity have illustrated in different ways, the media often plays key roles in constructing and amplifying powerful narratives and associated public fears. In turn, this can help support the claims of powerful agencies to control the threat (see Wald, 2008). In short, the case studies begin to indicate how clusters of political, institutional and knowledge–power processes – which together constitute 'governance' in its broadest sense – help to produce and maintain particular narratives, while marginalizing others.

Just as it is easy to fall into the trap of treating narratives as actors, it is important to resist the temptation to assume that these 'actor narratives', even in their dominant form, have automatic effects. Narratives, because they shape understanding, define the framing of a relevant system and the key dynamics of interest (including the priority given to global or local scales, and the key question of whether a disease outbreak even counts as an epidemic) and suggest appropriate responses, do have the power to shape policy and action. But this is not automatic, nor is it equally true of all narratives.

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In his chapter on HIV/AIDS, Edström highlights the limits of a vulnerability-based response to the epidemic. Edström describes how this approach, with its preoccupation with protecting vulnerable populations has led to policies that are too general in their focus, missing 'key populations' who act as super-spreaders of the disease. In her case study on grants, MacGregor analyses how a rights-based and exceptionalist narrative implicitly prioritizes the rights of healthy people infected with HIV ahead of those who are merely poor or unemployed. Though equity issues are arguably as significant in post-apartheid South Africa as the rights of HIV-positive citizens, the exceptionalist narrative has proved to be successful in promulgating policies that support the infected first. Bloom's study of the SARS outbreak suggests that a powerful shaping narrative assuming international consensus about the need for a coordinated global response missed the ongoing importance of national sovereignty concerns. Millstone's analysis of debates over obesity in Europe and America shows how powerful food lobbies urged government, with some success, not to intervene in the lives of citizens. Both Scoones, and Leach and Hewlett, emphasize the way in which certain narratives can limit the resilience and robustness of our responses. In the case of both Ebola and avian influenza, they show how dominant narratives for those diseases tend to foster pathways of response that rely on external scientific expertise and top-down (so-called global) interventions, such as large-scale culling of poultry, that may be unnecessary or counter-productive.

As discussed above, these global responses tend to privilege virulence and novelty above ongoing challenges to livelihoods and well-being posed both by disease dynamics and by intrusive interventions. The virulent Ebola virus receives much more attention than the low-level, quasi-endemic occurrences of Lassa fever. The effects of narratives can be even more dramatic, leading to negative unintended consequences. The case of H1N1 influenza in Egypt, described by Tadros, shows dramatically how a rapid and total approach can lead to a public health emergency. Similarly, Nightingale describes how misguided treatment of TB can make things worse by causing antibacterial resistance to frontline drugs. Such cases exemplify how certain pathways of response can generate effects which 'kick back' to shape the dynamics of disease themselves, bringing new implications for social justice – and who gains or loses – in their wake.

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Looking forward – directions for future research and dialogue

As varied as our case studies are, there is inevitably much that we have missed. Much more could be said about the causes and effects of antibacterial resistance, a serious and growing problem. Antiviral resistance is also a concern, with one study showing 25 per cent of H1N1 viruses in Europe resistant to oseltamivir, a frontline response drug (Fleming et al, 2009). Waterborne and foodborne diseases are also highly significant sources of infection and sickness, and have received relatively little attention – certainly relative to the health damage they wreak. There are, of course, many other epidemic diseases that we could have included. Malaria, in particular, is a key disease, with over 1 million deaths annually, most of them young children in Africa. New tools such as insecticide-impregnated bednets and new antimalarial drugs have raised the hopes of some that malaria could even be eradicated. Increasing temperatures due to climate change, however, are expanding the range of the mosquito vector that spreads the disease, and weak health systems and the scale of the problem present serious challenges – along with growing evidence of emergent resistance to even the latest drug treatments. Case studies investigating the role of narratives in shaping responses to malaria at the global, national and local levels would be very welcome.

Other significant infectious diseases include:

- Chagas disease, spread by beetles that hide in the cracks of poorly built houses in regions of Latin America with high poverty;
- West Nile Virus, first identified in the US in 1999, and now present in all but three states;
- dengue fever, currently present in areas where 2.5 billion people live, and causing an estimated 50 to 100 million infections annually;
- lyssavirus infection and henipavirus infections, carried by fruit bats in many parts of Asia and Africa and causing encephalitis in humans.

This list could be much longer. Emerging and re-emerging infectious diseases continue to increase and case studies on their social–ecological– political dynamics, and the effects of narratives and policy responses, are thin on the ground.

In taking forward such case studies, more collaboration between natural and social scientists is clearly warranted. This will be important to overcome the

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Excerpted from *Epidemics: Science Governance and Social Justice*

cognitive divides that have pervaded so much analysis of epidemics, whereby particular disciplines end up shaping particular narratives that 'speak past' each other. The biology, ecology and virology of infectious diseases matter greatly to the nature of the epidemics they cause, and the responses they require. Social science brings tools for analysing how human behaviours contribute to the spread of disease, as well as more critical tools such as the narratives approach we have been developing, which can show the power of different understandings of the causes of diseases to shape pathways of response. But the vision suggested by this book is not just of a new generation of truly interdisciplinary, collaborative research activities, difficult as even these can be to mount. It is also of new styles of research–policy engagement, in which scientists, those in the hot seat of epidemics policy-making and practitioners dealing with these issues on the ground, can work together to explore particular narratives and their effects, and perhaps construct and implement new ones. Forms of participatory and action-oriented research, of deliberative dialogue, and of reflexive interaction through which both researchers and policy-makers make explicit and debate their particular framings may all find a place in such an agenda (see Leach et al, 2010).

There are several broad areas where such research–policy dialogue could make a difference to pathways of epidemic response, their effects and their consequences for social justice. The relationship between narratives and institutions deserves more attention. While, as the last section reviewed, our case studies have addressed elements of this relationship, they have not done so systematically and this is clearly an area warranting further research and discussion. Throughout our case studies, the importance of institutions such as the WHO and, to a lesser extent, FAO, has been emphasized. Often, we have been quite critical of the role of the WHO in helping to construct a certain type of 'global' emergency-oriented response. A potential rebuttal to this critique, however, is to say that the WHO is only as strong as the contributions and commitments of its member states. Are we asking too much of this organization? Answering this question requires taking a broad view that encompasses and involves a range of institutional actors (at the local, national and international level) in reflecting on the ways in which they either cooperate, ignore each other or work at cross-purposes in responding to a range of diseases, epidemic and endemic, chronic and acute. Much more work is needed that attempts to trace the relationship between which narratives become dominant for a given disease, and which institutions are key in formulating those narratives or implementing the responses they engender. This type of research,

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which could be termed political epidemiology, will require tracing flows of money and power from both large and smaller institutions to their endpoints. The outlook needs to broaden to explore not only the effect of centralized institutions such as the WHO, but also the relations between these institutions, state institutions and their combined effects on local populations. Conducted in a research-policy, or deliberative dialogue mode, it would involve people in those institutions reflecting on the flows which shape their own work – and what is thus excluded.

Another area for research and research-policy dialogue is the effectiveness of new forms of surveillance, such as event-based and information and communication technology (ICT) driven systems, in relation to broader systems of risk management-based surveillance (discussed in Dry and Scoones, this volume). There has been very little analysis or reflection on how these interventions have affected the kinds of outbreaks that are noted, and whether the information gathered is of any ongoing use to local populations. One might apply a similar political, research-policy lens to projects aimed at discovering future diseases before they emerge. How do these projects, exemplified by the 'origins' initiative focusing on populations exposed to wild animal populations that may act as reservoirs for disease (Wolfe et al, 2007), feed into a broader culture of precise forecasting? What kinds of dynamics and uncertainties are excluded from these approaches, and what kinds of interventions would be needed to address them?

Identifying truly interdisciplinary and integrated research-policy questions, which draw on the strengths of varied approaches, is not easy. Taking forward the work to address these is harder still, challenging as it is to the many disciplinary, policy and institutional silos that characterize understandings of and responses to epidemics. The first step, however, is recognizing there is a need. We hope that this volume can serve as an initial move towards a shared agenda for research and action, in which concerns with science, politics and social justice are integrated in new ways towards the building of sustainable, effective pathways of epidemics response.

Notes

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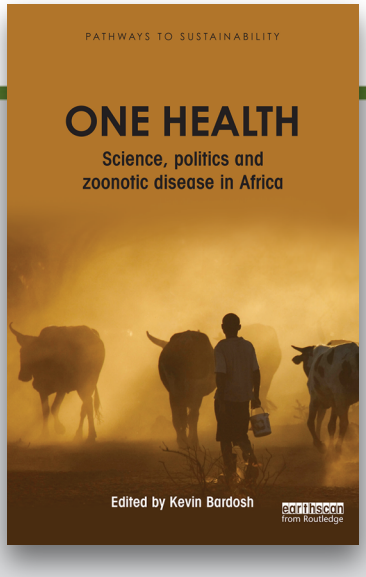
CHAPTER

2

CONTESTED HISTORIES

POWER AND POLITICS IN TRYPANOSOMIASIS CONTROL



This chapter is excerpted from

One Health: Science, Politics and Zoonotic Disease in Africa

edited by Kevin Bardosh.

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POWER AND POLITICS IN TRYPANOSOMIASIS CONTROL

Excerpted from *One Health: Science, Politics and Zoonotic Disease in Africa*

Ian Scoones

Introduction

Current One Health rhetoric focuses heavily on the need for 'integrated' control approaches that bring together diverse stakeholders and expertise. The assumed narrative is that an inclusive politics of collaboration is desirable and possible. While intuitively appealing, and perhaps economically sensible, often hidden from view is how scientific networks are formed and sustained by power and politics, and so prevent integration from happening. Most diseases have multiple control modalities, and divergent communities of research and practice compete for funding and influence. These science-policy controversies make collaboration inherently challenging.

This chapter explores these issues in relation to African trypanosomiasis, a complex disease with an equally complex history.[1] Trypanosomiasis is a devastating vector-borne disease of both humans and animals. It is, in fact, multiple diseases, involving various trypanosomes, protozoan parasites carried by different variants of the tsetse fly.[2] It appears in different forms, affected by different epidemiological and ecological processes. Over the last 100 years, a massive effort to fight the fly and control the disease has been undertaken using a wide array of techniques, from draconian colonial policies, aerial spraying, baits and traps, drugs and vaccines, and the breeding of resistant cows and sterile flies (Maudlin, 2006). But these technologies and approaches have sometimes been accompanied by conflicting aims, and tensions between them are apparent.

Colonial authorities were horrified by the consequences of human trypanosomiasis or sleeping sickness, investing huge effort and resources in trying to tackle it. Around a quarter of the colonial research budget was focused on sleeping sickness control, either major treatment campaigns for people, or wider efforts to push back the fly belts (Rogers and Randolph, 2002). Today, some 50 million cattle are potentially at risk from animal trypanosomiasis, and the economic losses of the disease amount to an estimated US$4.75 billion per year, suggesting massive gains to be made for development from control operations.[3]

However, since the peak of colonial efforts, human African trypanosomiasis has

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slipped down the list of priorities. Today it is classified as a 'neglected disease', one that is underreported, poorly understood and not allocated significant global resources, and so of lower prestige than other current priorities in global health (Maudlin et al., 2009). That said, there is still plenty of action around trypanosomiasis control – global coordination groups, pan-African initiatives, national programmes and dedicated branches, commercial public–private partnerships (PPPs) for drug and vaccine development and research projects galore on facets of vector and parasite biology.[4]

In many ways, trypanosomiasis is an ideal candidate for a 'One Health' approach. The different fly vectors are highly dependent on particular habitats for their survival, and so ecological and land use change has a major impact on fly populations, and the associated disease risks. Equally, the probabilities of infection by people and livestock are influenced by the presence and distribution of hosts, including wildlife, and so disease dynamics are equally affected by ecology, but also the social, economic, cultural habits of people and their livestock. This makes designing interventions very difficult, and open to controversy about what is the best approach.

This control quandary was posed by John Ford in his 1971 book, *The Role of the Trypanosomiases in African Ecology* (Ford, 1971). Ford was a brilliant, lateral-thinking, big-picture ecologist who argued that wider development was the answer to the tsetse problem, and that pre-colonial, indigenous systems were highly effective. He strongly objected to *Pax Britannica*, that peace brought by colonialism had improved development, indeed he argued that the early colonial epidemics of trypanosomiasis were a direct result of changing ecological dynamics influenced by colonial conquest. He argued instead that colonial science 'almost entirely overlooked the way considerable achievements [had been made by] the indigenous peoples in overcoming the obstacle of trypanosomiasis [through] tam[ing] and exploit[ing] the natural ecosystem of tropical Africa by cultural and physiological adjustment both in themselves and their domestic animals' (p9). He argued that, 'a policy based on elimination is not a practical one' (p10).

In his advocacy of a 'systematic' integrated approach based on 'joint investigation', he was in many ways an inspired forerunner of the One Health argument of today. But for a number of reasons this more holistic perspective on trypanosomiasis has been a footnote in a larger saga dominated by often narrow 'techno-fix' narratives,

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and policy drives centred on tsetse eradication and area-wide control. While these have, in many quarters, brought considerable benefits, they have also been accompanied by trade-offs and many failures.

This chapter examines several ongoing, and long-running, debates about vector and parasite, focused on zoonotic and animal trypanosomiasis in eastern and southern Africa. By tracing the histories behind particular technologies, it reveals the ways in which control methods are embedded within contests of power, prestige, funding and institutional politics. Engendering collaboration and integrated approaches, forming the basis of a One Health approach, seem an unlikely proposition unless these contested histories are made explicit and concerted efforts are made to address them.

Colonial 'scorched-earth' policies

Following the devastating rinderpest epidemic of the 1890s, trypanosomiasis became a major concern for colonial authorities. The East Africa Commission (1925) claimed that, 'the ravages of the tsetse fly are the greatest menace to the development of tropical Africa' (Ford, 1971, p1). In southern Africa, tsetse infestations were hampering colonization, especially the expansion of settler ranching. Colonial authorities ordered large-scale bush clearance and wildlife extermination programmes. These involved armies of people, clearing bush with machetes and trapping and shooting wildlife. The scale was phenomenal; around 750,000 animals were shot in Zimbabwe between 1932 and 1961 (Ford, 1971, p322). A close alliance between veterinary departments and hunters was struck. Presented as a project of taming, conquering and transforming wilderness into a productive alternative, efforts very much coincided with the colonial vision, and substantial resources were allocated.

They met some success. For example, in Zimbabwe the fly belts were pushed back significantly (Lovemore, 1994).[5] The settler population backed these efforts, as land became available and was cleared. Yet local people were not part of this picture, except as enlisted workers for the huge operations. The memories of these campaigns are often evoked, with strong nostalgia by some: 'It was a really massive effort. There were thousands of people, tens of trucks, dozers. If you lead the department you imagine that you can revive the department to that level of

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capacity. But it won't happen' (interview).

These approaches were not without their critics. While an environmentalist lobby did not exist as it does today, many white settlers and colonial officers had a romantic attachment to wildlife in Africa, and so the clearance policies were seen as unreasonably destructive. Even within the ranks of colonial veterinarians there were debates. For example, John Ford argued that regular, but low, levels of challenge fostered trypanosomiasis resistance among both cattle and people and when combined with vegetation management, settlement site choice and herding behaviours, this offered a better route to a longer-term solution.[6] This did not go down well with the more macho, scorched-earth advocates in the colonial tsetse and veterinary service.

The scale, depth and organization of colonial policies were witness to the disciplining power and control of the colonial state, and the institutionalization of tsetse control branches, often the most prestigious section of the agricultural ministry, with the most resources and personnel, reflective of the ambition. This created in turn professional cadres, and associated career trajectories, committed to such a control response. The funding and operation of tsetse control branches was thus dependent on justifying a particular style of response. While control measures have changed, and with them styles of intervention, the importance of tsetse and trypanosomiasis, especially for veterinary departments, is still significant. The justificatory narratives that attempt to mobilize resources – if not to return to the glory days of the colonial era, at least to sustain a commitment to control – are important.

The chemical revolution

Overlapping with this period was the promotion of insecticide applications, both from the air and through ground spraying operations. The chemical revolution accelerated following the Second World War, when new chemicals, notably the organochlorines, DDT and dieldrin, became available thanks to the war effort. This was a period when land allocation to white settlement began in earnest, especially in British colonies like Zimbabwe. War veterans from the UK and elsewhere were offered land, often in the more marginal areas, and colonial authorities needed to expand 'African' land to accommodate them. Tsetse clearance became a greater

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imperative:

> In the 50s and 60s tryps was a serious veterinary problem. In Zimbabwe they were looking to open up new places for communal areas. When the flies came back after rinderpest, it was a problem. The white farmers of Matabeleland North put serious pressure on the government.
>
> *(Interview)*

The ground spraying operations followed a similar pattern to the earlier bush clearance and wildlife extermination campaigns, and were often combined. Vast numbers of people were mobilized, often in very unsafe working conditions, to spray huge areas: 'The amount of dieldrin they put on was extraordinary. It was mixed with fuel and came out of the exhaust of the planes. It was in quantities that were unimaginable. They were so enthusiastic' (interview).

Again this was presented as human mastery over nature, the deployment of technology to conquer a scourge that lay in the way of a colonial vision of modernization. The military scale of the operations, and the involvement of former armed forces personnel as pilots, logistics operators and so on, gave a particular image and flavour to these efforts, reflected in turn in the language used – campaign, front, operation and so on. The full force of colonial power was being exerted, confronting and taming a dangerous and threatening Africa.

Both the intensity and scale of these efforts did again have results, boosting the argument for a top-down, hierarchically organized, military-style operation. But these efforts came at a cost: in terms of human health and wellbeing (for ground spraying operators with backpacks of chemicals), the risk of death (for pilots flying in low in difficult country) and for the environment (in terms of the impact of residual chemicals).

Rachel Carson's book, *Silent Spring,* published in 1962, raised the consciousness of a nascent environmental movement (Carson, 1962). DDT in particular became a watchword for environmental destruction: extensive studies, particularly in Zimbabwe, have shown the negative impacts of the use of residual chemicals as part of spraying campaigns (Douthwaite and Tingle, 1994; SEMG, 1997). Even though with time air spraying switched to endosulfans and other less toxic chemicals, such as synthetic pyrethroids with lower residual effects, the image of

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aircraft releasing gallons of chemicals on the African bush was not good PR. Ground spraying, too, was seen as expensive, dangerous and environmentally damaging, even if again the approach to chemical application had become more and more selective and targeted.

In Zimbabwe ground spraying with DDT continued until 1991, and in the Okavango delta of Botswana a major air spraying operation continued through the 1980s and 1990s using endosulfans: 'There were 17 successive years of spraying. It did not work. They couldn't get enough of it. It went on and on. It was just madness. They could have done it for centuries', commented one observer. But eventually the Botswana efforts had success thanks in particular to another technological development – the emergence of GPS systems for highly site-specific spraying (Kgori et al., 2006). It has since become the poster-child for pro-aerial spraying advocates.

Spraying efforts today are limited, and subject to many more controls than in the past. Environmental impact assessments (EIAs), toxicity appraisals and health and safety procedures are all part of the new requirements (Grant, 2001). Today, spraying operations are not part of large government-led, military-style campaigns, but are still being done, and planned, in some locations. The veterinary departments simply do not have the resources or expertise, and instead private contractors have taken on the role.

An alternative use of chemicals has evolved in parallel, however, particularly following the development of low-toxicity pyrethroid compounds, and this involves application on animals. Insecticide-treated cattle approaches can be highly effective against tsetse, particularly as the knowledge about fly behaviour has evolved (Vale, 1974; Vale et al., 1988; Hargrove et al., 2003, 2012; Hargrove, 2004; Torr et al., 2007, 2011). This means that pour-on application techniques can be highly targeted, and managed by herders (Swallow et al., 1995).[7] With the flies having such low reproductive rates, the kill rate needs to be relatively low in order to have a major control effect. 'Actually it's quite simple. Look after your cattle, spray the front legs, perhaps once a month, even every three months. It might cost two cents to spray', explained one researcher. The approach can also be combined with tick control, thus making any investment much more cost-effective for livestock-keepers to implement (Bardosh et al., 2013). Concerns have been raised, though, about resistance, and ongoing research on this continues.

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Baits and traps

As a response to the destructive land clearance, wildlife extermination and chemical spraying alternatives, trap technologies were developed. The earliest 'Harris traps' were used in South Africa (Swynnerton, 1933), although they did not use odour baits, and simply used visual stimuli. It was only through the work on fly behaviour and how they are attracted to odours in particular that new, more effective technologies were developed. This particularly took place in Zimbabwe from the mid-1960s through the persistent and innovative scientific efforts of Glyn Vale and colleagues.[8]

The Rukomichi research station in the Zambezi valley became a hub of activity. An incredible body of research was developed, based on detailed studies of fly movement, population ecology and disease epidemiology:

> They had some very clever people who worked there – Vale, Hargrove, and so on. They could do experiments on a gargantuan scale. They had money to support them. Vale had hundreds of people working for him, collecting flies and so on

explained one informant. 'Zimbabwe was the epicentre of the tsetse world'. Vale explained:

> We wanted something that was non-polluting. We didn't want to use DDT or dieldrin, to plaster tonnes and tonnes across the bush. The environmental people didn't like it, nor indeed the tsetse people. Shooting all the game animals was another option. Some of the wildlife people liked this. They were keen on hunting. Bush clearing was highly destructive. We wanted something else.
>
> *(Interview)*

When Zimbabwe became independent in 1980, the basic infrastructure, and many of the former staff, including Vale, remained. Recalling this period in southern Africa, someone joked:

> It was white guys in baggy shorts and knee length socks. A particular type of

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> science. A great gig. You could be in the bush, drive around in Landrovers… They don't even touch the socio-political aspects. It was a very British, ex-colonial scene.

Another informant observed: 'It was all very top down. And it was dominated by whites. For a long time it was always whites at the top in Zimbabwe, even after Independence.' Another commented on the social dimension: 'The white males stuck together. They were a tribe.' The gendered nature of expertise was also commented on: 'It was white males, mad on flies.' Yet despite the racialized and gendered context for science and policy in the transition to independence in southern Africa at least, there was also continuity in the science, and the unquestionably high-quality work on fly behaviour and traps continued.

This was given a massive boost with the inception of the Regional Tsetse and Trypanosomiasis Control Programme (RTTCP) operating in southern Africa (Malawi, Mozambique, Zambia and Zimbabwe) from 1986 to 1998. The RTTCP was seen by the European Union (EU) as part of the support to the front-line states during the apartheid era in South Africa, but suitably 'apolitical', focused as it was on flies, cattle disease and development. Significantly, the RTTCP also supported the bureaucratic and professional interests of veterinarians (and, to a lesser extent, entomologists):

> It was led by vets. This was a time when veterinary services were being privatised, and they were fighting for funds. They needed the funds to continue to justify their own existence. They wanted funds for vaccination, for mass prophylaxis. They didn't always see the broader goal.
>
> *(Interview)*

The RTTCP fitted a number of political objectives. First, it was an opportunity to support the newly independent Zimbabwe, and to capitalize on the very considerable research and operational expertise developed there. The end of the Zimbabwean liberation war meant that there was an opportunity to invest in control measures linked to a process of re-establishing national control and the demining of borders. Second, a grand mission to push the fly belt back over an area of over 300,000 km^2 was a sellable proposition. The RTTCP became a platform for the rolling out at large scale of the odour bait trap technology developed in pre-Independence Zimbabwe, presented as an alternative to aerial spraying. It thus

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was presented as a pro-development operation, with technologies that were environmentally sound, cheap and efficient.

It was a large aid commitment, and with hindsight some have questioned its focus: 'That many euros! What were they thinking? They were just chasing the fly.' The whole operation was highly dependent on external funds, and longer-term sustainability became an issue:

> After 1980 Zimbabwe was swimming in funds. Once something is moving you don't stop it. So all these people were hired after 1980s to do tsetse control… But when the cash started to dry up . . . you now have a huge tsetse department, but no operating costs.

RTTCP was a major test of the bait technology approach. Thousands of traps were distributed across vast areas. Because of the reproductive biology of the tsetse fly, killing very few flies could result in a diminution of populations in a relatively short period. When well organized, again with a top-down, hierarchical approach, the trapping worked reasonably well. As Vale explained: 'It has to be organised and planned properly. When it first started in the 1980s it worked magnificently.'

Elsewhere, however, things did not always go so well. This was particularly the case where the capacity of government services to implement and sustain such a large-scale programme was weaker, even with the considerable resources available from the RTTCP. Local people often did not understand what the traps were for, and did not in any case rate trypanosomiasis as a major problem. One observer commented: 'Trapping – it's more trouble than it's worth. It's a logistical nightmare. There are all sorts of other uses for blue or black cloth.' Another recalled that villagers found better uses for the traps: 'The netting used on some designs was perfect for fishing nets. The blue cloths were good curtains. And the aluminium frames were perfect for door posts and window frames.'

Community compliance and sustainability became a big issue. In the Lambwe valley of Kenya, a site of extensive and long-term research on tsetse and tryps, community programmes facilitated by the International Centre on Insect Physiology and Ecology, based in Nairobi (ICIPE) took off (Ssenyonga et al., 1996; Barrett and Okali, 1998). These involved community participation from the start – from trap construction to placement to management. This had a great effect, but required local-level community organization and buy in. Participatory development

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was, however, not a strong point of the average veterinary department. The institutional culture and the professional training ran against interacting with people.

With the trap technologies, there were always challenges of reinvasion. Trapping was a long-term solution that had to be sustained, particularly in border areas, for years. Some suggested that this was a 30–40-year challenge. As African governments became more and more reliant on donor support, projects would last a few years at best. Even a massive prestige project such as the RTTCP had only one renewal, and was wound down in 1998–1999. As one informant explained: 'In retrospect, the targets didn't produce the results that they hoped for. In the end, RTTCP was a lot of money down the drain.' Perhaps this assessment is too pessimistic. Vale counters: 'If we didn't have the bait system, the whole of Zimbabwe would have gone down. All gone down.'

Enter the nuclear solution

In the tsetse control field there seems to always be some group somewhere who has managed to convince someone that 'their' solution is going to work, and should be the next big thing. The Sterile Insect Technique (SIT) promoted by the International Atomic Energy Authority (IAEA) – based in Vienna with a UN mandate– gained prominence through the 2000s (Feldmann and Parker, 2010), just as other options and their funding were faltering.[9] This came from an unusual source, and was presented as part of the IAEA's advocacy of 'peaceful uses' of nuclear technology.

Based on successes in the Americas with screwworm, SIT is based on irradiating male insects and releasing them in very large numbers; it is an 'area-wide' eradication approach. This was presented as part of a strong narrative of eradication by the African Union (AU), specifically the Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC). John Kabayo, then PATTEC coordinator, argued: 'the application of the area-wide principle that is planned [has a] goal to continue the interventions in each identified area until confirmation of local elimination of the tsetse populations' (Kabayo, 2002, p474). As one commentator recalled:'PATTEC provided a renewed spurt of interest. It was like Godzilla rising out of the ashes.'

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The idea of eradication goes down well with veterinarians and policy-makers. Getting rid of the vector of a major infectious disease is a great achievement; everyone wants to replicate the iconic eradication campaigns for smallpox and rinderpest. Selling this potential is very much part of the rhetoric, even if the likelihood of this ever happening is exceedingly slim: 'SIT needs to be seen as part of a success story. This is what attracts people', explained Feldman of the IAEA during an interview. He went on, acknowledging the limitations, 'Of course it depends on the situation... SIT is not applicable everywhere... It is always part of an integrated approach.'

The IAEA had tested their approach on the island of Zanzibar – in fact in a fairly isolated patch of forest – and through prior suppression of the population by 95 per cent using traps. The elimination of tsetse from the island required the repeated release of sterile males over several years, and with the expenditure of perhaps millions of dollars – but they eventually managed to eliminate the tsetse fly from the area (Vreysen et al., 2000; Vreysen, 2001). This was glorified as 'winning the battle' and 'waging a war'– the final solution to the scourge of the tsetse fly across Africa.[10]

But as someone commented: 'SIT in Zanzibar worked. It was one species, on an island, with 1000 km sq of infestation. But on the mainland it's a different story.' Everyone, of course, likes a success story, no matter how peculiar, context specific and expensive. The details can be brushed under the carpet for the purpose of the big sell, and then the subsequent details worked out. The IAEA are not the only organization, and SIT not the only technology that has used such a tactic in the harsh world of competitive funding. As one informant mentioned: 'The key is generating success stories. Everyone wants to be part of a success. Then donors will want to be involved. And governments. Research is needed to demonstrate tangible successes.' Gaining a strong political ally in the AU, deploying an articulate African advocate in John Kabayo and inveigling your way into the international bodies was also part of the strategy.

The SIT approach, and the role of the IAEA and PATTEC's advocacy of SIT, provoked massive controversy, outrage and anger among the small tsetse and tryps community. According to some: 'The SIT approach has been massively oversold.' Some of this was of course jealousy: how dare they capture the increasingly scarce funds when we have worked so long and hard working out solutions? But part of it

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was legitimate scientific concern. One scientist reflected: 'SIT is only applicable if eradication is the objective.' A vicious war of words ensued, with a variety of papers, vitriolic responses and harsh critiques offered. David Rogers and Sarah Randolph from Oxford University responded in scathing terms: 'PATTEC's proposals ignore the lessons of history, deny certain undeniable ecological facts, require a degree of coordination that seems unlikely, and will surely lead to increasing foreign exchange debt with very little to show for it' (Rogers and Randolph, 2002, p534). The controversy sparked big debates in the scientific literature. In particular there was a to-and-fro of different models, each arguing for and against the efficacy and efficiency of the SIT approach, especially in comparison to others (Vale and Torr, 2005; Barclay and Vreysen, 2011; Hargrove et al., 2011; Bouyer et al., 2013; Shaw et al., 2013).

My interviews almost inevitably turned to this subject. Views were heart-felt and strong: 'Now it's a big political thing. This is my view. It's a sexy way of giving nuclear power a jolly green ecological face. Nuclear power, as a green, alternative, clean solution', argued one informant. Another commented: 'IAEA is distorting what is happening. SIT is hugely expensive. It requires massive suppression to work at all. And why would you do SIT when you have other perfectly good and cheaper alternatives?' Another observed: 'It's all ridiculously complicated and expensive', while another commented: 'Anyone who believes this can work is crazy.' Accusations of skulduggery were often not far below the surface:

> It's a political game. It is the basis for an awful lot of corruption. SIT involves a lot of funds. The fly factory that comes to your area brings benefits, they say. But the Ethiopian one has not released a single fly.

Others were more compromising: 'I have nothing against SIT. A tool, we have it. Under certain conditions it can work. If the tsetse population is isolated, and the chance of reinvasion is zero, and suppression can be implemented, then, yes, SIT can work.' Indeed, the overall evolution of the debate was acknowledged by some, and heavily emphasized by IAEA. An outsider commented: 'PATTEC has evolved… A shift from eradication to sustained control… it's more sensible now.'

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Drugs and vaccines

Another suite of alternatives has focused not on the vector but on the parasite itself through the development of prophylactic and therapeutic drugs for animals, as well as that ultimate Holy Grail, a vaccine. A range of drugs were developed from the 1950s, and later came off-patent, and have been produced as generics for very low cost since the 1990s. Also, over the last 40 years there have been attempts to produce an animal vaccine.

The drugs (notably diminazene aceturate (mostly for chemotherapy), isometamidium chloride (for chemoprophylaxis) and homidium salts (for chemotherapy)) are reasonably effective and relatively easy to administer, and especially as generics very cheap.[11] This can be, advocates argue, a livestock owner-led solution, delivered through agro-vets and the private sector drug companies, and so not reliant on large-scale government-led control campaigns, at least for animal trypanosomiasis. A unique mass treatment campaign for cattle has also been used to control the zoonotic parasite in Uganda.[12]

A private sector solution, especially developed through PPPs, is very much in vogue. GALVmed, for example, is modelled after approaches that have been successful in the human health domain.[13] GALVmed articulated an argument for a medical solution, using the latest recombinant genetics technologies, cutting-edge drug development platforms and novel approaches to private sector development and delivery. As a technology development broker and market initiator, they have argued that they could be the missing piece of the puzzle in the task to deliver new technologies to tackle neglected livestock diseases in poor areas of the world.[14]

The new class of drugs will, they argue, meet the increasingly stringent regulatory requirements that national governments and international protocols require. Such regulations, they claim, will make their new products competitive. While the market is relatively small, it is not insignificant, and as producers have higher-value animals to protect the incentives to protect them will increase, they contend.

There are quite a few uncertainties in this argument. Much relies on the control of the cheaper, lower-quality generics (and counterfeit) market, and the convincing of producers that a higher-quality product is worth paying for (Bardosh et al., 2013). Others question the push for greater regulation, arguing that the informal markets

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are actually providing reasonably good-quality products:

> There is a real push back from vets and companies. The market is so small. There is just enough cash in trypanocides to attract the private sector, but only just. They want quality control. More vets, more cars. Our work showed in West African markets in the mid-2000s, formal and informal, we didn't find anything bad. Counterfeits are rare. Generics are low price, so there's a low incentive. They have been off-patent for 10–15 years, so there is a mature market now.
>
> *(Interview)*

Clearly much hangs on the extent of low-quality and counterfeit products in the market, and the implications this has for longer-term problems of resistance, that is in turn compounded by widespread underdosing.[15] Disputes remain over the extent of the market for new products, given the mature generics market, the level of local demand and ability to pay and the scale and impact of under-dosing, sub-standard products and drug counterfeiting.

As with many technology-driven efforts, the investment in drug development has gone into the upstream science, and not into the downstream market testing and delivery. As one informant noted:

> There is a gap. Ideas are developed in isolation of thinking about the delivery systems. Unless you develop the technology with a delivery system in mind, it will end up too expensive, and sit on the shelf. Tryps falls into this problem.

This would not be the first time a new technological solution, even if it worked well, met an early fate, as the assumed mass of consumers refused to buy it. The real challenge, often poorly recognized and understood, is the social and political context of such markets (Kingsley, 2015). There are plenty of vested interests in not regulating drugs, and keeping poorly performing generics and counterfeits. Even if these were overcome, the ability to regulate drug markets in remote rural settings is very limited. And in any case the costs of off-patent drugs are so low that competitors would have to offer very substantial added value. While some claim that low-quality drugs, counterfeits and under-dosing is a real problem, others argue that it is not such a problem, and that livestock keepers have developed capacities to discriminate between drug types, and have good knowledge of application processes.

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Excerpted from *One Health: Science, Politics and Zoonotic Disease in Africa*

Most commentators regard the pursuit of new drug discovery channels as a useful thing to do, although questions are raised about how much de-risking support should be offered to large private pharmaceutical companies from public aid or philanthropic money. However, the same view is not shared when the technology development is focused on a vaccine, which has recently regained some traction.

Vaccine development for trypanosomiasis has a chequered history. Part of the Consultative Group on International Agricultural Research (CGIAR) system, the International Laboratory for Research on Animal Diseases (ILRAD) spent the best part of 30 years from the early 1970s in pursuit of a trypanosomiasis vaccine (ILRAD, 1991). The effort failed completely, and the work was finally shutdown in the early 2000s after a thorough-going review (e.g. Budd, 1999). An International Livestock Research Institute (ILRI) insider commented: 'There was good science, but it was a random walk. There is no point in fiddling around with more and more responses. There was not a rational basis for continuing.' In a similar vein: 'We spent the whole of the twentieth century learning that [tryps] vaccines don't work . . . donors don't have technical advisors who can say "hang on a minute". It's a tragedy of Shakespearean proportions. So much money wasted!'

There are good reasons why vaccine development is difficult, if not impossible. This has to do with the way trypanosomes change their antigenic covering, making it virtually impossible to generate a vaccine response:

> Now we have the Gates programme, and silver bullets and grand challenges. Everyone wants a new vaccine or drug . . . ridiculous... There have been some very clever people over 20 years doing research on tryps showing that they change their coat – not even in response to antibodies. There are thousands of genes controlling the coat, and it changes all the time... It will be a total waste of money.
>
> *(Interview)*

Certainly the allure of the technological silver bullet is strong. However, unregulated drug markets are difficult ones to compete in. Beyond the technical difficulties of achieving a vaccine solution, there are other delivery questions that have yet to be addressed. The prospects of a commercial vaccine emerging look slight and vaccine development is a way off. That the well-funded institute ILRAD failed over 40 years is witness to the steepness of the challenge. Sceptics argue

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that there are cheaper solutions that are possible, and the funds could be better invested elsewhere, while others counter that pursuing all options is essential.

Breeding resistance

Another long-running story in tackling animal trypanosomiasis has been focused on breeding. There are a number of indigenous cattle breeds, most notably the N'dama and West African Shorthorn breeds, that show characteristics of trypanotolerance (Roberts and Gray, 1973).[16] The International Trypanotolerance Centre was established in The Gambia in 1982 to build on this.[17] Making use of this genetic material in cross-breeding efforts was, it was hoped, a route to producing better-quality (larger, with greater meat and milk production potential) breeds that were also trypanotolerant. The International Livestock Centre for Africa (ILCA), and then ILRI, were engaged in this research in The Gambia and Senegal and had a number of core breeding herds across West and Central Africa that were integrated into the cattle breeding programmes over a number of years (Murray et al., 1984). The results were mixed. As many have argued, small, indigenous, low-productivity animals that have repeated tsetse challenge are often resistant to trypanosomiasis.

This is why trypanosomiasis is not regarded as a major animal health priority by people in tsetse areas, especially if the challenge is slight, occasional or can be avoided (Torr et al., 2011). It is only when people and animals move in from outside, or when susceptible breeds are used as in large-scale ranching operations, that it becomes a big problem, it is argued. It is a question less of disease challenge than of type of production system. Indigenous systems for a range of reasons were always quite resilient, and with a judicious combination of approaches, including the use of local breeds, this could be the same again.

This approach of course does not chime well with the objectives of technology centres who seek a technical solution, and see their role primarily as focused on milk and meat production. As someone put it: 'These resistant breeds are too small and unproductive for the breeders.' Trypanotolerance evolves through co-existence with the disease, and so is not easily transferrable: 'Over time, trypanosomes become tamed, domesticated. They become used to domestic livestock. Where you give it time, where tryps and livestock live together in a farming landscape there is

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less of a problem; it goes away.'

The search for a generic technical solution, however, continues. Breeding in particular has been given a new lease of life by a new generation of biotechnology solutions, allowing genetic screening and the ability to insert transgenes and so speed up the process of selection dramatically. From Dolly the sheep to Tumaini the cloned calf, some important scientific developments have occurred. A collaboration between ILRI, the Roslin Institute in Scotland and Michigan State University resulted in a transgene from the trypanosomiasis-resistant baboon being inserted into a cow.[18]

Is this the genetic silver bullet everyone has been waiting for, or yet another interesting scientific diversion, involving lots of funds, plenty of scholarly papers but no useful product? Only time will tell. Certainly the motivation and incentives towards a technical solution remain strong, and the biotechnology advocates will not shy away from making massive claims about the potentials.

Conclusions

In a global policy debate centred on an inclusive politics of collaboration and integration, the history of trypanosomiasis and tsetse research and control reminds us of how prevailing institutional politics and entrenched interests remain very much embedded within narrow scientific and practitioner networks. A parasite and vector very much amenable to a One Health approach, trypanosomiasis reveals the entrenched world of tropical disease research, and its contested social arenas. This story is often told in terms of scientific 'facts' or economic 'models', but it is one where science is deeply conflated with competing power, prestige, control and authority. Disease and vector control options support careers, professional interests and institutional positions. All research and intervention efforts are thus deeply political, and socially embedded in long personal and institutional histories. Scientific practices are often co-constructed with political and institutional power; scientists assert control over the problem, and so the solution. While there is much rhetoric about integrated solutions, holistic approaches, and 'One Health' policies, the practice, as this chapter has shown, seems to be very much about a narrow control framing, a technological focus, the defining of territory and so the capturing of resources – so essential for African veterinary departments whose

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budgets have been squeezed.

Despite the nods towards broader systems understanding, integrating veterinary, medical and environmental disciplines and holistic solutions, the tsetse and trypansomiasis community remains narrow and compartmentalized. The earlier calls for integration, and listening to local livestock keepers, of John Ford and others have not been widely heeded. Claims of 'One Health' and 'integrated pest management' are ever present, but most activities are fragmented, unconnected, poorly integrated, and too often based on limited data, evaluation and review. Attempts at integration and coordination either get captured or become talking shops of limited value. One of the major problems is that the politics at play prevent the more long-term approaches often needed to successfully control the disease and build capacity at the local level with district teams, livestock-keepers and communities. Funding is tied to a particular narrative and project: of a problem, a solution, a technology, an approach and a scientific network; and competition among the epistemic community enacts turf wars, feuds and animosities.

This tells us something relatively straightforward about the rhetoric of 'collabo-ration' and 'integration' dominating the One Health agenda. First, navigating political and institutional barriers is key to getting over the unhelpful competition between control approaches. Funding and governance pathways, if re-directed and re-envisioned in ways that account for contested histories and the ultimately political processes at play, may co-construct the scientific network in ways that incentivize new forms of collaboration and integration. Second, realizing the rhetoric of a more integrated One Health approach in practice would require moving beyond the science, towards a better linkage between the disease and those affected by it. What do livestock keepers think? What constraints do they face? What control modalities would work best, in what combinations, where and for whom?

Building a One Health approach would require investing in more capacity building and institutional strengthening at the local and national levels (Smith et al., 2015). In this way, the problem is not so much centred on the fly and the disease, but on the lack of infrastructure, governance, markets and wider development activity. Debates and agendas currently dominated by global donor and research institutions need to be re-directed towards more locally grounded perspectives

that emphasize the need for collaboration and integration in practice. Realizing this demands diverse views to be incorporated into the scientific and social networks of disease control – beyond the narrow cliques focused on control methods and associated technologies. Understanding the limitations of past technologically centred approaches, and the way science and policy have been co-constructed, as has been attempted in this chapter, can help us open up approaches to alternative pathways that are more integrative and sustainable, and more genuinely embracing a One Health perspective.

Notes

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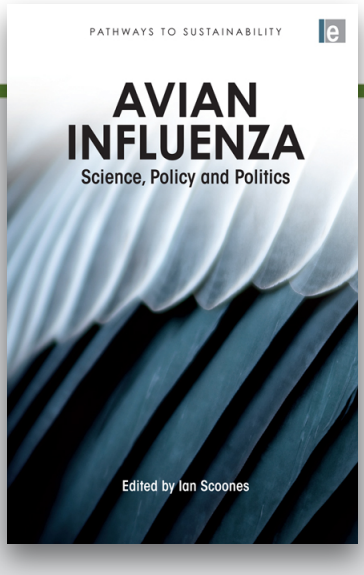
CHAPTER

3

ON A WING AND A PRAYER

AVIAN INFLUENZA IN INDONESIA



This chapter is excerpted from
Avian Influenza: Science, Policy and Politics
edited by Ian Scoones.

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AVIAN INFLUENZA IN INDONESIA

Excerpted from *Avian Influenza: Science, Policy and Politics*

Paul Forster

Tek kotek kote
Anak ayam turun sepuluh
Mati satu, turun sembilan...

Cheep-cheep, cheep-cheep, cheep-cheep
Ten baby chickens run around
Then one dies, and nine survive...
(Popular nursery rhyme heard in Majalengka, West Java, 17 August 2008
To be repeated, counting down...)

Introduction

Indonesia is more affected by H5N1 highly pathogenic avian influenza than any other country in the world. Since 2003, when it was first detected in central Java, avian influenza has spread to 31 out of 33 provinces, caused $470 million in economic losses,[1] disrupted the livelihoods of over 10 million people who are dependent on the poultry industry[2] and killed 115 people out of 141 confirmed human cases, mainly children and young adults.[3] Indonesia has also received the largest financial commitment to fight avian influenza from the international community, totalling over $132 million.[4] This has resulted in huge programmes of surveillance, culling, vaccination, and information and behaviour change communications, led largely by UN agencies, and some improvements to the health system. Despite these efforts, avian influenza remains endemic in Java, Sumatra, Bali and Sulawesi, and sporadic outbreaks continue to be reported in other areas.[5]

Historically, and today, Indonesia experiences economic uncertainty, inadequate infrastructure and regular natural and unnatural disasters, as well as separatist agitation and intermittent sectarian violence. The size and geography of the country also conspire against an easy response to avian influenza, and complex social, cultural and political factors are at work. Over half of all households keep poultry at home, and chickens, together with other birds, play an important role in culture and provide the poorest with something to eat and trade. Indonesia is also a numinous culture. Fatalism and humility prevail in the face of threats from the

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natural world in particular. Despite being an ideal place for a human influenza pandemic to start, there is little popular conception of such an event, and poor comprehension of its consequences. Understanding policy processes must take such contexts into account. How risks are understood, and how responses are framed, are very much located in particular ecological, social and political contexts, and Indonesia presents its own distinct set.

Politically, Indonesia is a dynamic young democracy emerging from 40 years of autocratic rule. Created out of political repression, economic hardship and the triumph of people power, today's political environment might be characterized as a democracy in formation, where protest is usually met by political compromise. This makes any robust response to avian influenza politically challenging. At the national level, and at that of 456 autonomous districts and municipalities, there is little trust in government. This is sometimes justified. Despite good intentions, all post-1997 administrations have suffered a degree of continuity with those of the past, which were characterized by institutionalized corruption, opaque processes and collusion with business interests. The complex relationship between the state and its bureaucracy – a vast, decentralized network of local governments and administrations – and the people, be they peasants or industrialists, is central to understanding the policy processes surrounding the emergence of avian influenza in Indonesia, and the responses to it. As this chapter shows, the relationship is neither straightforward nor fixed, and has led to a situation that is challenging the ideal plans of the government, its donor supporters and the implementing agencies. How will Indonesia – at the epicentre of the global avian influenza epidemic – choose to relate to the rest of the world, which is fearful of the consequences of a human pandemic? Here tough geopolitical debates about equity, public goods and global responsibilities arise, illustrated most starkly in the controversy surrounding virus-sharing.

The chapter is based on around 40 interviews in Indonesia carried out during 2008. First it outlines the geographical, economic, ecological, cultural and historical context of Indonesia. A description of political events since 1997 leads to an analysis of the current political situation, in particular the challenges posed by decentralization and the legal system. The late reporting of the initial avian influenza outbreak to the OIE is investigated, and the chapter contrasts major events related to avian influenza with other, competing, events. The role of poultry in everyday life and commerce is described and the responses to avian influenza

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are elucidated through outlines of the roles and activities of the national coordinating agency, and related national and international bodies. This is divided into sections covering agriculture, public health and communications. One objective is to identify both the dominant, and neglected, actors, networks and narratives (persistent storylines) involved, and their interactions or the lack of them. Finally, Indonesia's recent refusal to share human H5N1 virus samples is investigated and some conclusions are offered.

Poultry and people: The disease context

Some 30 million homes, 60 per cent of all Indonesian households, are estimated to keep around 300 million village chickens (*ayam kampung*) and/or ducks (*bebek*) and quail (*burung puyu*) in their backyards (Normile, 2007, p.31). Wild fowl were probably first domesticated in southeast Asia and foraging chickens are a common way for poor people to earn additional income and secure food. Backyard poultry also act as a form of capital, which can be sold to pay for items such as school uniforms and medical bills (Padmawati and Nichter, 2008). *Ayam kampung* eggs and meat are considered superior to that of commercial broiler chicken (*ayam potongan, ayam daging*) and the meat has about twice the market value: $3 per kilogram compared with $1.50 (Padmawati and Nichter, 2008). Beyond money and food, many Indonesians – particularly the Javanese, the Sundanese and the Balinese – have a strong affection for poultry and other birds. Poultry hobbyists, pigeon-racers and song-bird and fighting-cock owners abound, together with live bird markets. On Bali, chicken and ducks play important roles in religious ceremonies, which occur frequently. A cultural concept exists for the way that birds are kept that is not captured by either the 'pet' or 'livestock' concepts of the west. One respondent stressed that they were not pets: 'They don't have names and usually end up in the pot'.[6] Others spoke of a sense of 'completeness' they add to a household:

> *Indonesians, especially those from Java, love to hear the rooster crowing in the morning. Negative images are simply not understood because chickens have been a part of life for as long as everyone can remember. As well as food and money, they are pride, prestige, even toys.*[7]

Whilst this picture holds true for much of Java, with just over half the population, the same cannot be confidently said of the rest of the country, which is ethnically

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and culturally diverse. This poses a further set of challenges to a uniform and consistent response to avian influenza. Attitudes towards birds and poultry, as well as to disease, responsibility, authority and practically every aspect of life and the world, are all culturally located and highly variable.

The commercial poultry (*ayam negeri*) sector is large and well organized, employing over 1 million people (Padmawati and Nichter, 2008, p.32). Historically, production rose at an average rate of 15 per cent per annum from 1989 to the start of the economic crisis in 1997, and post crisis the growth trend recommenced.[8] The industry is strongly concentrated in Java and the largest companies are very profitable.[9] In the government's first Five Year Plan (1969–1974) high priority was given to increasing poultry production as a means to provide protein for an increasing population, and in the early 1980s the government passed a decree that regulated the size of commercial laying farms to 5000 birds. One objective was to spread business and employment opportunities; another was to limit the spread of disease in poorly managed large-scale poultry units (Kristiansen, 2007). The policy was very successful. Indonesia now produces more poultry on less land to feed more people than any other place on earth.[10] As part of general deregulation of the economy, government support was largely abandoned in the late 1980s and much of the growth since then has occurred through vertically integrated production units controlled by a limited number of large-scale feed manufacturers. Arguments for this approach have included easier access to veterinary and technical services (Ritter, 1984). The industry has grown rapidly because of increasing domestic demand, a ban on imports of poultry parts and strict inspection and 'halal' certification requirements (Fabiosa et al, 2004). Protection for the rice industry is also supported by all major political parties (Fane and Warr, 2007).

Encouraging domestic production and promoting rural employment has resulted in the need to import feed and other inputs (Fabiosa et al, 2004). From a low base in the 1980s, imports of soybeans and corn quadrupled with the expansion of the poultry industry between 1991 and 1996. Now Indonesia imports over 1 million tons a year of each of the major feed ingredients and roughly 80 per cent of imported corn is used for the production of poultry feed (Fabiosa et al, 2004, p.1). In 2000, imports came mostly from the US (83.8 per cent market share), Brazil and Thailand (8 per cent each). Feed costs in Indonesia are consequently higher than elsewhere. Typically in Europe or the US, feed comprises 60–70 per cent of the

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costs of layer egg production, while in Indonesia it is usually above 90 per cent (Kristiansen, 2007, p.60).

The 'big five' integrators are PT Charoen Pokphand Indonesia, PT Japfa Comfeed, PT Wonokoyo Rojokoyo, PT Sierad Produce[11] and PT Leong Hup [Leong Hup Holdings Bhd] (Kristiansen, 2007, p.60). Sumiarto and Arifin (2008, p.10) suggest the first three of these companies have shares of total production equivalent to 27 per cent, 23 per cent and 19 per cent respectively. Fabiosa (2005) adds PT Manggis, PT Cipendawa Agroindustri and PT Cibadak Indah Sari Farm as large producers, and PT Cheil Jedang, a Korean company located in Indonesia, and PT Galur Palasari Cobbindo are also significant players. The leading companies are parts of complex business conglomerates. Kristiansen (2007, p.60) suggests that elements are owned by individuals with close connections to the family of the former president. Aside from poultry farming and feed production and distribution, other activities in these conglomerates include poultry shops (providing feed, equipment and drugs), egg distribution, butchers' shops and fast- food restaurants. Most breeds for chicken egg production in Java and Bali come from one hatchery, PT Multibreeder Adirama Indonesia Tbk, which is owned by PT Japfa Comfeed, and most vaccine is supplied by one company, PT Medion in Bandung.[12]

Simmons (2006, p.437) suggests total poultry numbers of just under 2 billion, divided into 68 per cent broilers, 22 per cent native chickens, 7 per cent layers and 2 per cent ducks, with Java having 60 per cent of the national flock. As well as being profitable, the poultry business is considered risky, especially for small producers. Even before the avian influenza outbreak, on average 5–10 per cent of birds were lost to illness, most notably Newcastle disease. Such birds are (or were) often eaten or sold to petty merchants who visit farms to buy such birds (Padmawati and Nichter, 2008).

The Indonesian experience fits the common pattern of rising incomes and urbanization leading to increased consumption of animal protein and reduced consumption of rice and other starches. Chicken is the most popular meat in Indonesia. In 2005, national consumption was around 1000kt or 4.45kg per head, compared with beef at 2.4kg and pork at 2.6kg. Imports in 2005 were tiny at 2kt and exports zero (Vanzetti, 2007, p.4). Indonesia does not have the sanitary standards required for export to the European Union and Japan, and exports were minimal even before the avian influenza outbreak. In 1999, 50 per cent of the

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total broiler production was sold as live birds. Integrated producers dispatch roughly 30 per cent of their output through modern processing and slaughterhouses, which generally sell to restaurants, supermarkets and food processors, and 70 per cent to traditional outlets (Fabiosa, 2005, p.5). Komite Nasional Pengendalian Flu Burung dan Kesiapsiagaan Menghadapi Pendemi Influenza (KOMNAS FBPI), or the National Committee for Avian Influenza Control and Pandemic Influenza Preparedness, figures suggest that around 1.2 billion chickens are consumed each year nationally.[13]

In addition to 70 per cent of commercial production, all independent production goes to an estimated 13,000 live poultry markets, or is consumed at home. In Jakarta, for example, live markets account for 80 per cent of the chickens consumed each day. Normile and Enserink (2007) calculate this to be 300,000 to 400,000 birds daily, but interviewees suggested that the figure is probably closer to 1 million.[14] Women, who usually provision the household, consider it safer to purchase a live bird and have it slaughtered than to buy a dressed bird (Padmawati and Nichter, 2008). For many, halal slaughter is important. Supermarkets are not trusted, especially as suppliers of frozen chickens, which many believe have been injected with water. Most layer farms are privately owned and operated, ranging in size from 500 to 15,000 birds. Eggs are collected daily and sold unwashed to local traders who distribute them. If birds become ill or stop producing eggs, they are usually eaten by the farmer or sent to market. A remarkable concentration of layer egg production exists around Blitar in East Java, with farms varying in size between 3000 and 100,000 birds. Farmers in the area complain that large cartels and their outreach of poultry shops and traders are strangling smaller producers. In other areas small-scale entrepreneurs claim to be excluded, citing limited information and knowledge, and uncertainties due to the concentration and market dominance of powerful business groups. Close ties are maintained between a number of large-scale feed producers and dominant groups of egg collectors and traders, who benefit from the status quo (Kristiansen, 2007).

The integrated broiler production system is a complex web of activity centred around poultry distributors who usually act as agents for large poultry companies, supplying day-old chicks, feed, medicine and sometimes vaccines to contract farmers. Typically between 500 and 5000 chicks are supplied to a set of 20–200 farmers who then raise the chicks for 33–40 days before returning them to the distributor or selling them to traders. Usually, the distributor will sell on to

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established clients such as restaurants and hotels, and the traders will supply local and national markets. Open trucks are commonly used for long-distance trading, but more locally, transport is by whatever means is at hand: trucks, motorcycles, even buses. Manure is harvested and dried for sale to farmers who use it as fertilizer. As one informant put it: 'If you were going to design a system to spread an infectious poultry disease, it would look something like this. Combine it with the number of backyard birds in Indonesia, and you have the virus flowing everywhere.'[15]

The lack of regulation and the self-imposed self-sufficiency of the industrial sector have not helped the situation. One interviewee explained: 'It's murky and secretive. There's commercial competition, rivalry and no understanding that there is a shared interest.'[16] Another said:

> *The big integrators are willing, but they are used to looking after themselves. They know they have a problem but they don't expect any solutions to come from the government. They don't trust the government's intentions or competence. There is no tradition of dealing with animal diseases. There is no tradition of co-operation for the common good. They know what bio-security is, and are actively trying to find and deal with the virus, through vaccination mainly, but they say, 'leave us alone. We know what we are doing. Please go and sort out the backyard farms. That's the problem'. Some of them practically dip their workers in disinfectant at every step, but if they are going to be brought in to the dialogue, they have to be spoken to in their own language. Pointing fingers don't work.*[17]

There are therefore a remarkable number of actors involved in the Indonesian avian influenza epidemic (see Figure 5.1). Aside from chicken meat and egg consumers, and the millions who consider backyard birds an important part of everyday life, over a million people are closely involved in industrial production: farmers, feed suppliers, processors, wholesalers, retailers, transport personnel and shareholders. The government is also involved, even though it would prefer not to be. These actors can be resolved into four main groups: consumers, backyard farmers, industrial producers and the government; and the challenges of avian influenza in Indonesia become clear when the associated networks, or the lack of them, are considered. Short of not purchasing items and staging protests, consumers have few rights in Indonesia, and form only fragmented networks, susceptible to media excitement. Backyard farmers too generally have no common

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voice, or networks, beyond their immediate geographical locations. They range from the desperately poor to comfortably off hobbyists, and the government tends to interact with them, for example following specific protests, and inconsistently.

Similarly, the industrial producers are only just coming to the realization that they have shared interests amongst themselves, and are still a very long way from seeing that they have any interests in common with the backyard sector. As yet, even the large and mid-sized producers consider themselves as having little in common. Large producers are more concerned about a consumer backlash and are keen to deny the existence of disease outbreaks publicly, for example, whilst medium-sized producers are more likely to acknowledge outbreaks in order to seek assistance and compensation from the government (Simmons, 2006). The government, despite significant attempts to coordinate a coherent position and response, still finds itself fundamentally torn between industrial and small-scale agriculture, as well as other imperatives. What, then, has been the context for policy-making in Indonesia?

Contexts for politics and policy-making

The Republic of Indonesia's 235 million citizens[18] inhabit some 6000 islands in a 17,508 island archipelago that stretches over 5000km between mainland southeast Asia and Australia. Ranked 107 out of 177 countries in the UNDP's 2007/2008 Human Development Index, GDP per capita was $3471 in 2006 (PPP, current international dollars) with 40 per cent of the population living on less than $2 a day (Asian Development Bank, 2008). Despite a slowing global economy, national economic growth reached a 10-year high of 6.3 per cent in 2007 with unemployment falling to 9.1 per cent, exports growing and the balance of payments account showing a surplus (McLeod, R.H., 2008, pp185–186, CEIC Asia database).[19]

Under Dutch rule for over 300 years, and one of The Netherlands' richest colonies in the 1800s, Indonesian independence was declared in 1945, recognized in 1949 and until 1965 the country was under the authoritarian regime of President Sukarno. This period was characterized by a nationalist, quasi-socialist economic policy that resulted in hyperinflation and economic stagnation. An attempted coup in September 1965 was countered by the army and subsequently between 500,000

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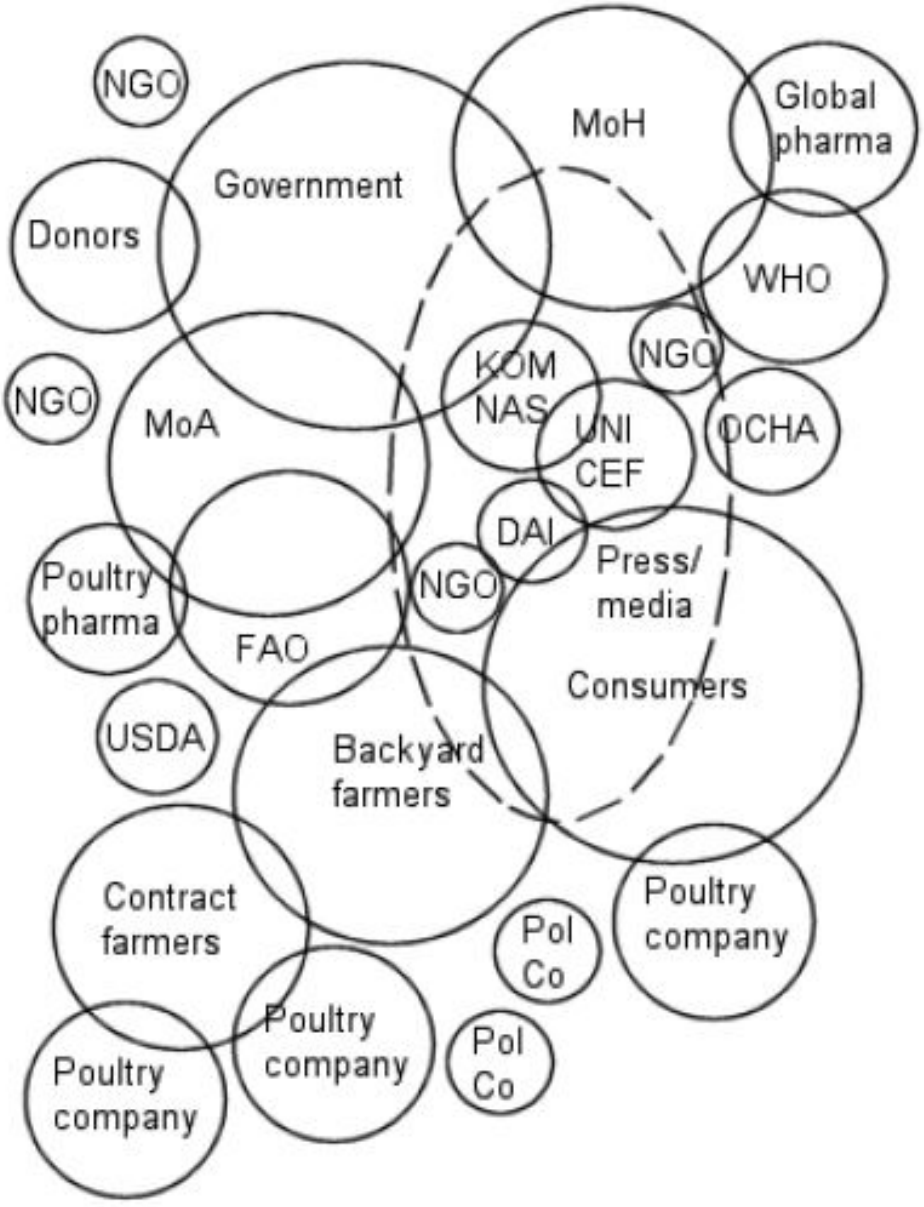

Figure 5.1 *Actors and networks*

Source: Author

and 1 million people were killed as alleged communists and supporters (Cribb, 1990). From 1968, when he was formally appointed, President Suharto reversed

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many of Sukarno's policies and initiated a 'New Order', which saw foreign debt rescheduled, an inflow of aid and investment and significant economic growth: the proportion living below the poverty line reduced from around 60 per cent in 1970 to around 11 per cent in 1997. More corrupt and authoritarian than Sukarno, Suharto and his close family also prospered, amassing a fortune estimated to be several billion dollars (McLeod and MacIntyre, 2007).

The 1997 Asian economic crisis devastated the economy and provoked dramatic political change. Popular discontent and resentment at the government's corruption manifested in urban riots and Suharto was forced to resign in May 1998. It was not until 2004 that the first direct presidential elections were held and Susilo Bambang Yudhoyono (known by his initials SBY) won a clear victory. SBY's administration has set a new tone of competence and political accountability and has acted significantly in the struggle against pervasive corruption. Economically, the country is more resilient than it has ever been, but significant patches of poverty and extreme contrasts of wealth suggest that it is brighter for some than others, and that a dangerous fragility may not be far beneath the surface. A number of questions arise. How can avian influenza be managed in such a setting? Are the existing political processes fit for such a purpose? How might they help or hinder the response?

Indonesia's system of government is both presidential and parliamentary in style, and has seen significant change since the beginning of the Reformasi era. Since 1999, constitutional and institutional reform has led to some important changes including direct presidential and parliamentary elections, a far-reaching decentralization programme, two-term limits for the president and vice-president and the creation of the DPD (Regional Representatives Council), in which each province is represented by four members. However, while policies are plentiful, implementation is another matter. One reason for the inability to defend and push through difficult decisions is that, compared with the two previous presidents, SBY does not have a natural constituency. If President Wahid's (1999–2001) ideology was founded in traditional Islam, and President Megawati's (2001–2004) in secular nationalism, SBY's touchstone might best be described as pragmatic populism, with vacillation or back-tracking common in the face of any opposition. Another factor fomenting against change is the fragmented multi-party political system (Reilly, 2007), as parties often form around distinct social groups based on ethnic, religious or regional identities. The status quo is also supported by the practical

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complexity of political life in 'rainbow' cabinets, where posts and state resources are distributed to neutralize party opposition.

Traditional Javanese political processes such as musyawarah (discussion, deliberation, consultation) are still very much in play. Analyses of Javanese concepts of power (see Anderson, 2006) see manifestations of disorder in the natural world, such as floods, eruptions and plagues, as symptoms (but not causes) of a lessening of a ruler's power. The implications for the response to avian influenza are manifold. First, political instinct would advocate ignoring it, or at least not acknowledging it as a substantial problem. Second, the protocols of power (as well as the associated, essential good manners) prohibit any sort of display of agitation, or real determination for the future to have a particular shape. Third, as the next section outlines, the control room of political order is still under construction.

A big bang: Decentralization

The World Bank (2003, p.1) calls Indonesia's 1999 decentralization legislation,[20] implementation of which began on 1 January 2001, a 'big bang'. One of the most centralized countries in the world was being transformed into one of the most decentralized. This was a key element in the reform strategy of the International Monetary Fund (IMF), proposed in 1998, and widely considered essential to resolve the regional and ethnic tensions that resulted from Java's historical hegemony and the policies of Suharto's 'New Order' (Erawan, 2007).

Change came in three areas: a direct electoral system, introduced in 2004, made the governors, district heads and mayors representatives of their constituents, rather than appointees of central government; local governments were guaranteed authority and discretion in policy innovation, with funding mechanisms put in place to enable regions to fulfil their autonomous functions, and the bureaucracy was restructured to emphasize local delivery. Most significantly, power was not devolved to the provinces, but to the districts and the municipalities. Consequently, in January 2007, Indonesia comprised 33 provinces and 456 autonomous local governments of which 363 were districts (regencies) and 93 municipalities (cities) (McLeod, R.H., 2008, pp.201–202).

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The responsibility for controlling avian influenza falls largely on the autonomous district-level governments, and national guidelines are only implemented when local officials think it is necessary and have the funds and local support to do so. Many interviewees suggested that this was the most significant challenge to controlling the disease in the country. One respondent was explicit: 'Decentralization is why avian influenza became established here, why it spread so rapidly, and why there is still no effective response.'[21] Another said:

> *In terms of dealing with an animal disease decentralization is a disaster. To pass responsibility to 440-plus autonomous administrations is absolutely ridiculous. The Ministry of Agriculture can do and say what it wants, but the districts don't have to take any notice, and nearly always don't. I guess their attitude is that there is no point to otonomi [autonomy] unless you are autonomous.*[22]

An informant from an international organization responsible for implementing elements of the avian influenza response said:

> *What otonomi means is that we have to negotiate with every district. Before we can start operating we have to get buy in from the local leaders and decision makers. We have to persuade them. Then we have to convince the local animal health people it's a good thing. And only then can we start doing the real work. It is a long and challenging set of steps.*[23]

The story in the health sector is the same. Padmawati and Nichter (2008, p.44) quote a WHO epidemiologist in Jakarta, interviewed by Associated Press:

> *The amount of decentralization here is breathtaking. Health Ministry officials often meet with outside experts to formulate plans to fight bird flu, but they are rarely implemented. Their power extends to the walls of their office. The advice must reach nearly 450 districts, where local officials then decide whether to take action.*

Otonomi was, however, not just a political ideology and a reaction to inefficient and corrupt central bureaucrats, but also a means to reduce central government expenditure, with local governments raising taxes from their own natural resources and business activities. In particular, veterinary services became an 'easy target' for cost cutting (Normile, 2007, p.31). As one source[24] put it:

> *At the provincial level we can find the Livestock Service, but in the district level we*

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> *cannot always find the Livestock Service since sometimes the Livestock Service is under another Service supervision, such as Agriculture and Marine Service. The Livestock service is positioned as sub-service [and beyond this, Animal Health is a further sub-service of the Livestock service]. This causes trouble in receiving and applying commands from the centre to eradicate AI, and is also sensitively related to the budget issues.*

Furthermore, the central state has no mandate to audit local governments, and district authorities are not obliged to report accounts. Examining the health sector in four districts (Central Java, Lombok, Kalimantan and Flores), Kristiansen and Santoso (2006, p.254) found no figures available for the real district government expenditure and concluded that 'there is a total lack of financial transparency and accountability in all districts'.

The results of decentralization are far from uniform. One significant factor is that income per capita is more than 50 times higher in the richest districts compared with the poorest, mainly due to earnings from oil and gas resources. Erawan (2007) reports significant variations in the style of politics across the country, with local state capture and rampant corruption in some jurisdictions, and deepening democracy and the emergence of effective government in others. Similarly there are variations in the avian influenza response and some 'pockets of excellence'.[25] Lampung in Sumatra is often given as an example, and regions in Kalimantan, which have only had sporadic outbreaks, are also deemed to have had some successes.[26] Similarly, Bali has been well coordinated since mid 2006 and South Sulawesi is often cited as a bright spot: 'The governor is engaged, there are some proper movement controls, and they are doing sensible things like paying compensation [for culling] and worrying about reclaiming the funds afterwards'.[27] One interviewee suggested taking advantage of this: 'If we could bypass the complex politics at the top, and reward regions that were responding well, the others might get the message and we could see a different picture emerging'.[28]

The bottom line, however, is that decentralization conspires against almost every conventional principle of stamping out an infectious animal disease. This requires comprehensive, consistent and coordinated action across the whole infected area. But with priorities, competencies, funding and even administrative cultures and languages varying across 450-plus autonomous regions the consequences are stark. Devising and implementing a national response consistent with the

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command-and-control principles of the international guidelines is an uphill task.

Legislation and the rule of law

Indonesia's legislation relating to animal health dates from 1967 (Law No. 6 on Animal Husbandry and Veterinary Hygiene) and does not cover an outbreak situation. According to one informant, the government does not actually have the legal capability to cull infected poultry.[29] A revision (provisionally entitled the 2008 Law on Animal Husbandry and Animal Health) has been in draft for over a year, but still has serious flaws. Critics find numerous shortcomings including: lack of clarity about to whom or to what the Law applies, lack of specificity in defining which diseases are notifiable and what the responsibilities of the veterinary authority are and an inadequate definition of epidemic diseases of livestock.[30] Decentralization, of course, complicates matters further. As an interviewee put it: 'Neither the national government nor the regions have the capacity to address the gaps in the animal health laws. They don't have the skills, they don't have the focus; they don't see it as a priority.'[31]

The situation is further complicated by politics. An informant offered one explanation: 'The agriculture minister does not have the necessary influence at the high table. This should have the highest priority. What can you do if there is no law?'[32] Within the Agriculture Department itself, matters are no less complex with the Directorate of Animal Health subordinate to the Directorate General of Livestock Services, and numerically and politically outnumbered by it. A respondent argued: 'Running Indonesia's animal health service is beginning to look like a poisoned chalice.'[33]

Even if appropriate regulations existed, enforcement would still be problematic.[34] Despite a determined anti-corruption drive, some argue that in the reformasi era corruption is especially damaging, because it is fragmented, incoherent and not under the control of a central force (McLeod and MacIntyre, 2007, p.3). Hadiz and Robison (2005, pp.237–238) conclude:

> *This regulatory state, like all modes of organising power, requires a social and political base which as yet does not exist in Indonesia … In the present conjuncture, save for isolated pockets of liberals in a few government ministries*

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and agencies, and some academics and intellectuals, the building blocks for such a vehicle are virtually nowhere to be found.

Consequently, the rationalist, science-led approach of the tried-and-tested international response to infectious animal disease, which assumes a Weberian bureaucracy operating in the context of a liberal democracy, runs aground in Indonesia. Should the international response to avian influenza therefore take account of these contexts? Imposing standard rational-technocratic policy solutions on contexts they do not fit is frustrating, and may be counter-productive. The following section looks at what happened when the H5N1 virus first appeared in the country.

The arrival of highly pathogenic avian influenza

Highly pathogenic avian influenza first appeared in Pekalongan in Central Java in August 2003 and by January 2004 it had spread across Java and into Bali, Kalimantan and southern Sumatra. In 2005, it reached Sulawesi, North Sumatra and Aceh, and in 2006, Papua. At the end of June 2006, 27 of 33 provinces were affected (Sedyaningsih et al, 2007, p.522) and, by mid 2008, all but two – North Maluku and Gorontalo – had reported outbreaks (Figure 5.2). In March 2008, the FAO described the avian influenza situation in Indonesia as 'critical', quoting FAO Chief Veterinary Officer Joseph Domenech: 'Despite major control efforts, the country has not succeeded in containing the spread of avian influenza in poultry',[35] and in September (FAO, 2008, p.49) the official verdict was that 'the disease remains endemic in Java, Sumatra, Bali and South Sulawesi, with sporadic outbreaks reported from other areas'.

Initial outbreaks are thought to have been in the commercial poultry sector, resulting from imports of live birds as breeding stock from China (Sedyaningsih et al, 2007, p.522; Vanzetti, 2007, pp.2–3). Thailand has also been suggested as the immediate source of infected birds.[37] Others say it is essentially unknown in which sector the disease first appeared, and where it came from. One informant said: 'The rumours say it was industry first, but that is all there is to go on. Rumour and hear-say.'[38] Phylogenetic analysis suggests that the Indonesian outbreak originated from a single introduction (Smith et al, 2006). The rapid spread is most commonly explained as a result of the movement of infected commodities, including

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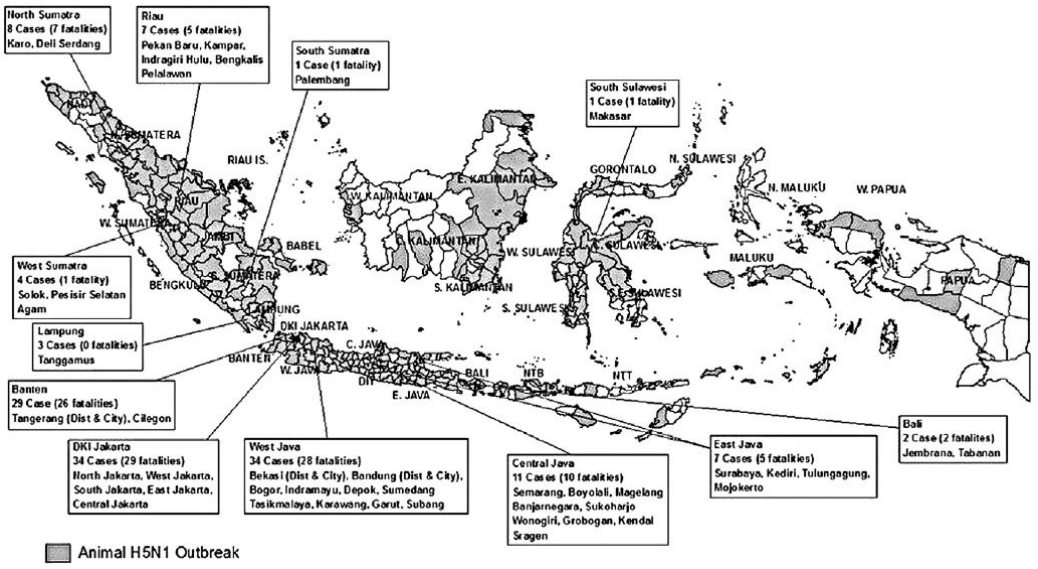

Figure 5.2 *Location of human H5N1 avian influenza cases and animal outbreaks on 26 January 2009*

Source: WHO[36]

commercial chickens (Thornton, 2007). The Indonesian government declared H5N1 infection to the OIE in January 2004 and on 3 February 2004 the Minister of Agriculture issued a decree declaring avian influenza a dangerous disease.

Between August 2003 and January 2004, at least 600,000 chickens reportedly died of the disease in 17 of Central Java's 35 regencies.[39] Some 10.5 million birds were reportedly lost in 2004 due to disease and culling[40] and, during peaks of infection in February–March 2005 and 2006, recorded monthly poultry deaths were 530,453 and 647,832 respectively,[41] with losses due to disease or culling estimated to be between 15 and 20 per cent of all poultry stock. In 2004, the combined effect of 50 to 60 per cent lower prices and 40 per cent lower sales volumes meant income reductions of 70 to 80 per cent for traders, and employment opportunities dropped by 40 per cent on larger poultry farms.[42] According to the chairman of the Indonesian Poultry Breeders Association, 2.5 million workers in an industry with an annual turnover of Rp50 trillion (US$5.95 billion) were affected.[43]

Many groups, including the press,[44] were quick to cry foul. The Chinese government had set a precedent for opacity in their cover-up of the 2002–2003

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SARS outbreak and the Indonesian government had doubtlessly been pushed to make an announcement. Confirmation of millions of avian influenza deaths by the East Java chapter of the Indonesian Association of Veterinarians was significant, as was the Malaysian and Singaporean governments' ban on poultry imports from Indonesia.[45] At a press conference, however, the then director general for the Development of Animal Husbandry, Sofjan Sudardjat, denied allegations that the announcement had been delayed due to pressure from the poultry industry, and suggested that the disease had been intentionally introduced into Indonesia by foreign parties. Industry was unsympathetic. 'The government is slow in handling the problem and is giving opportunities for the virus to spread to other areas in the archipelago. We have been asking for the vaccine since September', was the response of the Indonesian Poultry Breeders Association.[46]

A number of vivid conspiracy stories (see Box 5.1) surround the first months of infection, but those close to the matter have a more consistent and prosaic set of explanations. One informant suggested:

> *First, there was the matter of not believing it was avian influenza. Chickens die of disease regularly[47] and with no avian influenza reported in the country, there was no reason to think of it as an avian influenza outbreak. Second, there was no idea what to do. There were no reagents stored for testing, and with no scientific proof, it was easy for the Newcastle[48] lobby to influence the decision-makers.*[49]

Another said:

> *It was a cock-up rather than a conspiracy; bureaucratic inertia and incompetence rather than anything deliberate. The civil service here is very formalized, very hierarchical. You have to be deferential. If there was some technician with a test that was showing positive, he or she probably didn't show it to their boss for fear of upsetting them. It's possible too that the technical people, or even the regional bosses, were not aware of the need to report, or how to do it. Doing nothing is always the best course.*[50]

Once the news reached Jakarta, other factors came into play. As one interviewee explained:

> *Ministers travel all the time. They are expected to and whilst they are away nothing gets delegated, nothing gets decided. Whenever it was that some brave*

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soul had summoned up the courage to go to the boss and say 'we have a problem' there was a 50/50 chance the boss was away and nobody wanted to know.[51]

BOX 5.1 RUMOURS AND CONSPIRACY STORIES

Reflecting nationalist concerns, one of the most common rumours was that the US introduced the virus to destroy the Indonesian poultry industry and promote its own poultry exports and vaccines. Similar stories make China the protagonist, again looking to boost exports, with the government complicit as they would collect higher import taxes. More strategic analyses suggest that it was introduced by the US as part of a global plot to destabilize Islamic countries; or more specifically to weaken Indonesia, to make it more dependent on international aid and loans, and therefore behoven to the Western powers in need of its natural resources (interviews, Jakarta, 14 August 2008). Evidence given in support of this view is the fact that the disease arrived later in the predominantly Christian provinces (see also: www.indonesiamatters.com/1042/bird-flu/#comment-13469).

Domestic plots suggest that avian influenza was introduced by big business in league with central government to drive small producers out of the market by depressing prices and making factory-raised chickens appear safer (Padmawati and Nichter, 2008, p.38). Others, including some poultry farmers, hold that the government is exaggerating the problem in order to attract donor funds. Many are of the opinion that avian flu is being sensationalized by the press to sell papers (Padmawati and Nichter, 2008, p.42).

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Another suggested:

> *We don't know exactly what happened. The opinion is that it started in the integrated sector but the backyard farmers got blamed. They are a more visible target and have no way of putting their case in an organized way. It's easy to argue that poor and uneducated people are the source of the disease rather than big business. It might be the case that the industry simply does not want to 'fess up' [confess], but it is more likely that they see it as their business and their business alone. If they went to the government, would anybody say thank you to them? Would they get any help? No. They'd be told it's their problem, go sort it out, leave us alone, we have more important things to think about.*[52]

And the fact is that in 2004, as the virus was spreading rapidly across the most populated areas of the country, the people and the politicians did have other priorities. In June that year, the country had its first ever, and exuberant, free presidential election with a 70 per cent turn out. In September a terrorist bomb in Jakarta killed nine people and injured over 100. And on 26 December, the Indian Ocean tsunami hit. As one informant put it: 'After the tsunami, everything else dropped off the radar. This was understandable.'[53] The response to avian influenza must be juxtaposed with other demands on politicians' and bureaucrats' time and attention. The human death toll from avian influenza – 115 confirmed at 1 July 2009 – for example, slips towards insignificance when compared with the death tolls from other diseases and all manner of other natural and man-made disasters (Forster, 2009). Against this background, a more complex set of actors and networks has become involved with the avian influenza epidemic and the response.

The international response to avian influenza is largely driven by a sophisticated concept of a 'global public good', as illustrated by slogans such as 'One World, One Health' (see Chapters 1 and 2 of the book 'Avian Influenza: Science, Policy and Politics'). What happens when the international community, proclaiming global public good objectives, arrives in a place like Indonesia, where notions of public goods are fragmented, contested and highly contingent, and where an international public good appears very distant?

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The response: Networks and narratives

Actors associated with the avian influenza response include national, international and regional organizations. The Departemen Pertanian (Deptan), or Ministry of Agriculture (MoA), is in the front line, supported by the FAO. The Departemen Kesehatan, or MoH, is also involved, supported by the WHO. The national coordinating body is KOMNAS FBPI. This is a ministerial-level committee, headed by the Coordinating Minister for People's Welfare, Aburizal Bakrie,[54] was created by presidential decree on 7 March 2006. The committee has 14 members, including the agriculture, health, forestry, national planning (Bappenas) and industry ministers, the economics coordinating minister, the army commander, the police chief and the chair of the Indonesian Red Cross. The executive team includes six task forces that provide direction on research and development, animal health, human health, vaccine and anti-viral medicines and mass communications and public information. A secretariat and a media centre aid coordination between the ministries, with communications supported by UNICEF, and a similar structure has been established in a number of provinces.

Further to the presidential decree of 7 March 2006, on 9 May 2006 the Ministry of Internal Affairs issued a letter asking the regions to work with KOMNAS. This stipulated that they should prepare plans, take the required operational steps and monitor, evaluate and report every three months. The most important point however was the last: the costs were to be borne by the regional local governments.[55] KOMNAS and the related agencies are guided by the January 2006 National Strategic Plan for Avian Influenza Control and Pandemic Preparedness.[56] In 2006, the government allocated $57.3 million for control and in 2007 $52.9 million, with the chief executive of KOMNAS seeking $300 million annually.[57] By 30 April 2007, the international community had committed $132.32 million in grants (including $25.97 million from Australia, $16.16 million from Japan and $8.45 million from the US) and in kind (including $39.18 million from the US, and $12 million from The Netherlands), of which $92.84 million had been disbursed (UNSIC and World Bank, 2008, p.87). This is the most committed to any country.[58]

This adds up to a complex set of relatively well-funded networks. At the national level the response requires coordination between the MoA and MoH, and both organizations are required to coordinate with KOMNAS. This creates difficulties familiar to anyone who has worked in any civil service. 'We have two plans in one

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binder and call it "integrated"', says one closely involved respondent.[59] Another interviewee suggested: 'The Ministry of Agriculture doesn't talk to the Ministry of Health, and vice versa. Politics and personalities get in the way.'[60] And another said:

> *Agriculture and Health hate the KOMNAS role. They see avian influenza as their problem and ask why another organization should be involved. At the Bali simulation in April 2008, the MoH would not let their people wear the official jackets as they had KOMNAS on them. Another plan was to embed KOMNAS in the MoA, but MoA said, 'no way, this is our business'. You would not believe the level of dysfunction that exists. There's now talk of disbanding KOMNAS in 2010, but that's not helping, just adding to the air of uncertainty.*[61]

The international agencies, of course, have their own cultures, and are challenged in their own ways by organizational, disciplinary and professional divides. In Jakarta, a large FAO team is firmly embedded in the MoA, to the south of the city. A significantly smaller WHO team works out of more central MoH premises, and UNICEF and UNOCHA (Office for the Coordination of Humanitarian Affairs) both have independent offices. One respondent suggested: 'The internal [UN] bureaucracy is not helpful, especially when combined with that of donor organizations like the EC, which are not exactly nimble. The priorities of the donors are not necessarily the same as those of the country, and it's hard work making them fit'.[62] An informant explained: 'The focus of the response is very, very scientific and this does not fit the local context well. The science is important but it is not a solution on its own.'[63]

Perhaps the greatest fracture between the national and the international is in the conception of a human pandemic. Accepting the uncertainty of when, where and what magnitude, the international agencies and the individuals involved with them appreciate the science of viral evolution and the associated inevitability of a human influenza pandemic. But candidly, and almost without exception, every Indonesian interviewed admitted that they did not believe a pandemic would occur. One explained:

> *We have no word for pandemic. We just use 'pandemi'. We have 'wabah' for outbreak, but this is not pandemic. We have no picture of pandemic. We have no history of events like the Black Death. It is not part even of our imaginary world. Most people have more urgent and important things to deal with.*[64]

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An (international) interviewee said: 'There is no conception of the pandemic threat. Politicians need to buy in to this. Healthcare workers need to buy in to it. Everything is driven by the short term, the here and now.'[65] Another suggested: 'There are people working on the problem who care. But the average citizen does not care. It's like talking to people who don't drive cars about the importance of wearing seat-belts.'[66]

Thus the scale of the challenge for the international organizations leading the response to avian influenza becomes clear. In Indonesia, the fourth most populous country in the world, and one of the geographically, ecologically and culturally most complex, they have set themselves the task of implementing a rigorous and consistent set of programmes in a highly decentralized and politically dynamic environment which has not, as yet, provided the opportunity for significant trust to develop between civil society and authority, or vice versa. The scale of the problem, and the emergency nature of the response, has precluded much in the way of reflection, and the response to date has been driven by an overarching 'outbreak' narrative (see Wald, 2008), with veterinarians, doctors and communications specialists creating and driving modernist sub-narratives of surveillance, control and behaviour change.

But what constitutes an 'effective' response in the views of these different players? Details of the response are offered below, divided into sections covering agriculture, human health and communications. These distinctions reflect both the national administrative structures and the competencies and responsibilities of the international agencies involved. One question is whether such divides are appropriate, or helpful. A bigger one is what happens when the international community, driven and justified by science, and proclaiming public good objectives, arrives in the vague and relatively unruly world of the Indonesian countryside?

Chasing the chickens

'The plan was put together in a hurry in order to have something for the Beijing meeting,[67] but it was a good plan. The challenge is to make it work.'[68]

In mid 2005, the MoA in collaboration with FAO, WHO and other international partners, developed a National Strategic Work Plan for the Progressive Control of

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Highly Pathogenic Avian Influenza in Animals for 2006–2008 (MoA, 2005). It had an indicative, and ambitious, budget of $322,146,000 over three years. To date, in line with international advice, disease control has focused on culling with compensation recommended, vaccination, surveillance and community awareness, improved bio- security and movement controls. Until late 2007, this activity was almost exclusively focused on the 'backyard' sector – small farmers or hobbyists keeping poultry at home.

Early in the outbreak, in January 2004, the government responded to international pressure by announcing that it would cull infected birds and compensate small farmers.[69] Later that year, in July, the policy was extended to include mass culling within a radius of 3km of infected sites and testing within 20km and Rp82.5 billion ($8.42 million) was set aside to finance the measures and compensate farmers.[70] Only three days later, however, in Tangerang, close to where the first fatal human case had occurred, only 31 pigs and 40 ducks were slaughtered, with the Minister of Agriculture, Anton Apriyantono, saying that the government lacked the money to live up to its promise.[71] Despite a significant decrease in the number of scavenging chickens in some urban areas, this pattern of unfulfilled intention has very largely been repeated across the country, with Apriyantono explaining that mass culls would cause serious social unrest.[72]

The focus then turned, strategically at least, to focal culling and ring vaccination, and by mid 2008, 'very restricted voluntary culling' had become the norm.[73] Most surveillance is now active – MoA teams are actively searching for cases in the field – but faced with poultry deaths showing clinical signs of avian influenza, backyard farmers are supposed to contact their village head who informs the local livestock services office. In endemic areas MoA staff will then collect samples from sick or recently deceased birds, perform a rapid test for Influenza A and if positive implement a cull in the immediate area. Commercial farmers are supposed to report the event to their distributors who inform the local livestock services office, which sends a veterinarian to do a rapid test and/or take samples to a laboratory for polymerase chain reaction (PCR) and virus isolation tests. As part of the integrated plan, humans living nearby are sometimes tested too.

In practice, many backyard farmers are reluctant to report die-offs, especially if no family members appear to be sick. There is often suspicion of government officials, stigma associated with having an outbreak (Padmawati and Nichter, 2008) and

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uncertainty about how to identify the disease (particularly how to distinguish it from Newcastle disease) and to whom outbreaks should be reported. In some areas avian influenza is referred to as 'new' or 'strong' Newcastle disease (tetelo) or just 'plok', the sound of a dead chicken falling from a perch (Normile, 2007). Compensation has arguably raised more problems than it has produced solutions. According to government decree, the value of each culled chicken is set at Rp10,000 ($1 approximately), with only farmers having flocks up to 5000 eligible. But poultry market prices differ from one region to another, not every die-off is a result of avian influenza and there are practical difficulties in distributing any funds that might be available. Simmons (2006, pp.442–443) found only one of five producers interviewed on Bali and Lombok had been compensated. One interviewee, an egg producer, had had 2000 birds destroyed and was paid Rp2000 per bird, which he claimed had been negotiated down by government officials from the official Rp10,000.

An informant explained:

> *There is money available, but there is not enough and the mechanism is unclear. The provinces are supposed to make an estimate and send a request to central government, which will then disburse funds, but a) how do you make an estimate in these circumstances, b) any estimate then becomes a subject for drawn-out negotiation and c) in a low-wage environment where it is culturally acceptable for everyone to shave a slice for themselves or their organization, it's hard to make a system work where you have to deliver small amounts of cash to large numbers of people. The compensation itself becomes a matter of individual negotiation. Infrastructure, probity, efficiency, equity are all alien concepts.*[74]

The eye of the needle

Vaccination, which decreases susceptibility and virus excretion, is a familiar procedure in the industrial sector and widely used for a variety of poultry diseases, including Newcastle disease, but is unusual amongst backyard and mid-sized operations. Mass vaccination was first proposed in March 2004, with plans to provide 300 million doses of a locally produced vaccine free of charge to backyard and small farmers. Due largely to limited vaccine supply and a realization of the costs of such large-scale provision, mid 2006 saw a change of strategy to targeted

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vaccination, with 11 of the most affected provinces targeted.[75] At that time, a decision was also made to prioritize control in animals, epidemiological surveillance and information and public awareness, as these were determined to be most likely to have an impact on the spread of the virus (Samaan, 2007).

Implementing and managing mass vaccination campaigns in backyards and villages is a different order of activity from vaccinating in relatively organized industrial settings and Indonesia has achieved only partial success (see Thornton, 2007). A cold chain is required and Indonesia has seen recurring controversies over vaccine quality from both domestic and foreign suppliers, particularly China. Confusion has also arisen regarding the legality of importing vaccines and a scandal erupted in October 2005 in which officials were allegedly complicit with vaccine producers in lowering vaccine quality in order to boost profits.[76] Mass vaccination is doubtlessly hard to accomplish in a backyard setting and is unpopular with veterinarians. It requires repeated administration and owners are suspicious as birds sometimes die after vaccination (Padmawati and Nichter, 2008). One respondent explained:

> *In theory vaccination solves the problem, but implementing it on the scale required here is impossible. Imagine … you arrive in a village with 500 chickens wandering about the place. They belong to everybody and nobody. There are no fences and no coops. In all each bird will need five or six injections over a year – an initial dose, a booster after three weeks, and then a booster every quarter. This means that the catchers and the vaccinators will need to visit five times with the right vaccine which has been sourced and stored properly, and the right equipment, and deliver it correctly to the relevant animal. In the long term it is just not sustainable.*[77]

This situation is exacerbated by a lack of veterinarians and appropriately skilled people, particularly in provincial and district government service. The medical community too has reservations about the vaccination programme. The director of one of the leading avian influenza-designated hospitals has suggested that improper vaccination may be helping to spread the virus.[78] An interviewee was more explicit:

> *Half-baked vaccination programmes do nothing to help. The vaccine is too widely dispersed and there is no monitoring of drift. There are also questions about the virus strains being used. Vaccination seems to have repressed the virus to a degree, but it may well just be concealing the virus and complicating surveillance.*[79]

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Vaccination is a clear example of a rational, technocratic, international-led solution confronting a challenging context. Another is the notion of clear and comprehensive movement controls. The Quarantine Service is responsible for protecting each island from contamination by foreign and domestic animal diseases. It is, however, not under the control of the Directorate of Animal Health and suffers even more severe challenges of competence and resources than other parts of the national civil service. In 2004, transport of live birds (including fighting cocks) was banned between Java and the eastern islands, including Bali and Lombok. However certified day-old chicks and chilled and frozen poultry meat were still traded (Simmons, 2006, p.442). Poultry also continued to be smuggled, or moved by small traders who were unaware of the ban. Ketutsutawijaya[80] suggests:

> *Poultry smuggling in Indonesia can happen from island to island, and smuggling city to city within the same village [sic]. Smuggling is common due to the price differentiation is so big between each areas [sic]. Example, smuggling ducks from East Java province to Bali province. In Bali, duck price can up to Rp35,000 each, since many people demand ducks as one of the main component in their religious ceremony. While in East Java, duck price only Rp15,000 each [sic]. Chicken smuggling from Sulawesi and Surabaya heads to Papua. In Papua, chicken price is up to Rp150,000 each (kampong chicken). While in their origin place (Sulawesi and Surabaya), the price is only Rp30,000 each. Another smuggling area is Lampung to Java.*

As an interviewee put it: 'Anybody can move anything around. There is legal and illegal trading over a vast area. If you are stopped, you simply pay a tax and go on.'[81] Similar practical issues often pertain to matters such as caging, bio-security and the disposal of infected carcasses.

Science meets society

Since January 2006 the core of avian influenza control in Indonesia has been the Participatory Disease Surveillance and Response (PDSR) project, a collaboration between the MoA, local government livestock services and the FAO, supported primarily by USAID, the Australian Agency for International Development (AusAID) and the government of Japan. The project is based on a qualitative approach to epidemiology known as participatory epidemiology, which has the objective of

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developing and supporting a community-based response to detecting and preventing the disease by using local knowledge of where and when outbreaks are occurring and enlisting the local population in control efforts. The first phase of the PDSR project emphasized the detection and control by separate surveillance and response teams primarily in 'backyard' settings at the household level. Now, a broader village-level approach encompasses all poultry farmers, traders and community leaders; a greater stress is put on empowering communities to understand the origin, prevention and control of all poultry diseases, and better links are sought with veterinary services, where capacity is being developed.

By mid 2008, 2112 officers, including 353 qualified veterinarians and 945 people with no official animal health qualifications, were operating in 27 of 33 provinces across 331 of Indonesia's 448 districts. Supported by large-scale awareness campaigns in the national and local media, the PDSR teams visit villages, meet with community leaders, key informants and poultry farmers, with the objectives of gaining trust from the community and understanding historical and active poultry disease better. Each team reports their activities to a Local Disease Control Centre (LDCC), which enters reports into a database which is later compiled into a central database. When active outbreaks are encountered, the teams have rapid tests available to confirm avian influenza and, with support from the affected community, infected birds are subsequently culled and disposed of, infected properties disinfected, movement controls implemented and the local medical authorities or District Surveillance Officers contacted. From January 2006 to September 2008, PDSR teams made 177,306 surveillance visits, responded to 6011 cases of avian influenza and worked with over 2.1 million community members.[82]

The FAO-supported project has grown into a remarkably large enterprise involving recruiting, training and managing a large number of staff spread over a wide geographical area. At a number of levels, the PDSR project is doubtlessly a success. Non-veterinarians associated with the broader response comment admiringly on the scale of the operation, its organization and sense of purpose.[83] The locally orientated approach represents a significant attempt to meet the requirements of Indonesia's diverse complexity on its own terms. An interviewee associated with the project said:

> *Looking to the future, I'd say that it is projects like this that stand the best chance of helping to rebuild veterinary services post decentralization and the financial*

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> *crisis, and to evolve into a surveillance, prevention and control programme that addresses other animal and zoonotic diseases in the way that the One World One Health initiative is calling for.*[84]

Other respondents, some close to the project, are more critical. One suggests:

> *The problem is with the R in PDSR. The teams can measure but they can't respond effectively. They don't have the authority to cull. They can't vaccinate. All they can do is talk. This sometimes has the required outcomes, but what is required is an assured, standard cull and compensate response to isolated outbreaks.*[85]

Yet communication with industry is better, given hard facts about what is going on in the environment surrounding their facilities.[86] One interviewee suggested:

> *Industry is now more willing to talk about zoning and compartmentalization. We know that small farms are awash with the disease. We know that industry has problems, but not much more. The problem is probably linked and self-perpetuating. We need to know more about the market chains. We need to know more about feed. Only now is that work starting to be done.*[87]

Although relations between the international agencies and the government are significantly better in agriculture than in health (see below) and, by all accounts, the FAO in particular has a good working relationship with the MoA, political complications exist further up the ladder. One informant said: 'There needs to be priority and focus. This is basically an agricultural problem and agriculture should be leading. But agriculture people don't have the influence.'[88] Another suggested:

> *I don't believe agriculture has a high enough priority on the national agenda – the future is seen as development through industry and services – and I don't believe avian influenza is a high enough priority within the MoA. The CMU [avian influenza Central Management Unit] sits too low in the hierarchy … Funding is going down right now, and only the most long-sighted of the donors are prepared to commit to more than a year. You can't successfully address a protracted problem like this on a year-by-year basis.*[89]

Those close to the programmes are at pains to stress that, despite the challenges, there have been successes in controlling the disease in some regions. However, even if this is now appreciated, there are still significant uncertainties as to which

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aspects of the activities have been responsible. A standard cull-and-compensate approach ('stamping-out') is inevitably challenged and unpopular, unless the mechanisms and delivery of compensation are consistent, transparent and timely, which they are not. Given Indonesia's geography, lax regulatory regimes and under-resourced and inefficient enforcement processes, movement controls are not going to reach the required standards soon either. 'It only takes one chicken',[90] was how one interviewee put it, and that ignores feed, feet, feathers, meat, unwashed eggs, manure and more. Vaccination, the ultimate technological fix, solves the problem in theory, text-book style, but a question mark hangs over the practicalities of implementing it across every village and backyard in the country, as those who have been in the field trying to do it have pointed out most clearly.

However, whilst those involved in managing the response, especially those from the international community, have a clear understanding of the necessity of a robust response, and the (global) public good attached to this, such conceptions are not widespread amongst the population. Someone involved in a socio-economic study in Jakarta explained:

> *The people did not want to tell us they had poultry. They hid from us and they hid their poultry from us. We were blamed. They said we were stupid. Even though we were officials trying to help they were rude to us and didn't welcome us. It's very difficult to make them understand as they have been farming like this for centuries. They say: 'Look at us. We have chickens, but we are not sick'.*[91]

Yet, as will be discussed in the following section, people do sometimes get sick, and die.

Humans at risk?

'The biggest issue is that there is practically no understanding of germ theory in the population, almost no conception of it at all'.[92]

The first WHO lab-confirmed avian influenza A(H5N1) human case, and death, was reported in July 2005, a 38-year-old man from Tangerang near Jakarta, whose two daughters, aged one and eight, also died.[93] By 1 July 2009, Indonesia had more human cases, and more deaths, than any country in the world. Of the 141

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laboratory- confirmed cases, 115 have been fatal. West Java, the capital Jakarta, and Banten (on Java's most western tip) have seen the majority of infections, with 97 cases and 83 deaths. In comparison, Central Java has had 11 cases and 10 deaths, East Java 7 cases and 5 deaths, Bali 2 cases and 2 deaths, South Sulawesi 1 case and 1 death and Sumatra 23 cases and 14 deaths.

Direct avian-to-human virus transmission is the predominant means of infection and handling sick or dead poultry is the most commonly recognized risk factor (WHO, 2008c, p.262). Bird-to-human transmission is believed to occur largely by infected bird secretions being inhaled or transferred with contaminated hands to the mouth, nose or eyes (Vong et al, 2008, p.1304) with the virus replicating primarily in the human respiratory tract. Slaughtering, de-feathering, or preparing sick poultry for cooking; playing with or handling diseased or dead poultry; handling fighting cocks and ducks that appear to be well, and consuming raw or undercooked poultry or poultry products have all been implicated in transmission. There is evidence that the virus replicates in the gastrointestinal tract and that infection is possible through ingestion of contaminated food and water (Samaan, 2007, p.18). In Indonesia, contact with fertilizers containing poultry excreta is also considered a risk factor (Lye et al, 2006, p.472).

Compared with other causes of death in Indonesia – infectious and chronic diseases, accidents, malnutrition and ageing – avian influenza cannot even be described as a blip on the chart. This causes a huge disconnect between the (global) public good construction driving the eradication of avian influenza, and constructions and understandings of the danger on the ground. More than anyone, the Indonesian and international doctors and epidemiologists working in the MoH realize what the consequences of a pandemic will be, especially for a relatively poor and unprepared country like Indonesia. But they are faced with huge challenges in making the case that it is an urgent problem.

Even in Tangerang, immediately northwest of Jakarta, which has had a remarkable number of cases, life remains essentially unchanged. An interviewee explained:

> *It's obvious that human cases are concentrated very much around Jakarta and the western end of Java, where the population density is the highest. This is possibly a surveillance artefact – Jakarta is better informed, and better off, so people are more likely to report. But you walk between the tower blocks and you find a village with live markets, teeming life, even chickens scratching around. This is life in Indonesia.*

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> *Tangerang is the hottest spot. There is still a concentration of poultry farming and processing there, and a high level of traffic movements in and out of the city. In my opinion, the markets drive the problem in Jakarta, the movements of birds and people in and out of the city.*[94]

One interviewee complained: 'Cases decline in the annual dry season, so interest drops off and people forget about it. Then when cases rise again in January and February, there's a realization that the problem has not gone away. It's very difficult to keep avian influenza in people's minds.'[95]

Avian influenza A(H5N1) is a very rare disease in humans (Sedyaningsih et al, 2007, p.527); it is also difficult to diagnose and confirm. The most common symptoms are fever, shortness of breath and a cough, with pneumonia showing on chest radiographs. The MoH, supported by the WHO and donors that include USAID, AusAID and the government of Japan, has responded by designating 44 hospitals nationwide (previously SARS centres) as specialist H5N1 referral centres, providing anti-viral treatment at provincial and district levels, training health care workers, building laboratory capacity, providing personal protection equipment for health workers, developing information systems and establishing a command post in the ministry. Sero-surveillance programmes (surveillance involving the collection of blood samples) and information campaigns have also been run, aimed at market and poultry workers particularly. In November 2006, MoH launched a community-level initiative focusing on 12,000 remote villages and in April 2007 the Integrated Surveillance for Avian Influenza (ISAI) Project was launched linking human surveillance with animal surveillance through collaboration with MoA and FAO. By the end of 2007, 170 District Surveillance Officers in nine provinces had been trained and equipped.[96]

Difficult questions of priorities inevitably arise. H5N1 is doubtlessly putting a further strain on an already stretched system. With demand for health care increasing due to economic growth, urbanization and ageing, government spending is falling (Kristiansen and Santoso, 2006, p.249). Since 2001, managerial and financial responsibilities for public health care have been decentralized from central government to the district level and health care is increasingly privatized. There is a common reluctance among the poor to seek medical assistance due to the fear of high costs, and very different pictures exist between the different strata of society as to the availability of medical care, and what it should constitute. To

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date, avian influenza has very largely been a disease of the poor – either the rural, or those living on urban peripheries. This may result in under-reporting of H5N1 infection and the relatively high mortality rate. Only the more severe cases may reach medical attention (Lye et al, 2006, p.474) and late initiation of therapy appears to be a major factor in the high mortality rate (WHO, 2008c, p.268). The non-specific clinical presentation of H5N1 has also resulted in misdiagnosis of subsequently confirmed cases (WHO, 2008c). In other cases, specimens have not been available for testing, and some infections have probably not been identified due to the use of unsuitable test elements.

One informant suggested, however:

> *The hospitals are getting better. They have isolation facilities, protocols and drugs. Staff are trained in technical specifics, but nurses lack access to basic training – simple things like waste management, occupational health and safety. Similarly, there are labs that can detect the disease, grow the virus and test at a genomic level, but there are questions about the skills available to interpret data, and I've seen work I can only describe as sloppy. The variability of influenza viruses calls for frequent updating of primers and probes and that doesn't always happen. There are always financial pressures, and sometimes they are used as excuses to cut corners.*[97]

Others stress the low capacity and poor adaptability of the health system. One respondent suggested: 'There is no shortage of funds for avian influenza, but it is hard to spend the money because the baseline is so low. The ministry of health and the culture here is so slow. There is no sense of urgency at all.'[98] Yet detection of H5N1 in humans is rated as reasonable. An interviewee said: 'Sure, there are sporadic deaths that are not investigated – like any disease – but I'd say that there is now the capacity to detect clusters. Karo, for example, is a very remote area, but the second case there in 2006 was detected.'[99]

The medical community falls into two (not uncomplementary) camps. One focuses on the need for more pure research. An interviewee said:

> *A lot of research is needed. What is going on with the clusters of blood relatives? Why are more poultry workers not catching the disease? How is the virus changing? The fact is that the countries where cases are occurring rarely have the capacity to do this work, and the countries that don't have many cases are not inclined to do*

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> *the work. But here research raises a red flag in the ministry. It's so sensitive.*[100]

The other focuses more on the need for organizational change, capacity building and skill-set improvement. Another interviewee suggested:

> *In the medical sphere there's too much emphasis on lab capacity strengthening and analysing the virus, as if that is going to fix the problem. In other countries, public health experts, civil servants, managers have all made useful inputs. Here the scientists are the designers and they usually don't have much idea about what is going to work in the real world.*[101]

All agree, however, that real-world politics, particularly the style and manner of leadership in the MoH, have intervened in the medical response and made basic and important medical work more difficult, if not impossible. As things stand, Indonesia is totally dependent on the international community for the provision of anti-viral drugs (of which some stocks exist in the country, ticking towards their expiry dates)[102] and any human vaccines that might be produced in the months following the outbreak of a human epidemic.

Most in the medical community agree that H5N1 is best dealt with before it infects humans. As well as attacking the disease in animals, this involves increasing awareness of the virus and its potential consequences amongst the population, and attempting to change behaviour that puts people at risk. This is the subject of the next section.

Agitating for change

> *A dead chicken is a dead chicken. There's no demand from the population to discover why. Avian mortality is just not an issue. On Bali for example, about a third of the birds are eaten, a third are used in ceremonies and a third die. This is the way it always has been. The challenge is to encourage the communities to understand what is going on and be responsible.*[103]

A wide range of organizations are involved in public communications and information initiatives, led by KOMNAS FBPI. They are all challenged by attitudes that see regular poultry deaths as normal and unavoidable. UNICEF and Development Alternatives, Inc. (DAI), working with government, national, regional

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and other international groups, run the largest projects, which are focused on raising awareness and spreading information about how to recognize the disease and stop its spread. One respondent commented: 'There are literally hundreds of activities, nearly all of which are useful. But they are fragmented and this means they are less effective.'[104]

DAI's USAID-funded Community-Based Avian Influenza Control (CBAIC) project was launched in July 2006. It operates in three main spheres. One links with KOMNAS and other government ministries to strengthen pandemic preparedness at national, provincial and district levels. This involves facilitating meetings to improve coordination within and between the relevant ministries and local government offices, training government spokespeople and drafting and producing leaflets and other communications material. A second sphere is more local: managing and coordinating community mobilization and training. This involves running events and training workshops and producing a wide range of materials including booklets, banners, T- shirts, calendars, videos, posters and stickers. By mid 2008, DAI counted around 25,000 volunteers trained to recognize avian influenza symptoms and respond to outbreaks, and the involvement and activities of local organizations such as Muhammadiyah, one of the country's biggest Muslim groups, and the Indonesian Red Cross, were seen as significant successes in broadening the scope and the appeal of the communications response. The third, overlapping, sphere of activity (in partnership with the Johns Hopkins Bloomberg School of Public Health's Center for Communication Programs) is to develop and implement a range of BCC programmes. The most recent and prominent of these was a series of nationwide television and radio public service announcements. These 30-second TV spots were dramatic and hard hitting – dead chickens, alarms, hospitals, human deaths – with the messages of burn and bury infected chickens and report the incident. The broad objective was to raise the level of perceived threat of human disease amongst the general population.

In September 2006, UNICEF, with funding from the government of Japan, and working closely with KOMNAS, launched a national awareness-raising campaign called *'Tanggap Flu Burung'* ('Take Action on Bird Flu'). The campaign's keystone was a memorable thumbs-up hand symbol with four key messages on the fingers: don't touch sick or dying birds; wash your hands before eating and cook poultry well; separate new birds from the flock for two weeks; and report flu-like symptoms and seek medical attention, especially after contact with birds. The campaign included

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public concerts (one notable event in October 2006 brought more than 10,000 people together in Gowa, South Sulawesi for a celebrity pop concert), billboards and the production and distribution of leaflets and other materials. Most prominent, however, was a four-month radio and television campaign consisting of four light-hearted 30-second spots (one for each of the four key messages) introduced by a well-known talk-show host.

In May 2007, the 'Take Action' campaign was expanded with a social mobilization and education programme that involved distributing 1200 avian flu kits, containing masks, gloves, soap, banners, stickers, an instructional booklet and video compact discs, to community leaders in some 100,000 villages in high-risk areas, and this is now being extended to over 50,000 schools across Indonesia. The school kits include a comic book and other material using the characters of a popular television show, and teachers are being encouraged to incorporate avian influenza-related material into the curriculum.

Aside from this centrally coordinated activity, a wide range of events including rallies, parades and health walks have been initiated by all sorts of independent groups. In December 2006, for example, a student group was sponsored by the MoA to travel around the country spreading a poultry hygiene message and encouraging people to eat chicken. In West Java, a Sundanese performance group has produced the *Flu Burung Longser* Show, a comic opera using songs, drumming and dances. The International Labour Organization (ILO) and the International Union of Food Workers (IUF), for example, plan to replicate a project run in Thailand promoting good workplace practice in the commercial poultry sector. UNESCO, with partners, has been distributing poultry cages and running workshops on Bali.

This blizzard of activity has been very successful in raising general awareness, but has not yet had time to show convincing behaviour change. KOMNAS data show that 97 per cent of Indonesians are aware of avian influenza, but only 15 per cent regard it as a direct threat to themselves and their families.[105] Padmawati and Nichter (2008) found no farmers who expressed personal fear of avian influenza, with most speaking of avian influenza as some form of *tetelo* (Newcastle disease). What was feared more than illness was losing chickens due to culling, or the price of chicken falling. One informant explained:

> *The awareness among at risk groups is quite high but the perception of the risk is low, and changes in behaviour and practices are less than optimal. The community*

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> *is only at the level of knowing, and people tend to forget. The next stage must go beyond the media and confront people face-to-face. We have to keep reminding people. When human cases decrease, people are not on the alert. Constant communications, year after year, are vital.*[106]

One of the greatest challenges for avian influenza communications in Indonesia is that there are so many different regions, cultures and groups involved. A respondent suggested:

> *The usual idea with communications programmes is that you have one clear message. If you don't have one message you risk confusing people. But here we need different messages for different groups. How do you reach cock-fighters and housewives with the same message? How do you communicate both with those who live in modern air-conditioned apartments and with those who live in communal longhouses with no taps or toilets? It's impossible. They key is trust and this is hard. You have to get the leaders to trust you first, community leaders, religious leaders. If they believe you, they can take the message to the community.*[107]

Other activities associated with the response have had powerful short-term effects on awareness, but little on long-term behaviour. In Jakarta, the capital, backyard birds were banned in January 2007 and moves were announced to move poultry markets and abattoirs out of residential areas.[108] It has proved difficult, however, to win public backing. One interviewee explained:

> *In the first few months there were cullings. They were on TV. But this was only for three months and there was opposition in the press. Reporting concentrated on the concerns of low-income poultry farmers. This made the government reluctant to go forwards. The middle classes and the rich stood aside. This was not their concern. Democracy has a price. It is that the scale of priorities has been compromised.*[109]

Another informant said:

> *There was a 50 per cent price drop following the announcement. Those with flocks of five to 500 were hardest hit. Around 40–60 per cent of people who were making a living, or part of their living, from poultry had to find another job. Some did. That's possible in Jakarta. Others just moved their little farms from around their houses to unoccupied land nearby. The wet markets were seriously affected for*

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> *about six months. Now you see live birds being sold again. The bottom line is that poultry numbers halved, poor people's incomes dropped by one third, and you still see and hear birds in the city.*[110]

Another high-profile event was a three-day pandemic simulation involving nearly 1000 people in Jembrana regency in Bali.[111] An attendee said:

> *I was very impressed. Roles and responsibilities had been defined. There was disinfectant, food, drugs, transport. Things worked ... Then, just two or three days later, it was back to normality, everybody seemed to have forgotten about it. But the question left hanging in my mind was: how do you contain panicking people without the army using their guns?*[112]

As the pandemic planning simulations have shown, there is a significant disconnect between the global construction of the risk associated with H5N1 and the Indonesian one. World views, social structures and values all differ radically between Washington, DC (or London, Geneva and Rome) and the villages of western Java, or the low-rise sprawl of Jakarta's periphery, so it is inevitable that there are going to be radically different constructions of risk associated not just with H5N1, but almost everything. Furthermore, in Indonesia's stratified society, the rich and the poor, the urban and the rural, and many other groups, construct risks in widely varying ways. Which common values are going to lead to which common fears? Which groups are to be held together by commonly constructed risks? This makes the communications aspects of the response particularly challenging. Whose risks are really being addressed, and why?

Viruses and sovereignty

The previous sections have shown how the response to avian influenza in Indonesia has been hampered by political and bureaucratic processes, the lack of a coherent idea of a public good, especially a global one, and varying constructions of risk. These themes coalesce in the geopolitical storm, discussed already in Chapter 2 of 'Avian Influenza: Science, Policy and Politics', which began on 20 December 2006, when Indonesia's Minister of Health, Dr Siti Fadilah Supari, announced that the country would stop sending human H5N1 virus samples to the WHO, as long as it followed the 'imperialist' GISN[113] mechanism (Supari, 2008, p.24)

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and would only resume if the system were changed to give Indonesia control over where viruses originating from Indonesia went, and a share of profits resulting from research and commercialization. This sent a shock wave through the international health, diplomatic and academic communities.[114] Timely samples are vital to track changes in the virus and the global response was quick. In mid February 2007, WHO representatives met with Supari and her team in Jakarta, offering anti-viral drug and vaccine supplies and support for developing laboratory and vaccine manufacturing facilities. This smacked too much of 'charity' to Supari (2008, p.33) and after seven hours of negotiations (with much energy apparently expended in trying to make Supari's notion of 'empowerment' meet the WHO's notion of 'capacity building'), the matter remained unresolved. Supari was insisting on a Material Transfer Agreement (MTA) that recognized the viruses as Indonesian and the WHO was required to 'establish the mechanisms for more open virus and information sharing and accessibility to avian influenza and other potential pandemic influenza vaccines for developing countries'. One model was the International Treaty on Plant Genetic Resources.[115] Another was the Convention on Biological Diversity, which recognizes the sovereign right of states over genetic resources.[116]

A more public series of events followed. In late March 2007, two 'high-level' meetings in Jakarta, which included 13 ministers from 'like-minded' countries, yielded the 'Jakarta Declaration'.[117] In mid April, a meeting in Geneva ended deadlocked, but the 60th World Health Assembly in May saw the 'Jakarta Declaration' included as resolution 60.28, Supari elected to the WHO executive board and three samples released. The resolution received significant support and at the first Non-Aligned Movement Health Ministers' Meeting 112 countries voiced their concern at existing arrangements. In June, a meeting of civil groups from around 50 Asian and African countries pronounced the 'Bandung Message' from the town of that name in West Java, and in November and December, tense negotiations continued at an intergovernmental meeting in Geneva and at the international ministerial conference on avian and pandemic influenza in Delhi.

Despite an international diplomatic offensive, Supari remained unswayed throughout 2008. In February her book *Saatnya Dunia Berubah Tangan Tuhan di Balik Flu Burung* was published in English: *It's Time for the World to Change, Divine Hand behind Avian Influenza*. In April she made charges of spying against Jakarta-based US Naval Medical Research Unit Two (NAMRU-2).[118] In May, she

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announced that H5N1 human cases, and deaths, would no longer be reported on a case-by-case basis to the press, and in October she officially suspended activities at NAMRU-2. At public meetings, Supari has accused the WHO of colluding with rich-world pharmaceutical companies to trick poor nations into giving away virus samples, to be processed into drugs and vaccines that are then denied to countries that can't afford them. 'The conspiracy between superpower nations and global organizations is a reality', she is quoted as saying. 'It isn't a theory, isn't rhetoric, but it's something I've experienced myself.'[119]

Few in the international community fail to accept that Supari has raised an important matter, but her intransigence in the face of increased global transparency[120] and genuine offers of support has caused an unusual mixture of hurt and confusion. There are some tricky issues at the root of the matter. With global (seasonal influenza) vaccine production capacity currently running at no more than 500 million doses annually, and a total population of over 6 billion, a large number of people are certain never to see any vaccine in any circumstances. There are also doubts as to whether the virus actually originates from Indonesia and questions emerge which are almost philosophical. An interviewee asked:

> *Even if you accept that the virus is Indonesian, what happens if an Australian, say, gets infected, and goes home? Does the virus then become Australian? Or does it even become the personal property of the patient? It is an impossible matter to wrap up legally.*[121]

Another person argued:

> *Everyone agrees with the basic point, but Supari has over-played her hand. Her motivation is a mystery, but I'd say the problem boils down to a poor understanding of the issues. She was instructed by the president to buy a stockpile of drugs, but didn't have the money. So she's scratching her head when Indonesian viruses start turning up in prototype vaccines*[122] *and she thinks 'Bingo!' Now she's dug herself into a hole and she's turned it into a bigger crusade. Speculatively, I'd say that she is also looking to deflect attention from her failures, and not just with avian influenza. It's sad. It's not an easy problem and she should not take it personally.*[123]

Other analysts see a wider agenda. One interviewee suggested:

> *In case it's not obvious, the whole matter is driven by nationalism. The main*

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> *tension in the country is now between Islamic nationalism and secular nationalism, and Siti is trying to play both cards. The nationalists are getting more strident, and it's pushing to extremes, verging on paranoia. It's not difficult to work through her logic.*[124]

Supari's own writings back this up:

> *For a second time*[125] *Indonesia would lead other developing countries, which for a long time had been the victims of the greediness of the people of developed countries in the field of health. With spirit burning in my chest, I determined not to step backwards. 'Ever onward, no retreat,' as Soekarno, the first President of the Republic of Indonesia, put it. Bismillaahi rahmaanir rahiim!* (2008, p.25)

Supari has also put her Islamic faith at the centre of her struggle, claiming divine guidance, and is reputed to be associated with groups such as Hizbut Tahrir, which believes in replacing Indonesia's secular government with a Muslim caliphate.

A cardiologist before being selected for the cabinet in 2004, politically Supari 'came from nowhere' according to one interviewee. Four years later, lifestyle magazines were profiling her as a 'hero' of Indonesia and the weekly television programme which she hosted (and sponsored) was popular viewing. Other Indonesians, however, profess to be mystified by her persistence, asking: 'Indonesia does not have stated objectives. Just "equity". How do you negotiate with someone who does not know what they want?'[126] Others see a simple logic at play: 'This is a very quid pro quo culture, where everything is negotiated. Siti realizes that the threat of widespread avian influenza, or worse a human pandemic, has economic value, and is looking to milk it'.[127]

No matter what the logic might be, according to one informant:

> *Everything is bogged down. The ministry is not happy with WHO and WHO is not happy with the ministry. Nothing is moving. We can't even get agreements signed to disburse money we have waiting. In one case we have been waiting over a year. We talk to our friends and colleagues in the hierarchy and they apologize saying there is 'anti-western sentiment' at the top. It's insane.*[128]

In mid 2009, no human H5N1 samples are leaving Indonesia, nor are human case figures being announced by the MoH,[129] but the cabinet reshuffle which will follow

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the presidential elections in July (or after a run-off in September) may see rapid change at the top. Like the virus, the situation is unpredictable. Supari still has considerable popular support, topping a poll of ministers in late 2008,[130] and to date, she has managed the H1N1 ('swine' flu) pandemic reasonably well. May 2009 also saw 'a noble achievement for the world of health and medicine,'[131] according to Supari, when the 62nd World Health Assembly in Geneva approved a resolution to move to finalize elements of a SMTA (Standard Material Transfer Agreement) by January 2010. But the details are still troublesome. Such basic questions remain as to whether benefit-sharing is to be voluntary or compulsory, for example, and more complex issues surround intellectual property rights relating not just to the viral material, but also to related parts, products and even uses.[132] In Jakarta, NAMRU-2 has seen no respite,[133] and Supari continues to cause consternation. In March she announced a halt to child meningitis and mumps vaccinations because she feared foreign drug companies were using the country as a testing ground,[134] a position that was quickly reversed by the ministry.[135]

This debate over the 'nationality' of a virus has provoked unprecedented passion, and despair, on both the Indonesian side and that of the organizations charged with responsibility for global health. Despite signing up to the IHR of 2005, Indonesia has thrown this optimistic new world order in doubt. Few would disagree that the system did not need revising to give poor and middle-income countries more say and better access to affordable medicine (see Chapter 2 of the book 'Avian Influenza: Science, Policy and Politics'). Similarly, few would disagree that Supari's actions are reprehensible if motivated purely by personal political ambition. But, yet again the rational, technical and universalist solutions of the 21st-century global community come unstuck in the Indonesian political, economic, social and cultural context.

Conclusion

'Unless we are all prepared, no one is prepared.'[136]

Indonesia, particularly western Java and the area around the capital, Jakarta, offers a prime example of the 'hot-spot' conditions where new emerging infectious diseases are likely to arise. Many factors – size, geography, ecology, politics and socio-economics – conspire against the control of avian influenza in Indonesia, but

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a remarkably dense population living closely with a remarkable number of poultry, and other birds, makes the response a severe challenge, and despite a greater effort than anywhere in the world, greater funding and some valuable local successes, the disease is still widespread. The opportunity presents to build on the avian influenza response to encompass other diseases at the human–animal interface. In Indonesia there is little scope for the 'fatigue' reported elsewhere.[137]

At the Sixth International Ministerial Conference on Avian and Pandemic Influenza, held in Sharm el-Sheikh, Egypt in October 2008, a high-level review, prefaced by the observation quoted at the beginning of this section, identified seven factors as crucial to success in responding to the disease.[138] The first was high-level political commitment. The second was the ability to scale up in key sectors, with improved management of veterinary and medical services, and the third, transparent sharing of information. The fourth was clear incentives to encourage reporting, with effective compensation schemes, and the fifth, effective strategic alliances of civil society, the private sector and all levels of government. The sixth identified research, product development and technology transfer, and the seventh, collective government support for mass communications on avian influenza and healthy behaviour.

This chapter has shown how Indonesia is challenged in all these areas, except some aspects of the last. Despite the efforts of some determined and dedicated individuals, the national government is not committed to eradicating the disease, nor are there significant demands for this to happen from the population, or the poultry industry. Many other pressing priorities exist and the situation is complicated greatly by an ongoing process of decentralization and a weak regulatory environment. Scaling up and improving the management of veterinary and medical services in Indonesia will be the work of decades rather than years, given the current low levels, as the challenges of disbursing funds into them have shown.[139] Incentives to encourage reporting are at best patchy, given the confusion and inconsistent regimes of compensation attached to culling infected birds, and the stigma and unwelcome attention of owning them. The high levels of disease reported from Indonesia are due entirely to MoA teams actively searching for it. Regarding transparent sharing of information, research, product development and technology transfer, again Indonesia starts from a low baseline and political wrangling has made even moving in the right direction difficult. Finally, effective strategic alliances of civil society, the private sector and all levels of government

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often founder, making a coordinated response challenging.

Three main factors underlie the relative failure of Indonesia to address avian influenza effectively. The first is the lack, or emergent form, of a modern Weberian bureaucracy, coupled with the assumption by many in the international agencies leading the avian influenza response – mainly based in Rome, Geneva, Paris and Washington – that such does, can or should exist. The rational, legalistic, bureaucratic response based on surveillance, intervention and control runs into difficulty in the Indonesian setting. The situation is characterized by a very large number of actors, sharing few commonalities, which are only now beginning to coalesce into the sort of networks that might yield coherent action.

The second, and related, factor is a mismatch between the clear moral right, and imperatives, that the international community associates with acting in pursuit of a (global) public good and the lack, or emergent form, of such a concept in Indonesia. Inside this vast, diverse and rapidly developing country, ethnically defined, regional and socially stratified conceptions of common goods exist, but the idea that there is a good of benefit to every Indonesian finds little traction. Indonesia's young and post- colonial national identity is so challenged by internal diversity – ethnic, cultural and socio-economic – that it has little option but to lean heavily on the idea of 'otherness'.

The third, and most pertinent, factor relates to a wider domain than avian influenza in Indonesia. Put simply, scientific experts cannot just prescribe and expect obedience. This increasingly difficult relationship between science and society can be seen across a wide range of issues (see Chapter 2 of the book 'Avian Influenza: Science, Policy and Politics'). The H5N1 virus is a construction of science, and science, particularly biomedicine – an emerging mesh of power relations linking health, industry, institutionalism and governance – has constructed the threat, designed the response and defined its own terms of success and failure. Faced with such a consistent and clearly constructed threat – an invisible virus – the global response can only present as a consistent, unified discourse, a paradigm of centrally planned and enacted intervention. Yet science's truths are not universal. Its boundaries and competencies are drawn differently by different people, whose voices and alternative approaches may be obscured by the prominence and power of science. Context, as well as trust in the individuals and institutions making prescriptions, therefore matters, and Indonesia's context, as has

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been shown, is diverse, complex and as yet unsympathetic to modernist models of authority and rationality. The narratives of the international organizations do not fit naturally, or necessarily, with those that exist or are emerging nationally, and to ignore this – as well as to assume a rational technocracy – risks generating uncertainty and unexpected outcomes.

Furthermore, if scientific knowledge is created by people and institutions with particular situated and partial perspectives, it will ask partial questions responding to partial interests. Given that scientists frame policy issues by defining what evidence is significant and available, and policy-makers frame scientific enquiry by defining what is relevant, unhelpful self-sustaining routines of co-production can emerge, which are shaped by political and economic forces (see Jasanoff and Wynne, 1998). Interests therefore align in a particular historical-cultural context, which can be called the political economy. Given Indonesia's diversity, complexity, history and current position in global geopolitics, it is in this realm that new ways to engage civil society, create effective public–private partnerships and generate genuine trust must be found.

Notes

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CHAPTER

4

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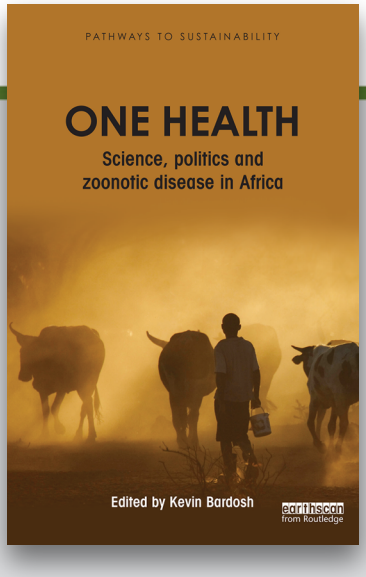
THE POLITICS OF LASSA FEVER IN SIERRA LEONE



This chapter is excerpted from

One Health: Science, Politics and Zoonotic Disease in Africa

edited by Kevin Bardosh.

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THE POLITICS OF LASSA FEVER IN SIERRA LEONE

Excerpted from *One Health: Science, Politics and Zoonotic Disease in Africa*

Annie Wilkinson

Introduction

In 2014, the Ebola outbreak in West Africa once again brought zoonotic diseases to the forefront of the international community's attention. The surprise and horror that the Ebola epidemic provoked, including in Sierra Leone, was a reminder of the value of One Health, but also of considerable unmet challenges in realizing it. This chapter examines science-policy processes for Lassa fever, a rodent-borne viral haemorrhagic fever (VHF) in West Africa, and explores some unique practicalities and politics of zoonotic disease control. In certain zones of Sierra Leone, a country that has consistently reported some of the highest incidence rates in the region, Lassa fever was considered one of the country's most feared infections: it had, as one survivor put it a 'big name'.[1] Now described by local outreach workers as Ebola's 'little brother',[2] it holds clues to the way events unfolded in 2014; more than that, though, the story of Lassa presents both questions and opportunities for applying One Health in extremely low-resource contexts.

Since the discovery of Lassa fever in 1969, only Sierra Leone, Liberia, Guinea and Nigeria have recorded regular cases.[3] Lassa was long thought to be confined, mysteriously, to these few hotspots in West Africa and consequently it was not high on international policy agendas. Post 9/11, and the US anthrax attacks, however, Lassa virus was assessed for its use as a bioterrorist agent (Borio et al., 2002) and is now categorized as a 'Category A' agent by the US Centers for Disease Control and Prevention (CDC).[4] Category A is the highest risk level of 'select agents' with potential bioterrorism use on account of their ability to spread easily and cause major public health impacts. Lassa is considered a threat as fatality rates in symptomatic cases are high, diagnosis is difficult, treatments are not widely available and vaccines do not exist. Most of all, although airborne transmission is not considered to be a routine mode of transmission, it could not be ruled out (Borio et al., 2002).

Unusual among the list of today's bioweapons, Lassa also causes considerable endemic human disease in West Africa.[5] Recently, Lassa fever's home territory appears to be growing, with cases identified in Ghana, Benin and previously non-endemic areas of Sierra Leone and Nigeria, revealing new dimensions to the

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region's viral make-up (Gire et al., 2012; Sogoba et al., 2012; WHO, 2015b). As a rodent-borne virus, whose host is the *Mastomys natalensis*, Lassa fever is of particular interest from a One Health perspective since it displays complex, and yet still unknown, social and ecological dynamics that drive periodic epidemics and maintain steady states of endemicity.

The heightened concern around Lassa is an illustration of how the biosecurity agenda reframes – 'securitizes' – health problems as existential threats (Elbe, 2010b). In securitization debates, biosecurity priorities are often portrayed as being in opposition to those of public health (Elbe, 2010b; Lakoff and Collier, 2008). Two basic points are made about framing health problems as security issues: on one hand, it successfully raises awareness and mobilizes resources, but on the other these resources can be limited, privileging defence priorities instead of civilian ones. The case of Lassa fever provides an opportunity to broaden these debates, as the disease occupies a space at the intersection between biosecurity agendas, neglected diseases, standard public health and emerging One Health perspectives. In light of commentary on the failure of preparedness and global health governance to prevent the Ebola crisis, this is timely.

Public health efforts and investments in biosecurity have improved the management of Lassa fever but not in ways that have translated into sustained and wide-ranging health systems strengthening, or in improved understandings of the interactions between human and animal health needed for effective disease management. Indeed, we see how the uncertainty of emerging diseases makes policy action difficult and, in this case, appears to have led to a 'retreat into the laboratory', with basic-science research the only interest able to raise substantial investment. Prevention, based on understandings of environment–human–rodent interactions has been relatively neglected and is actually very poorly understood. One Health can provide a more holistic approach but its effectiveness, for Lassa at least, will depend on finding ways to address the politics that accompany the ambiguity and complexity of the disease.

Central to this analysis is the sense that diseases are complex systems, involving interlocking social, technical, cultural, political, economic, ecological and biological dynamics, which are often not easily discernible (Leach et al., 2010a). Different values, assumptions and knowledge-making processes cause problems to be framed in distinct ways (Jasanoff, 2005). Policy narratives, which combine different

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framings, are mobilized by actor networks to promote specific courses of action (Roe, 1994; Keeley and Scoones, 2003). As displayed in the populist discourse on emerging diseases (Wald, 2008), the preponderant concerns of biosecurity hinge on an 'outbreak narrative', where the sudden emergence of a new disease (often in remote African landscapes) triggers a global pandemic, seeping across international borders and causing mass panic and economic disintegration. Underpinning this narrative is the critical role of epidemiological science and military-style responses in tracking and containing the disease. The dominance (and shortcomings) of this discourse in policy approaches devised by international agencies and Northern governments for epidemic disease has been pointed out elsewhere (Leach et al., 2010b). This critique has highlighted the need to contrast the 'view from above' with alternative, local-level perspectives. Collier and Ong's (2005) concept of 'global assemblages' is relevant here. 'Global assemblages' describe the configurations of people, artefacts, brokers, economies, normative frameworks, styles of reasoning and more, through which global forms (such as biosecurity, see also Lakoff and Collier, 2008) are brought to life in particular settings. In this way, the concept emphasizes how distant policy priorities and frameworks are manipulated and (re)constructed in line with local contexts.

To understand how local and global concerns interact, this chapter not only looks at the role of different narratives in defining the research and control landscape for Lassa fever, but also at the sociotechnical processes and contexts through which they emerge. Drawing on ethnographic research in Kenema, Sierra Leone, it explores these critical but poorly understood dimensions of science-policy processes.[6] The 'Lassa ward' at Kenema Government Hospital (KGH) is the world's longest-running dedicated Lassa isolation facility; in 2005 work began to supplement the dilapidated 'Lassa ward' at KGH with the 'Lassa lab' (Khan et al., 2008). The combined facilities serve as a field site for international research collaborations on Lassa and other viral haemorrhagic fevers, and so offer a unique window to contribute to the debates.

From neglected disease to priority pathogen

Lassa fever was first identified in the town of Lassa, Nigeria, in 1969 after missionary nurses fell sick from a mysterious new illness. As scientists began to

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investigate, there were two laboratory-based infections in the USA: a laboratory technician at the Yale Arbovirus Research Unit died and a senior researcher contracted Lassa fever but survived. In light of these events, ad hoc protective procedures were applied (Fuller, 1974).[7] Informal biosafety arrangements have since matured into formal standards with pathogens classified according to their perceived risk. Lassa virus has been classified as a biosafety level 4 (BSL-4) pathogen, and requires the highest possible containment facilities. In 2007, there were only 20 BSL-4 laboratories in the world and when research on Lassa began there were even fewer (Gronvall et al., 2007). None of these were in West Africa.

From these early discovery days, two worlds of Lassa fever research begin to take shape. In Europe and the USA, biosecurity norms and practices predominate as stable electricity supplies made establishing highly controlled environments feasible and the necessary resources – expertise and finance – were easier to come by. In the Mano River, these standards were not achievable. Even when investments (including solar power) were made to build the 'Lassa lab' in Kenema, it only reached BSL-3 standards at best (Khan et al., 2008). Meanwhile, education in laboratory sciences in Sierra Leone remains constrained so the production of scientific knowledge for Lassa fever is geographically anchored in the Global North, to where samples need to be shipped from 'field stations' like the Lassa lab. This has implications for science-policy processes as field contexts, and the complexities of the disease–environment interactions, fade from view.

Central to this disease–environment nexus is the reservoir of the virus: the rodent host, *Mastomys natalensis* (Figure 7.1), which was identified in 1972 after outbreaks in the towns of Tongo and Panguma in Eastern Sierra Leone (Monath et al., 1974). These settlements and the area surrounding them have been known as the 'Lassa belt' ever since, with some of the highest incidence rates in West Africa. After the 1972 outbreaks in Sierra Leone, the CDC set up field research stations in Segbwema, Kenema and Panguma. The main treatment programme was based in Segbwema at the Nixon Memorial Mission Hospital, and run by Dr Aniru Conteh. But as civil war erupted in 1991, spilling over from the Liberian border not far from Segbwema, Lassa activities moved to KGH, where they remain despite KGH being outside of the hyper-endemic Lassa belt.[8] Civil instability, which would continue for over a decade, caused the CDC to close their programmes and pull out of Sierra Leone entirely in 1993. They moved some of their work to Guinea but the incidence of Lassa was lower there and the organization's interests were soon diverted. By

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2003 the Guinea programme was also closed. After the departure of the CDC from Sierra Leone, the Lassa ward was left largely without support. It was kept going on a shoestring by Dr Conteh. In 1996, in the wake of a steep rise in cases, and with the country still blighted by war, the British medical relief organization, Merlin, took the reins in Kenema by providing health promotion and treatment activities, but not laboratory support (Khan et al., 2008).

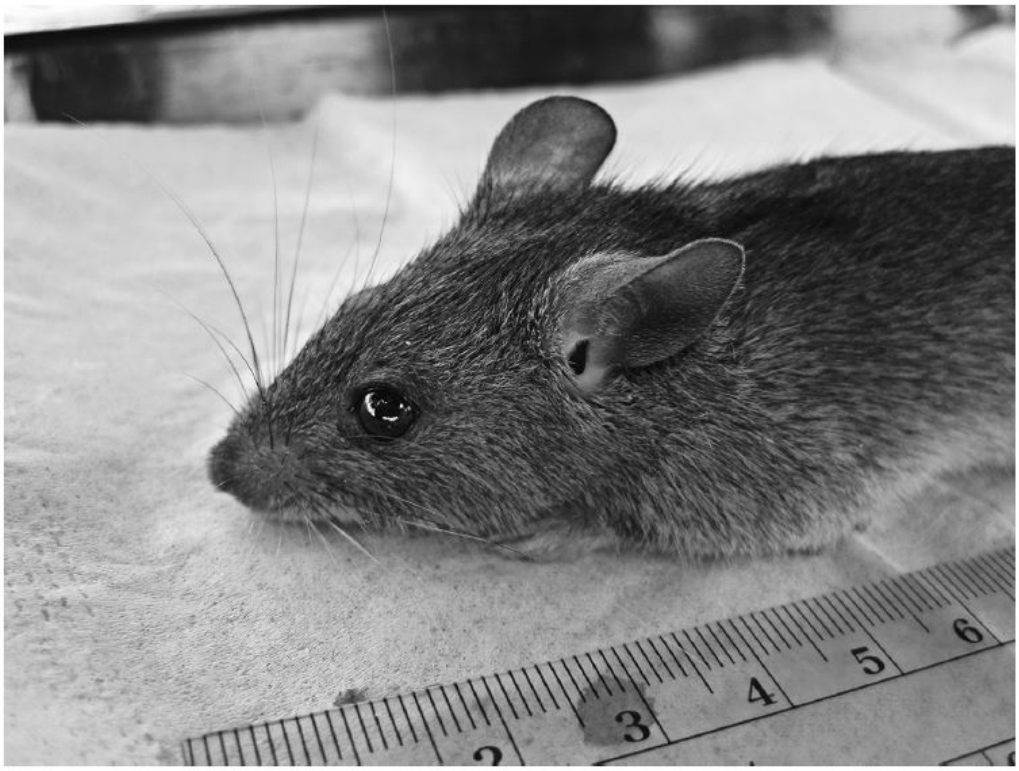

FIGURE 7.1 *Mastomys natalensis*, the reservoir of Lassa virus (credit: Lina Moses)

On one level, the trajectory of Lassa fever's emergence – the first cases in Nigeria, the US infections and subsequent outbreaks in the Mano River region – provided the key events for a typical 'outbreak narrative' (Wald, 2008). On the international stage, Lassa was considered an emerging infection that followed this logic of outbreak and containment, with CDC field stations doing pivotal work to understand and control the disease. Books such as *Fever! The Hunt for a New Killer Virus* (Fuller, 1974) and *Level 4: Virus Hunters of the CDC* (McCormick et al., 1999)

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reflect such storylines. The ongoing problem of Lassa fever in Sierra Leone proved trickier to narrate and manage. Lassa fever disease control was dependent on international whims and humanitarian assistance, made worse by the regional conflict. By the end of the war, Lassa was proving itself to be an 'unheralded problem' (Birmingham and Kenyon, 2001) and the 'poster child of neglected diseases' (Donaldson, 2009). Yet the steady stream of cases was not matched by resources.

The confluence of the outbreak narrative with a range of security concerns, at local and international levels, meant that Lassa was not destined to remain a typical neglected disease. The year 2004 was a devastating one for Kenema, but one which marked the beginning of a new phase. With stability returned to Sierra Leone, Merlin, primarily an emergency relief organization with no mandate to provide long-term support, was looking to leave. The virus, however, was wreaking havoc with renewed vigour. A nosocomial outbreak linked to KGH's paediatric ward saw 95 paediatric cases admitted to the Lassa ward between 1 January and 24 April 2004 (WHO, 2005a). There were also cases among expatriates and peacekeepers. With the ward overflowing, a further blow was the death of Dr Conteh after he contracted Lassa fever through a needle stick injury.

The Office of United States Foreign Disaster Assistance (OFDA), part of USAID, then set up a task force to deal with Lassa fever. They brought stakeholders from Sierra Leone, Guinea, Liberia, the World Health Organization (WHO), the European Union (EU), and INGOs together to develop a regional strategy. In 2004, the Mano River Union Lassa Fever Network (MRU-LFN) was formed to strengthen scientific cooperation, patient management, surveillance, laboratory capacity and information communication and education. OFDA gave a small amount of funding to the WHO to coordinate this and to set up a laboratory in Kenema. A member of the WHO team recalled that the death of Dr Conteh was a 'tipping point' in setting up the MRU-LFN – previous WHO missions to Sierra Leone had come to little and there was a sense that Dr Conteh had been 'left in the lurch, without any help' and they wanted to 'put this right' to ensure that it would not happen again. Central to the WHO/OFDA plan was the idea of building a laboratory in Kenema that could be a research campus where international researchers would pay to use the facilities. The Kenema laboratory was to be connected to laboratories in Guinea and Liberia through the MRU-LFN, with governments cooperating on surveillance. There were also plans for a new isolation ward at KGH for which the EU had committed funds

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(WHO, 2005a).

The MRU-LFN was part of wider efforts to strengthen surveillance for global health security post-SARS (severe acute respiratory system), and in the wake of outbreaks of avian flu in the early 2000s. WHO revised the International Health Regulations (IHRs) – to control diseases *and* avoid interference with international traffic and trade – and established structures like the Global Outbreak Alert and Response Network (GOARN) to ensure global public health security (Dry, 2010) through surveillance and early warning systems. Lassa fever was included as a notifiable disease under the revised IHRs due to its potential to 'cause serious public health impact and to spread rapidly internationally' (WHO, 2005b). The Ministry of Health and Sanitation (MOHS) also adopted the WHO's Integrated Disease Surveillance and Response[9] (IDSR) in order to implement the IHRs, under which Lassa fever was included as a 'priority' 'epidemic-prone' disease. But is Lassa really a threat to global health security? And can Sierra Leone really abide by the standards of the IHR? These governance tools worked on the principles of detection and containment at source, but they have been criticized for prioritizing the safety and interests of Northern populations (Calain, 2007b; Dry, 2010; Elbe, 2010b) while overlooking the social and material circumstances which produce disease in specific contexts (Hinchliffe, 2014). In the case of Lassa, most agree that the virus is much less infectious than Ebola and secondary infections in imported cases are rare. Many scientists, therefore, do not even believe the natural risks of international spread are high. Potential use of the virus as a bioweapon, discussed below, is considered by many to be sensationalism and 'paranoia' which is useful to raise grant funds – although this is not an uncontested view and some scientists do maintain that it is a threat which should not be dismissed.[10]

Hence the events of 2004 were, from the start, entwined with a collection of biosecurity concerns that took place in a global health landscape that was increasingly security conscious. As one long-term researcher recalled:

> In 2004 a lot of things were happening simultaneously. There was epidemic spread in the Sierra Leonean population. There were cases in UN peacekeepers. There were cases in relief workers. There was a Red Cross surgeon who got Lassa and died. In the United States side of things people were of course worried about Lassa as a Bioterrorist agent . . . [then] culminating with Aniru Conteh, who ran the Lassa ward, getting Lassa and dying.

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During the MRU-LFN inception phase further security anxieties emerged. After the war, with the influx of aid workers and peacekeepers, Lassa was painted as a threat to post-conflict redevelopment. A Weekly Epidemiological Record from the WHO, which played a key role in setting up the MRU-LFN, spelled this out:

> Civil unrest in the Mano River Union region created newly vulnerable populations, including refugees and humanitarian relief workers. There have been several recent fatal cases of Lassa fever among United Nations peacekeeping forces. The return of areas to government control and the rebuilding of civil society in Liberia and Sierra Leone puts aid workers at risk of contracting Lassa fever.
>
> *(WHO, 2005a)*

By the risks it posed to the humanitarian relief and reconstruction efforts, Lassa was framed as a threat to a fragile new peace. Indeed, the doctor employed to replace Dr Conteh in running the Lassa ward recalled senior staff in the MOHS persuading him to take up the post by warning him that 'the peacekeepers will leave if they don't have a [Lassa] doctor'.

The creation of the MRU-LFN also saw Lassa fever control dovetail with regional post-conflict diplomacy. As countries where Lassa fever was endemic, Sierra Leone, Liberia and Guinea also made up the Mano River Union economic sub-region.[11] Staff from WHO saw an opportunity to use that entity to get leverage for Lassa fever work. High-level ministry staff from each Mano River government were invited to participate in developing the five year MRU-LFN strategy. The hope was that tackling the mutual problem of Lassa would foster and capitalize on intercountry cooperation in a historically volatile region. However, as the WHO staff coordinating this reflected, there was relatively little input and engagement from the three governments themselves, which in hindsight was not enough to realize the network's broader aims.

The establishment of the MRU-LFN did a great deal to improve the situation in Sierra Leone. Diagnostics have been available routinely to suspected Lassa cases in Kenema since 2007. Yet, outside of laboratory diagnostics, progress on the MRU-LFN's objectives of surveillance, case management and education have been much more limited. The laboratory established in Kenema continues to run, but programmes in Liberia and Guinea either never materialized or could not be

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maintained. The fact that the laboratory was even built was down to the 'sheer will of a few' rather than effective stakeholder cooperation. Many of the original commitments made by the MOHS and NGOs were not fulfilled. The laboratory was finished in the end with the help of Pakistani peacekeepers who were stationed near Kenema and who offered their help after some of their troops contracted Lassa fever. They donated supplies and arranged for the biosafety cabinets, which could not be taken over the dirt roads from Freetown, to be airlifted in the UN helicopter to Kenema.

Both past and present WHO staff describe difficulties in getting original stakeholders, including the MOHS, to stick to their commitments. The foundations of the new EU-funded ward were laid but never completed as match funding from the government did not materialize. Eventually the WHO, both Country Office and Geneva staff, pulled back. The WHO country representative was moved to another position, the Geneva-based staff were sent back from time to time but, as a former staff member recalled, 'somewhere down the line when the glow of the outbreak was done', attention was turned away from Lassa (see also Khan et al., 2008).

Biodefence dollars: technology deficits and counter threats

Of the various security 'problems' attached to Lassa the one which has raised the most resources, and eyebrows, is US biodefence interests: the laboratory in Kenema has been called a 'US anti-terror outpost'.[12] However, while the headlines may refer to bioterrorism, on closer inspection the biodefence assemblage reflects a more complex set of interests and politics surrounding knowledge and technology.[13]

When the MRU-LFN was set up, diagnostics were identified as a priority. Cumbersome and expensive to produce, routine serological tests were unavailable in West Africa. Classification of the Lassa virus as a Category A pathogen created funding incentives and possibilities for researchers and biotech companies to work on an otherwise neglected disease, marking a gear change from the activities carried out by humanitarian and international agencies up to that point. However unrealistic the widespread transmission of Lassa fever may appear, that classification frames Lassa fever as a threat to US national security due to its potential to spread and cause panic, therefore necessitating 'special action for public health preparedness'.[14]

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The greater part of the billions of dollars which have been raised and spent on biodefence by the US government since 2001 have both biodefence applications and non-biodefence applications – for instance in health care, public health or other security applications (Franco, 2009). The Tulane University-led research proposal to the United States' National Institute of Health (NIH) to develop Lassa 'Diagnostics for Biodefense' exemplifies this 'dual-use' purpose:

> The potential use of LASV as a biological weapon directed against civilian or military targets necessitates development of, '*effective, rapid, highly sensitive, specific, easy to use, adaptable, and cost-effective medical diagnostics for public health laboratories, hospital-based clinical laboratories, and point-of-care use (RFA-AI-08-001)'* to diagnose individuals exposed to and/or infected with LASV. The impact of Lassa fever in endemic areas of West Africa is immense, and a safe and effective diagnostic can also provide a very significant public health benefit.
>
> *(Garry, 2004, p64, emphasis in original)*

With a budget of approximately US$9–10 million, this was one of the first grants using the new Lassa lab in Kenema for field research. Another five-year grant, focusing on the role of humoral immunity in the protection or pathogenesis of Lassa fever (which has implications for developing effective treatment), was awarded from NIH's biodefence allocations in 2009/2010 for US$15 million.[15] The portfolio of biodefence-related projects in Kenema also includes those of Metabiota, a private for-profit company run by 'virus hunter' Nathan Wolfe. Metabiota focuses on monitoring 'viral chatter' in emerging disease hotspot, where intensive contact between humans and wildlife, for example through bushmeat hunting and trade, take place. The hope is that by being able to identify and mitigate viral spillover events before they take place, the 'next HIV' can be stopped in its tracks.[16] Metabiota had at least three grants from the Defense Threat Reduction Agency (DTRA) and Cooperative Biological Engagement Program (CBEP), both of which are US Department of Defense (DOD) agencies. Work in Sierra Leone initially concentrated primarily on the pathogenesis of Lassa fever, with applications for treatments and vaccines. More recently, Metabiota has carried out modelling research to understand the cycle of transmission in relation to climate. To put all of these Lassa grants into perspective, the Sierra Leonean MOHS was allocated approximately US$19,562,598 in 2009 to run the national health system

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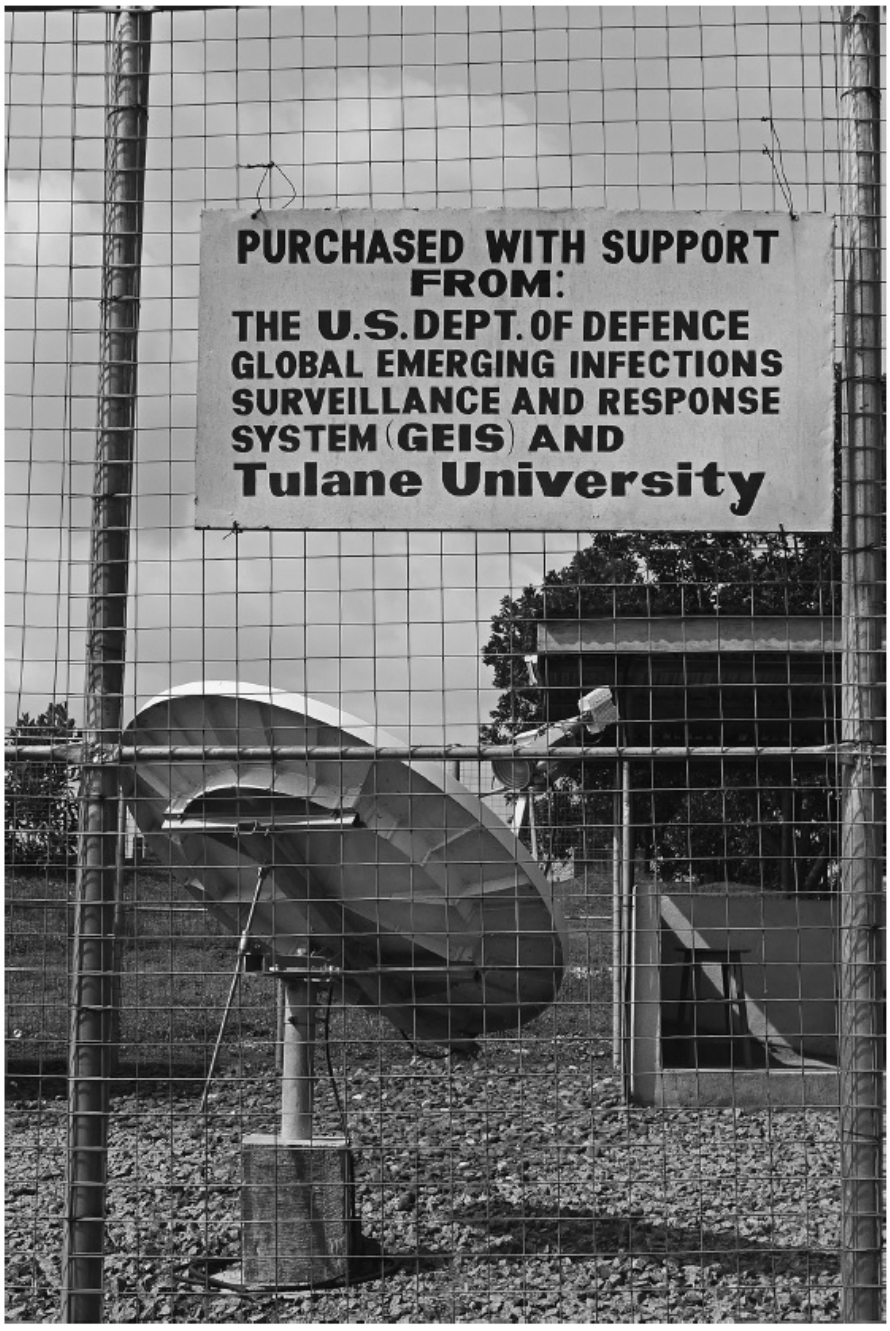

FIGURE 7.2 *Satellite on KGH grounds funded by biosecurity-related grants (credit: Annie Wilkinson)*

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for a country of 5.6 million people.[17] The significance of these well-funded research projects to a small site in Eastern Sierra Leone is considerable.

In 2010, the Viral Haemorrhagic Fever Consortium (VHFC) was established, bringing together US universities and research institutes, biotech companies, KGH and Irrua Specialist Teaching Hospital in Nigeria. The driving force behind this consortium was to understand mechanisms related to the human immune response to Lassa virus infection.[18] Collectively, the general approach has been to do research oriented towards the development of products, such as diagnostics, drugs or vaccines. A senior scientist at one of the Consortium's biotech firms summarized this in an interview: 'You're never going to eradicate the virus', he said, 'what we want to do for the next ten years is just get into a system where we can diagnose them quickly, treat them quickly and reduce the mortality rate'.[19] Consortium partners at Harvard University are also carrying out genomic studies of the virus and exposed humans as improved understanding of genetic factors may help in the development of effective treatments and interventions.

Vogel (2008) argues that, post 9/11, the US approach to biodefence has been captured by a 'science-based approach' that emphasizes the development of biotechnology as the most effective way to deal with uncertain threats stemming from complex socio-political factors. Preparedness is conceived of in terms of scientific capabilities. The 'tech fixes' hoped to arise from investments in research are thought to be the most rapid and robust way of overcoming threats. Understanding the social and political drivers of such threats is not a significant part of the agenda. In Sierra Leone, research trends reflect this. With the CDC's pre-9/11, pre-Sierra Leonean civil-war field investigations halted, the focus of recent work has been on the development of medical countermeasures as funding flowed for research on pathogenesis and genomics for diagnostics and treatment. On the ground in Sierra Leone, biodefence concerns are largely alien but they provide an injection of otherwise scarce resources. A MOHS doctor explained:

> The average Sierra Leonean won't see LF as a bioterror threat. Only in the Western world do they see it like that. They see it coming from here as a weapon… All the knowledge produced here could be used to help counter bioterror. But we do not see it like that.

For KGH, the research funds flowing into the Lassa laboratory provide opportunities to improve clinical practice. During development, using samples

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from Sierra Leonean populations, the prototype diagnostics are provided to KGH for free. The research projects have created work and skill development opportunities for Sierra Leonean staff employed at KGH. Research funds have also supported the outreach and surveillance team to do critical but often overlooked community sensitization on Lassa. This reflects a broader trend whereby the traditional roles of defence and health agencies are blurred as defence actors become involved in humanitarian and development work. In this case, research, defence and health system strengthening are brought together in an uneasy blend under the auspices of 'white coat diplomacy'. Yet when grants are primarily for research, the diplomatic spillovers are not always clear-cut. In particular, the provisions within research projects for longer-term capacity development and training of national staff have jarred with local expectations, especially over training and educational opportunities. Diplomacy is also undermined by inter-organizational disputes with national staff having to mediate between, for example, Metabiota and Tulane conflicts. One clinician commented, 'Now we have the troubles of one organisation to another, it is giving me a headache.'

Further complicating the research–defence–health system strengthening nexus are the uncertain financial incentives driving innovation, which for tropical diseases in poor countries have traditionally been minimal. While biodefence can provide a cash injection for developing drugs, vaccines and treatments for otherwise neglected disease, bringing products to the market has proved tricky. Members of the VHFC have made considerable progress in developing laboratory-based and rapid diagnostic kits. The innovation process has been driven by expectations of a market for these products in wealthier Nigeria as well as with US troops in Africa. However, in Sierra Leone there are questions about the sustainable supply of these kits. The provision of diagnostics is currently tied to the availability of research programmes but there is no formal agreement between the MOHS and Tulane and their partners about how the diagnostics will be supplied once research and development is completed. This ambiguity about ownership brings to mind another infamous example. In 2007, the Indonesian government famously refused to share their H5N1 samples in a protest about the inequity of international virus-sharing agreements. They argued that poorer countries supply the raw materials – i.e. samples which are then used by Northern pharmaceutical companies to develop and sell drugs, vaccines and diagnostics at a profit, often at prices too high for those same poor countries (Elbe, 2010b). It is hard not to see the rumours about a US-created Lassa–Ebola hybrid virus (as

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circulated during the Ebola outbreak) as a reflection of the ambiguous interests and outcomes of international viral research and the unequal power relationships it transects.

Becoming a national public health problem: from unknown to known

While on the international stage Lassa fever is an emerging disease and potential bioweapon, in Sierra Leone it is an endemic disease largely associated with the east of the country. There is a local version of the disease's exceptional status; it has, as one survivor put it, a 'big name'; however, compared to malaria or typhoid, which are common throughout the country, Lassa fever is not a 'national disease'. Professionals residing in Freetown spoke of Lassa fever as located in 'that little corner of Sierra Leone' and 'so far off'. Parts of the country are designated as being the 'Lassa belt', understood to run across the 'Kenema–Kailahun axis' or the 'axis of Kenema and Segbwema'.

Although money has gone into laboratory research, it has been shadowed by chronic underfunding in the wider health system. For significant periods of fieldwork in Sierra Leone there was no thermometer on the Lassa ward in Kenema, despite the fact that temperature readings are a key part of the case identification protocol. Nurses had to reuse needles on patients over the course of their treatment (although not between), which puts nurses at increased risk of infection as they 'recap' the needles. In health clinics elsewhere across the country neither gloves nor clean water are routinely available, let alone electricity. This is shocking but not surprising in a country that has faced ten years of civil war in recent memory, and is consistently ranked near the bottom of the Human Development Index.[20] Sierra Leone has some of the highest rates of maternal and child mortality in the world. In this context, Lassa fever is simply one problem on a long list of pressing concerns. Understandably, priorities are constructed in terms of geographic distribution and prevalence. A senior MOHS official emphasized that as long as the virus was considered to be geographically limited, resources would be limited: 'I'll be very frank with you, [resources are] not forthcoming because [Lassa] is not being perceived by all as a nationwide threat, yet.'

Scientists emphasized the patchy evidence base: the lack of good-quality diagnostics and the absence of extensive prevalence studies contributed to a

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knowledge vacuum. Many of the established facts are dismissed as 'dogma' by some research groups. One US researcher summarized the situation like this, 'Seriously, everything about Lassa, I think, needs to be re-examined. Everything published before 2000... There is a big gap, at least in field research on Lassa.' The patchy evidence base was not sufficient to translate into sustained policy support. There are moments, such as the death of Dr Conteh, when attention is drawn to the plight of Lassa in Sierra Leone but these focusing events tend not to last long.

In a country with multiple health and development problems, high-level policy interest has been episodic. After 2004, the MRU-LFN was formed and there was supposed to be regular regional meetings. But seven years lapsed before the next regional meeting, held in 2011. This meeting came about largely because of a spate of infections in the north of Sierra Leone, including the death of a South African engineer working for a biofuels company, which provoked concern about the disease's appearance outside of the traditional eastern zone and with negative consequences for the country's investment prospects. By 2012, however, a nationwide cholera outbreak had become the pressing concern. WHO country office staff reported that little had been done since the second regional meeting and that people and funds had once again moved on. Likewise, Ebola replaced cholera.

Within the usual policy ebbs and flows, the events of 2011 created a new discourse about Lassa fever. Conventional wisdom had located Lassa only in the east of the country, but it was now 'everywhere but Freetown'. As such the disease was now a nationwide problem that needed nationwide resources and attention. A senior MOHS official described what this would look like:

> A new approach would be for us to just take the country as it being endemic. Not only do you have the hyper-endemic areas but you really have it all over the country. And as such each and every health worker should be trained to look out and diagnose and pick out cases of it. Now more than ever the nursing barriers should be in place at all times. It also calls on all health institutions to provide the personal protection equipment for nurses, for health workers. It goes a long way in terms of the entire system... it means community sensitisation in previously non-endemic areas should be ongoing and not a one-off issue. It is a disease that does not forgive you if you make mistakes.

This was a new conceptualization of the disease prior to which the Sierra Leonean government's approach to Lassa could be described as 'policy-less'. The new

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narrative, that Lassa was a national disease making inroads to Freetown, challenged the implicit politics of the status quo which was that Lassa was a disease of the rural East and thus of little concern to Freetown policy-makers and donors. Technological change played a pivotal role in creating the conditions needed to shift the politics of this emerging disease. Before the Lassa lab was set up there were no routine diagnostics available for Lassa in Sierra Leone, or indeed the Mano River. Samples could be tested for research, mainly in laboratories abroad, to provide a retrospective diagnosis at best (Khan et al., 2008). The first routine laboratory-based tests– enzyme linked immunosorbent assays (ELISAs) – were introduced in KGH in 2007 but they still took the best part of two days to process the results, making them of limited clinical use. The Tulane-led 'Diagnostics for Biodefense' grant to develop ELISA kits saw the two-day wait reduced to a few hours.[21] The new ELISAs were not only quicker but more specific and therefore reliable (Branco et al., 2011). The speed and availability of new diagnostics improved clinical care and surveillance, which in turn provided the evidence needed to make new policy claims. The lack of diagnostic knowhow and associated knowledge deficit was one of the reasons that researchers had focused so heavily on diagnostics. As one international researcher commented in 2010:

> I was really impressed that the only way we were going to be able to get any sort of handle on things was to not jump right into community education or prevention measures because all those things require you to have some base line data, you know, what are you preventing, are you using your resources wisely; if you say we're going to go out and do community education or prevention, where are you going to do it? How much Lassa is there really in one particular region, or one village? The only way you could know, answer any of those questions was to have reliable diagnostics. And then start to collect information that was objective and could be verified and say here is where our Lassa cases come from, here is what is real and here is what is not real.

Public health prevention and disease control relies on statistics to improve epidemiological understandings but also to raise funds, secure policy attention and to make investments accountable through monitoring. These concerns were also emphasized by a senior MOHS official:

> So resources for Lassa sensitisation, Lassa training, are not forthcoming. Last year we approached WHO and we have thrown this to some NGOs working in

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> some of these districts to pick up this as an issue. But you know before even things become a priority you need to see data, case notes, and its coming and by all means the focus on Lassa will soon take place but it won't take place immediately because there are other priority diseases which have [more] attention.

He added later that '[Lassa] is an unknown.' Hard data is required before, and in order for, Lassa to compete with other diseases for attention and resources. There were disagreements about the direction of the LFN-MRU at its outset and some stakeholders wanted to focus on community-based prevention or improving the ward. However, the focus on diagnostics and surveillance won (Khan et al., 2008). Lassa needed to make the transition from an *unknown* to a *known* disease, and diagnostics were the building blocks to enable improved understandings of the disease profile, incidence and prevalence.

The differing attitudes towards uncertainty between biodefence and public health helps to explain the dominance of biodefence-funded projects for Lassa fever up until now. The public health resistance to act in contexts of uncertainty contrasts with the knowledge processes propelling biodefence interventions. Biodefence is, as argued by Vogel (2008), built on preparing in the face of ambiguous, potential threats – as a policy framework, it deals in the unknown and thrives on uncertainty.

Beyond containment: the scope for One Health

As the knowledge base for Lassa matures, the disease is increasingly caught between different problem framings and on the boundaries of policy assemblages in global health. Much of the research up to now has been based on a premise that Lassa is a rare and deadly disease which needs to be contained. It is this view which has enrolled biodefence interest. However, both the virus' geographic spread and its clinical presentation look to be wider than once thought. Improved diagnostics are finding evidence of milder infections, reshaping the diagnostic profile of the disease (Branco et al., 2011). Integrating a more nuanced understanding of what the disease looks like in a patient is a complex task and it has implications for the health system as a whole. The scary 'bleeding disease' image so useful for attracting resources may be less helpful in meeting this objective. Sensationalized accounts about Lassa, and indeed Ebola, can prevent

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them being dealt with in a calm and measured way. It was common to hear nurses talk about how they feared, and tried to avoid, nursing jobs in the Lassa belt. Doctors at KGH described cases being declined admission to other hospitals if there was the slightest suspicion that they may have Lassa. Inaccurate images of bleeding orifices and rapid death run counter to helping the public and healthcare workers understand the varied way the disease actually presents, and the need to extend treatment, infection control and suspicion beyond Kenema and the East.

Aside from the clinical and diagnostic work going on in Kenema, there was also a core group of staff carrying out (passive) surveillance, community outreach and rodent-trapping, supported by US research funds. Some of these frontline workers have worked on Lassa for decades. They embody the deep history of Lassa fever research in Sierra Leone and have unmatched expertise of the disease in local context. Working in close contact with the laboratory and ward at KGH, and with visiting scientists, they provide a bridge between the community and hospital settings and are the backbone of clinical, prevention and research activities. When a positive case is confirmed it triggers both human contact tracing and, if possible, rodent trapping. Community outreach is done by members of this team, and so benefits from their extensive knowledge of the local terrain. In many ways the integration of spatial (villages, bush, hospitals, labs) and knowledge domains (bioscience, human health, rodent ecology) achieved at KGH, in 'that little corner of Sierra Leone', is what One Health aspires to. Yet this team are based in Kenema and though they have kept admirably on top of caseloads, the geographical expansion of Lassa fever means such a setup is unlikely to be feasible for much longer. They are also constrained by out-of-date and unsophisticated field research on Lassa.

Even before Ebola hit, the limitations of the joined-up but small-scale and vertical operations in KGH were increasingly clear. After the flurry of early CDC research when the virus was first discovered, field studies on Lassa have since been scarce. By 2010, some researchers were beginning to question the diversity of research in Sierra Leone:

> The problem is a lot of money is being devoted to Lassa in terms of therapeutics, vaccines, diagnostics. But there is no money whatsoever for prevention, education, for health promotion. For understanding the epidemiology and transmission dynamics of Lassa, nothing.

As a result, little is known about patterns of exposure and disease vulnerability.

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The lack of clarity about the drivers and consequences of expanded disease territory (Gire et al., 2012) highlights this. Significant questions remain concerning the apparent disparity between the distribution of *Mastomys* habitat and recorded incidence of disease and whether this is due to occurrence of vertical or horizontal transmission within *Mastomys* populations (Moses et al., 2012). Fichet-Calvet and Rogers (2009) investigated climatological influence on the distribution of Lassa by compiling data on human infections from 1952 to 2007 and using it to draw predictive maps. Their results suggest that heavy rainfall and temperature impacted on Lassa fever distribution, with rainfall exerting the most influence. However, their models did not include rodent data, and it has been suggested by Moses et al. (2012) that these maps may be biased towards where humans get diagnosed rather than the actual ecological niches of the virus.

Understandings of social, economic, technical and environmental drivers of Lassa prevalence in human or rodent populations are further constrained. The impact of the civil war and development trends towards largescale agriculture or mining activity are unknown. However, in Sierra Leone, wellknown hotspots for Lassa overlap with long time mining areas, such as Tongo Fields, and new cases in the north were detected in areas undergoing transitions to largescale farming. Research looking at macro socioeconomic or ecological trends that may drive exposure, either due to major changes in land-use or seasonal agricultural practices, would be valuable. Patterns of transmission linked to farming practices and livelihood strategies, old and new, and across gender roles are not known.

The result is that plausible disease control and prevention strategies based on an understanding of everyday practice and differential vulnerability, as documented in recent modelling work (Iacono et al., 2015), are not possible. Instead, the prevention work carried out by the outreach team is based on CDC work from before the war, mostly from the late 1980s. It can be summarized as: don't eat rats, keep your environment clean and go to the doctor if you have a fever. Of potentially greater significance is the fact that *Mastomys* are burrowing animals. Dirt floors are common where cement cannot be afforded, making poverty itself a potential indicator of risk. Moses et al. (manuscript in preparation) found that houses with mud walls were nine times more likely to have rodent infestation than houses with concrete walls. Existing prevention messages advocating hygiene amount to little in the face of these socioeconomic conditions.

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Medical historian Charles Rosenberg distinguishes between 'contamination' and 'configuration' models of disease (Rosenberg, 1992). Configuration is concerned with the interacting social, medical and economic factors in particular contexts. Contamination models tend to put more emphasis on tracking and treating pathogens – through surveillance and counter threats – rather than understanding the conditions in which they thrive, and where changes could produce or reduce vulnerability. While much of the work done under the umbrella of the VHFC and the MRU-LFN has been in contamination mode, the research portfolio at KGH has begun to diversify and include more field studies to complement the counter threat work and to inform prevention. Metabiota is modelling the influence of climate on disease incidence using rodent and human data. The genetic work done by Harvard University and their collaborators is bringing a longterm perspective to Lassa fever. In 2011, the Dynamic Drivers of Disease Consortium, which this case study is a part of, began multimethod and participatory research into the ecological, epidemiological and environmental drivers of Lassa virus transmission, focusing especially on local livelihood and ecosystem service processes, including land-use patterns, climate, biodiversity, geography and lifestyle patterns.[22] In 2012, a Tulane researcher obtained UK Department for International Development (DFID) funding to work with GOAL, an Irish NGO, to test rodent control methods in an effort to update disease prevention messages and techniques. Collectively, these efforts are broadening the research base, providing an enriched understanding of the disease in its social and ecological context which One Health requires. Unfortunately, many were disrupted by the Ebola outbreak, so progress may be set back.

Promising research on the configuration of the disease should be matched with efforts to understand and influence the configuration of the policy environment. Dominant narratives about Lassa fever in Sierra Leone contain some troubling patterns. The persistence of the idea that Lassa fever is located only in that 'little corner of Sierra Leone' sees Lassa fever located in rural backwaters of little concern to urbanized areas such as Freetown, where most business, government and NGOs are based. This also relegates Lassa fever to an area associated with the civil war which began in the east.[23] Furthermore, Lassa fever's infection route is easily stigmatized and it converges with the perception that rural people living 'up country' are less civilized. The reason Lassa fever is only in the east, it is said, because that is where people are driven by ignorance, a lack of education and tradition making them behave in risky ways: eating rats and practising poor

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hygiene. Although common across rural Sierra Leone, the consumption of rodents as a source of protein receives considerable scorn; as one Freetown professional said, 'there is no better way of getting the disease than by eating its carrier' (see Figure 7.3).

These perspectives on Lassa, which attribute responsibility to individual behaviour as opposed to socioeconomic conditions or longterm socioecological change, are troubling in a context where ideas of disease and development can so easily become entwined. Post-war Sierra Leone has sought to move up from the bottom of the human development index and discard its 'blood diamond' label by achieving growth. The Sierra Leone Investment and Export Promotion Agency (SLIEPA) was formed in 2007 and seeks to promote investment opportunities in the country, particularly from foreign investors. It has focused on agriculture, identifying sugar cane and oil palm as priority investment areas. Commercialization and diversification of agriculture by the private sector is proposed as a key means of achieving change (GOSL, 2005). Largescale land deals, farming and mining are the order of the day.

Changes to the landscape may well influence rodent populations and disease ecology, but debate about the implications of these environmental and economic changes is absent, discouraged even. Institutional reluctance to consider different possibilities was evident from key stakeholders. During interviews, farming and mining industry actors did not see connections between their work and zoonotic diseases such as Lassa fever. Both London Mining[24] and Octea Mining[25] staff interpreted questions about the potential health implications of their operations as concerning staff getting sick. Otherwise, they saw their activities as unrelated and argued, for example, that Lassa fever was simply about people's culture and behaviour. As one stated: 'It is society generic not mining operation specific.' The mining companies, and the EPA who oversee their licences, view the impact of mining activities through the limited lens of the environmental, social and health impact assessments (ESHIA). This covered only those issues which were described as 'mining related health issues', like noise, dust and human resettlement. Health outcomes are framed as immediately observable with direct causal links. Messier, longer term and indirect outcomes are not contemplated and are not included in impact assessments. The direct links between Lassa fever, rodent consumption and poor hygiene are preserved as the primary drivers of infection and consideration of longterm and non-linear impacts of changing land use are avoided.

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FIGURE 7.3 *Local rodent trap, in Mende, with mock rodent (credit: Annie Wilkinson)*

Advocating for a broader, deeper conceptualization of One Health, Hinchliffe (2014) emphasizes that there is not one world, but many different worlds full of different perspectives. Putting this into practice means integrating plural forms of knowledge, especially bringing the views and experiences of local people into research and disease control. If outbreak narratives dominate on the global stage, and episodic, and at times stigmatizing views of Lassa fever are held in Freetown, very little attention has been paid to the perspectives of those who are most affected by the disease, making health messaging very unidirectional. Ethnographic research in eastern Sierra Leone uncovered some rather different understandings and reasons for susceptibility (Wilkinson, 2013; also DDDAC, unpublished). Although the message that Lassa is caused by rodents has diffused relatively well, there is a common misconception about which rodent carries Lassa. *Tuile* is the local name for an unpleasant smelling common pest, known to eat rice, on which Lassa is blamed. *Tuile* is more likely to be a shrew and the *Mastomys natalensis* is most likely known as *fogbetei*, although identification of rodent species is challenging, especially distinguishing *Mastomys* from other similar rodents. For

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example, DDDAC research has determined that *fogbetei* is not associated with homes and is considered to reside mostly in fields, swamp or the bush (unpublished). However, *M. natalensis* has routinely been trapped in homes in high numbers in Sierra Leone: in a study by Moses et al. (forthcoming) rodents were captured in 63 per cent of houses sampled, of which 47 per cent were *M. natalensis*. Rodents are eaten but people avoid *tuile* due to its unappealing smell and assumed Lassa connection. No such restrictions apply to *fogbetei*, and in general people report a preference for eating rodents found in the field or swamp instead of those around houses. This has implications for prevention messages, especially making information about rodent exposure more relevant to local categories of food and hygiene.

In village settings, Lassa fever was explained within existing disease landscapes where categorizations of sicknesses correspond, less to causative agents, and more to the available treatment options and social relations of sickness. In Mende areas, Lassa fever is known, along with other similar fever-producing illnesses, as a 'big fever', as opposed to a 'small fever'. A key distinction is that a 'big fever' is considered to be a 'hospital sick' which requires expert, most likely biomedical, attention, as opposed to an 'ordinary sick' which can be managed at home. There are some practical issues relating to if, and how, these categories can be realized. Whether someone has sufficient funds to travel and pay for treatment is a critical factor in determining whether a 'hospital sick' can actually be dealt with at a hospital. However, the circumstances surrounding sickness or death are also important. As is characteristic of Mende social life (Ferme, 2001), much about disease causation is ambiguous and biomedical information, even a positive diagnostic result, is not considered to be the end of the story in many cases. Fitting into existing ideas about misfortune and witchcraft, the deaths of pregnant women from Lassa (a group who are particularly vulnerable to the disease) are often said to have broken important social, ecological or ritual rules. In other cases, the questions hint at ideas about unknown environmental exposures. The role of rodent consumption, the discouragement of which is a key part of Lassa fever health prevention messages, is often disputed. Questions about the surrounding environment, for example the quality of water sources, are common. As such, the experiences of local people mean explanations for vulnerability to Lassa are grounded as much in social, economic and ecological dynamics as they are in biomedical mechanisms. This suggests that prevention methods and communication relying solely on giving biomedical information overlooks the

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realities and perspectives of people at risk of the disease, and will have limited effect.

Conclusions

The question of whether Lassa's expanded territory is truly 'emerging' or caused by improved diagnostics hints at the sociotechnical processes underpinning Lassa fever's discovery and recognition. It is not simply a new virus disease of man coming out of Africa. The co-evolution of science, technology and policy has constructed different versions of Lassa fever over time. This chapter has identified policy and knowledge processes that have underpinned the transition from a neglected disease to an exceptional high-priority pathogen, through to a national public health threat. This progression has been shaped by shifting assemblages of people, tools, economies, framings, styles of reasoning, interests and values (Collier and Ong, 2005). While Lassa can no longer truly be called a 'neglected disease', scrutiny of the distribution and direction of disease control efforts in the Sierra Leonean context is needed.

The scale of the Ebola crisis necessitates reflection on preparedness and biosecurity. Strong critiques have been made of how the tropes of pandemic preparedness, bioterrorism and emerging diseases have dealt in imaginary threats (Vogel, 2008) and produced imaginary interventions (Lachenal, 2014). In Sierra Leone, the threat of bioweapons may have been largely imaginary, but the problem of Lassa was real and tangible, and biodefence agendas have contributed to significant developments in diagnostics. The nascent articulation of Lassa fever as a national public health problem establishes a version of preparedness based on health systems, which is broader in scope than that of biodefence, but it is still lacking depth. So far, this national public health framing has involved talk of surveillance, training and a consistent flow of protective equipment for health workers. Missing from the discussion has been the vector itself, *Mastomys natalensis*, and its relationship with social, economic and environmental processes at community, regional and national levels. This may be due to *Mastomys natalensis* being considered a pest instead of livestock, removing it from linear discussions about 'economic value' that tend to define the priorities of the veterinary, public health and livestock sectors.

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THE POLITICS OF LASSA FEVER IN SIERRA LEONE

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Lassa also highlights the need for One Health proponents to engage with uncertainty – an area where the paradigms of biodefence and public health, as applied in development contexts, means that influential disease dynamics are overlooked. Biodefence funding and science has been pivotal in establishing a valid evidencebase for Lassa fever. However, the uncertainty narratives that have been told about Lassa fever, which emphasize a knowledge and technology deficit, overlook important alternative sources of knowledge which should now be integrated. Both biosecurity and standard public health approaches prioritize laboratory knowledge and have come to focus on reducing contagion; but they do so on the basis of impoverished understandings of human to animal transmission that pay little heed to configuration in the 'real-world'. Unpicking the configuration of the disease in field contexts, in particular the interaction with gender, socioeconomic status and forms of 'development' has been marginal at best. As Lassa proves itself to be a more common and complex disease than first assumed, plural forms of evidence can contribute to contextually appropriate, diverse and more resilient response pathways.

Recognizing and integrating the knowledge of a broad range of actors, especially frontline workers, field staff, social and political scientists, and urban and rural populations is essential. The Lassa ward suffered appalling losses in the Ebola epidemic, as did the general health sector in Sierra Leone, but those remaining have gone on to play pivotal roles in turning Kenema's fate around and now have a deepened knowledge of viral haemorrhagic fevers in the local context. Local communities have also learned rapidly and developed effective protective communitybased responses (Abramowitz et al., 2015). Ebola has demonstrated how fragile local expertise is if not nurtured and supported, while also revealing the problems caused by weak health systems which local populations do not trust or feel connected to (Wilkinson and Leach, 2015). Applying such a lens is urgent as Lassa emerges as a national disease, as the MRU-LFN ends its first decade, and as the Mano River region recovers from Ebola. It should address not only the socioeconomic conditions that drive disease, but also the ways in which these conditions can be systematically overlooked by dominant policy perspectives.

Notes

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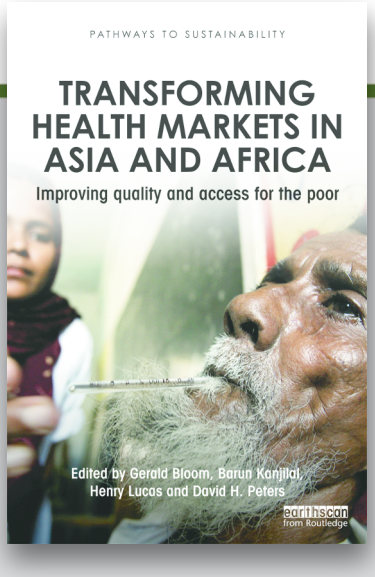
CHAPTER

5

MAKING HEALTH MARKETS WORK BETTER FOR POOR PEOPLE



This chapter is excerpted from

Transforming Health Markets in Asia and Africa: Improving Quality and Access for the Poor

edited by Gerald Bloom, Barun Kanjilal, Henry Lucas and David H. Peters.

Learn more

MAKING HEALTH MARKETS WORK BETTER FOR POOR PEOPLE

Excerpted from *Transforming Health Markets in Asia and Africa: Improving Quality and Access for the Poor*

Gerald Bloom, Barun Kanjilal, Henry Lucas, David H. Peters and Hilary Standing

From working with private providers to engaging with health markets

As the cases presented in this book show, health stakeholders and policy analysts need to pay much more attention to the operation of the health markets that play such an important role in most low- and middle-income countries. The kinds of health systems that will eventually emerge in these countries will be strongly influenced by the degree to which governments and other stakeholders can build institutional arrangements that both encourage innovation and influence the provision of safe, effective and affordable health services.

Much of the available evidence on the performance of health markets in low- and middle-income countries comes from studies of donor-funded interventions aimed at improving the performance of private providers and/or at using public funds to purchase services from private providers. Many of these interventions were designed in the context of long-standing debates about whether 'developing countries' should adopt an 'American' or 'European' model of health system organization. These debates have strongly influenced the way the issue has been framed, generating a lot of heat about alternative visions of ideal future health systems but shedding little light on the real situation in many countries. The extraordinary economic dynamism of a number of low- and middle-income countries and the effect of the economic crisis on the United States and Europe has reduced the plausibility that either can provide a model for health system organization in the rest of the world (Crisp, 2010).

The chapters in this book show that health markets have become a very important source of drugs and outpatient medical care for poor people and that the development of appropriate institutional arrangements to influence the performance of these markets has lagged behind their growth. In consequence, poor and vulnerable people are at risk of receiving dangerous and/or ineffective medical care and spending unnecessarily large amounts of money on these services. They also show that the dichotomous definition of health service providers as either 'public' or 'private' bears little resemblance to reality. In China, for example, formal ownership by a local government is only one of a number of influences on the performance of facilities that rely on market activities for

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financial survival.

In Bangladesh and India the boundary between what is public and what is private is obscured by the movement of health workers into market-based practice simultaneously with their formal service, and complex referral linkages across the boundary. In Cambodia a national NGO has emerged to help poor people with diabetes negotiate medical support in managing their illness in the context of unregulated health markets and a government system that can only meet a small proportion of the potential demand for services. These case studies illustrate the need to move beyond a narrow focus on the formal ownership of providers of health-related goods and services and to build a greater understanding of the complex health market systems that now exist in many countries. The remainder of this chapter outlines elements of a strategy for supporting the creation of appropriate institutional arrangements for increasing access to effective and affordable health services in contexts of rapidly changing market economies.

Building knowledge of health market systems

The first step towards more effective engagement with health markets is to create a body of systematic knowledge on their structure and the factors that influence their performance. The health market systems approach outlined in Chapter 1 provides a framework for analysing influences on the performance of providers of health-related goods and services. These include:

- formal ownership of organizations and their mission;
- the relationship between organizations that finance and provide health services and the pattern of incentives the providers face;
- government bodies (national and local) with mandates to influence different aspects of the performance of health organizations;
- professional and business associations, citizen groups, mechanisms of local accountability and other civil society organizations that influence health systems;
- formal and informal norms of behaviour that are widely accepted as part of a social contract in the health sector;
- political factors and the basic elements of regime legitimacy.

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The findings of a health market systems analysis can be used in the design and implementation of interventions to improve the performance of these markets in meeting socially agreed objectives. The case studies illustrate a variety of interventions that involve government, market arrangements (such as different forms of franchising) and existing or new civil society organizations. They demonstrate the complexity of these interventions and the need for all relevant stakeholders to learn new roles and responsibilities in ensuring that health markets take into account the needs of the general public, as well as the interests of specific stakeholders.

Understanding sources of innovation

There are a number of sources of innovations with the potential to improve substantially the performance of health markets in low- and middle-income countries. The advanced market economies have spawned a number of market-driven organizational models that include retail pharmacy and hospital chains, and franchises for a variety of health-related products. These models are diffusing through the expansion of organizations to other countries and by replication of these models by local entrepreneurs. Several donor programmes have attempted to adapt these models to meet the needs of the poor, but there is little evidence, to date, about the degree to which these efforts have successfully altered the performance of a health market system.

The rapid economic growth of a number of low- and middle-income countries is creating new international centres for technological and organizational innovation (Mashelkar, 2005; Leadbeater and Wilsdon, 2007). The demand for health-related goods and services is rising very rapidly in these countries. This increased demand is likely to result in the emergence of quite different types of market organization that reflect current technologies, the economic and social context, and the regulatory environment in these countries. If these companies can build a reputation for providing trustworthy services at an affordable price, they could expand very rapidly to become important actors in the global health economy. This process is well advanced in the pharmaceutical sector and there are already signs of the emergence of large service delivery companies. The rapid development of information and communications technology is creating major opportunities for

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Excerpted from *Transforming Health Markets in Asia and Africa: Improving Quality and Access for the Poor*

new kinds of organization, such as mobile phone health companies, to play a potentially disruptive role in the organization of the health sector.

The emergence of pluralistic health systems attests to the volume of local innovation. One commonly finds a bewildering variety of providers of health-related goods and services in many different practice settings. One can also find many examples of local approaches to build trust and address information asymmetry. The major lack has been in mechanisms to associate these providers with larger-scale organizations to extend access to the benefits of healthcare technology to larger segments of the population.

There is growing interest in the role of social entrepreneurs in health-related markets. The term is usually used to refer to organizations that 'borrow a mix of business, charity and social movement models to reconfigure solutions to community problems and deliver sustainable new social value' (Nicholls, 2006, p. 2) and/or to a focus on the creation of social value and a number of attributes of innovation, risk taking and a willingness to try something new (Peredo and McLean, 2006; Weerawardena and Mort, 2006). Social entrepreneurs work in the public, private and social sectors and are often involved in organizational innovations across these sectors. This makes them particularly interesting in the context of heavily marketized health systems with blurred boundaries between public and private roles and functions.

The boundary between social entrepreneurship and responses to commercial opportunities can shift. For example, banking through mobile telephones has evolved from being an act of social entrepreneurship to a major business opportunity. The same applies to micro-credit. An assessment of micro-credit confirms its success in achieving growth in access by people previously excluded from the organized economy (Greeley, 2006). It has substantially improved the performance of credit markets by using innovative approaches for identifying good credit risks, appropriate to the institutional context of many low-income countries. Successful schemes are linking to commercial financial organizations. This in turn may create new ways of delivering insurance-based health protection.

There is a significant risk that organizational innovations will create new types of market segmentation in which more people are able to benefit from efficient markets, but some are still excluded. In this context, Greeley (2006) points out that there is limited evidence that the very poorest people have benefited from

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commercial micro-credit. He emphasizes the importance of monitoring the performance of innovations in meeting the needs of the poor. Measures to meet the needs of the excluded are almost certainly going to require subsidies from government or other sources, with associated specialized institutions to ensure that these subsidies reach the target population.

Strengthening health market systems

In this section we draw on the analysis of health market systems and the case studies to present an initial framework for making health-related markets work better in meeting the needs of the poor. What this book has drawn attention to is the need to go well beyond the immediate context of local suppliers and users – the interactions between 'private' providers and users of goods and services in health systems. These interactions are part of complex health market systems that vary in many particulars and are embedded in contextually specific social, political and economic environments and associated institutional arrangements, spanning the local to the global. Whereas there is much to be learned and adapted across different contexts, 'what works' will be a balance between more generic findings and innovations that draw from specific experience. We have argued that institutional innovation will arise predominantly from this intersection.

Table 12.1 provides a descriptive matrix that brings together the major components influencing health market systems. Innovations aimed at changing provider performance are unlikely to result in sustainable changes to health market systems unless complemented by changes to other aspects of the market system. Such changes may involve the creation and enforcement of new regulations, the engagement of a variety of actors in regulatory and/or accountability partnerships and the development of new mechanisms of accountability in strengthening access to reliable and trustworthy knowledge. It is impossible to separate the performance of the supplier organizations from the market system within which they are embedded. Thus, in assessing the challenges and viability of an intervention or innovation a key step is to map it in relation to the wider health market system.

This mapping process provides a basic template for situating an intervention or innovation in relation to market functions, players and potential institutional

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Table 12.1 Health market systems framework for mapping of interventions

Market factors	*Supporting functions and rules*	*Product variation*	*Product organizational attributes*	*Institutional factors*	*Market and non-market actors engaged in producing market order*
Level of formalization	Infrastructure	*Level of:* Clinical/ practitioner skill	Managerial competence	Payment systems, both by patients and to practitioners	Formal regulatory authorities – local, national, international
Degree of information asymmetry	Information flows	Clinical/ practitioner effort	Financial resources – quantity	Segregation or integration of various medical services	Informal organizations, local, national, international
Degree of segmentation	Related services	Clinical/ practitioner integrity (trustworthiness)	Financial resources – source	Extent and quality of external state regulation of quality	'Hybrids', e.g. private or independent agencies with 'public' mandate
Complexity of supply chain	Laws	Price	Governance structure (and its alignment with patient interests) – ownership; values; extent of patron-clientage; influence of financial source	Extent and quality of external and internal regulation of quality by professions and other associations	Private companies
Interconnectedness of markets	Sector-specific regulations and standards	Accessibility – subdivided into distance, hours of practice, languages spoken and social distance		Extent of implicit regulation and training	NGOs/non-state service provider organizations
Global, national and local market systems	Informal rules and norms including those of health workers	*Level of:* Patient knowledge			Providers' associations
Source/driver(s) of innovation	Non-statutory regulations/codes				
	Social values				

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	provided by the referral system	Citizens' bodies, co-producing arrangements
	Extent and quality of internal regulation of quality by the health organization	User organizations
	Visibility of reputation, including via franchises, 'report cards', and sharing of experience between neighbours	Media and other sources of health-related information
	Interrelationship with global organizations and institutions	
Patient effort (including compliance) Patient trust (note that a patient may trust a provider who is not trustworthy) Patient ability to pay		

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arrangements. It provides the basis for a series of further questions to be asked about the potential to achieve the following outcomes:

- Does it reduce information asymmetry and enable patients to better assess whether the health services they are acquiring are appropriate to their condition?
- Does it align incentives better or worse with patient welfare?
- Does it relieve or exacerbate constraints on competence, finance and management?
- Is there evidence that it results in better health-related outcomes?
- Does it provide benefits to the poor and does it support the creation of sustainable arrangements to meet the needs of the poor in the longer term?
- Is it likely to encourage innovation and support the development of a more coherent market, or is it likely to distort the market and be purely temporary?

The devil, then, is in the detail. The evolution of market actors depends strongly on the specific interactions between direct financial incentives and the countervailing influences of reputation and a variety of regulatory and accountability arrangements. Successful management of institutional change involves the construction of new rules and widely shared understandings of what constitutes legitimate and illegitimate behaviour. A paper on the factors that influence the investment climate in developing countries by Moore and Schmitz (2008) contrasts an idealized view that advocates the construction of highly organized institutional arrangements as a prerequisite to economic growth with a messier reality within which private actors create informal arrangements to facilitate trust-based market transactions, and governments establish mutually beneficial relationships with private actors to create some degree of market order. Moore and Schmitz argue that the political economy strongly influences the degree to which these arrangements lead to economic growth and the eventual creation of rules-based market order, or to a descent into low-efficiency 'crony capitalism'.

Similar factors influence the trajectory of health-related markets in which informal arrangements and a variety of partnerships between governments and private actors play important roles. In some circumstances the state is unlikely to do more than prevent very dangerous practices such as the sale of counterfeit

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drugs, leaving local actors to create informal arrangements to bring some order to health-related markets. These arrangements are unlikely to be efficient except with regard to very simple goods and services. In other circumstances the state and/or other actors play a leadership role in a process that can eventually lead to a rules-based regulatory system. Where state regulatory capacities are weak, it may be possible to create alternative institutions that can improve quality, but not in a manner that is economic in the short run. These changes are likely to demand philanthropic or donor investments that will see the new institution through the period in which it is gaining recognition in the market of health consumers.

Countries face a major challenge in managing a transition from a situation of largely chaotic and inefficient health-related markets to more ordered market systems underpinned by some form of social contract. This transition will involve experimentation and learning by a number of actors and the gradual development of appropriate rules, behavioural norms and mutual expectations. The Chinese use a compelling metaphor to describe their management of multiple transitions as 'crossing the river while feeling for the stones'. This captures the iterative nature of a process that is driven by local innovation and adaptation and where a legal and regulatory framework is evolving to incorporate lessons from local innovations that have worked well or have been developed as responses to scandals or major negative outcomes. It is much too early to assess the success of China's efforts to improve the performance of its health system, and there is lots of room for debate about the applicability of this approach to countries with very different administrative and political systems. Nonetheless, this metaphor encapsulates an important message about the kind of complex change process that many countries will need to manage in their health-related markets. This change process will involve a number of stakeholders learning new roles and responsibilities to ensure that services are safe and effective and that they meet the needs of the entire population, including the poor. It needs to be accompanied by the creation of new rules of behaviour underpinned by ethical norms. The kinds of institutions that emerge from this process will strongly influence the pathways of health system development for many years to come.

Final thoughts: a framework for learning and dissemination of lessons

It should be clear from the diverse examples provided in this volume that there

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are no simple blueprints for the creation of both appropriate health service delivery organizations and the institutional arrangements to influence their performance in meeting the needs of the poor. The lack of simple blueprints highlights the importance of a learning approach that enables relevant actors to learn how local health markets work and to test alternative institutional innovations. As an initial step, building on work on learning approaches in development (Brinkerhoff and Ingle, 1989; Bond and Hulme, 1999), we propose a conceptual framework that recognizes key market players and institutions and focuses on the concrete activities they can undertake (Figure 12.1). This framework is not only a reflection of how public institutions may have been designed (e.g. with assumptions about Weberian motivations), or how they currently operate, for instance as dependent on street-level bureaucrats or front-line staff who use their discretion in implementing central policies (Lipsky, 1980). Nor is it limited to learning processes within private or civil society organizations. Rather, this is an action-oriented framework that builds on all these experiences.

The framework shown in Figure 12.1 is intended to be a flexible guide to different types of learning process, and its application is expected to vary considerably depending on local market conditions. At different stages in the design and implementation of strategies to improve the provision of health-related goods and services, a variety of actors will play important roles. For example, consumer organizations may be directly involved in problem solving, resource mobilization and monitoring. Yet consumer organizations do not necessarily represent the interests of the poor (Peters and Muraleedharan, 2008), which may lead to continued negotiations of formal and informal rules between their stakeholders and the organization. The interests of consumer organizations may also be in conflict with those of providers or other key players, which may result in providers being less forthcoming with information, or less willing to collaborate. Service provider organizations will work best if they are able to identify and retain qualified and motivated staff, communicate effectively across organizations, and use professional facilitation and advice in targeted ways (as distinct from the tendency in many development agencies to see technical assistance as a driving force for change). Critical institutional support includes government policies that encourage local participation and innovation by service providers, using permanent and local organizations for administration and regulatory functions, and a willingness and ability to reorganize and refocus these institutions as needs are identified.

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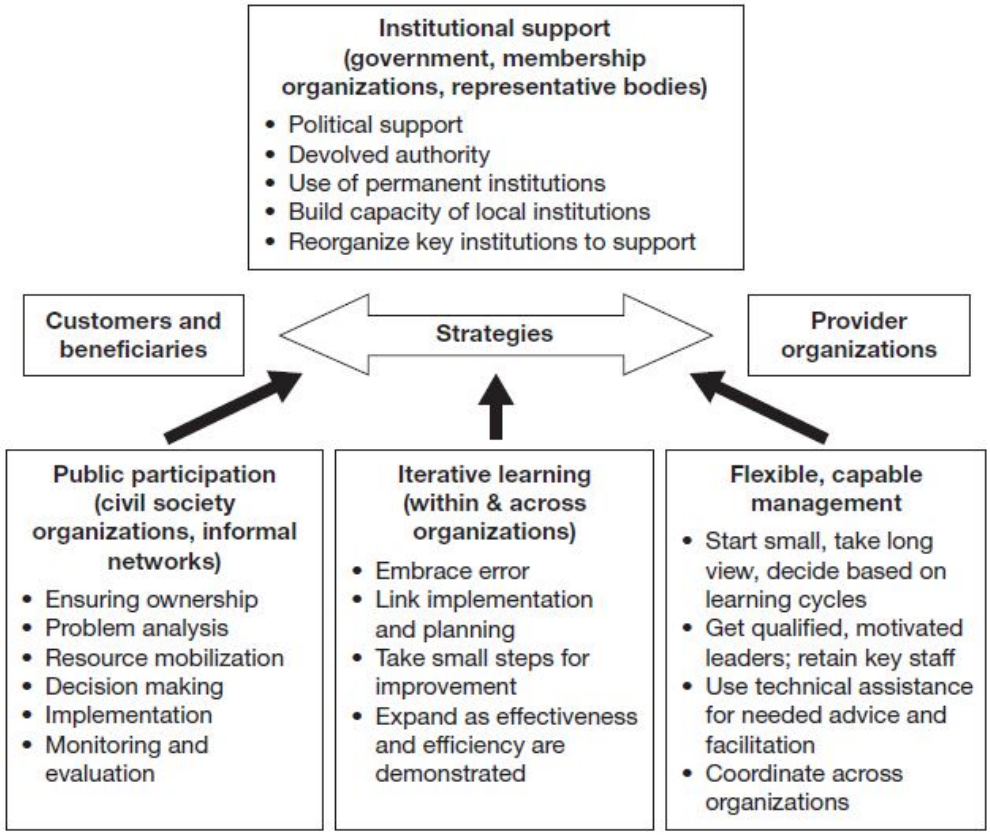

Figure 12.1 *Framework for applying systematic learning to health markets.*

A common problem in the health sector in developing countries is limited capacity for implementation of strategies. Trying to find the right fit between intervention goals, the expectations of beneficiaries or customers, and the capabilities of implementing organizations, governments and communities is an ongoing challenge. We propose that part of the solution involves continually questioning capacity constraints and being aware of the effects on other market players. Do the constraints lie in the lack of specific human skills, infrastructure or management systems that organizations need to perform their work, or is there a more important problem in the setting and enforcing of rules across organizations, or in communicating information between different actors? If the constraints lie within a key organization, such as a service provider or regulatory agency, radical reorganization is often considered, even though the costs to morale and

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productivity can be substantial. Can such problems be addressed by more subtle changes that minimize these costs while better aligning responsibilities, authorities, resources and accountabilities with the objectives and tasks of the organization?

Knowing when the pace of change is outstripping the ability of organizations to deliver quality services effectively requires intelligence gathering and processing with both implementers and service beneficiaries. Simply asking which units within an organization appear to be performing well and which do not may provide early warning signs. Although any well-functioning organization will try to monitor the performance of its own constituent units, government regulatory agencies are traditionally seen as having the main role in assessing performance across organizations. In health market systems, however, the leading players in assessment, and in setting rules on provider performance, may also include consumer groups, research agencies, the media, professional bodies or insurance companies. Whatever the origin of information concerning provider performance, it is important to consider the roles of other market players and their responses to that information.

Processes that encourage learning and good decision making

A range of existing tools can be applied to reinforce iterative learning that links implementation and planning, encourages appropriate risk taking and promotes a forward-thinking perspective towards expansion of services that builds on what is learned. Participation in learning processes across organizations involves risks, as it cannot be assumed that stakeholders will always see a benefit in their participation. A culture within organizations that accepts error may be needed, as well as trust between organizations. In the absence of trust, actors may undermine learning processes by manipulating information.

Processes that encourage learning, decision making and action based on learning have been shown to be particularly effective in improving implementation (Peters et al., 2009). There is little evidence to suggest that specific types of organization must take a lead in driving or facilitating such processes in a given context. They tend to rely on the involvement of multiple stakeholders.

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Types of question to ask in a learning strategy

On the basis of an extensive review of strategies that have been used to improve the performance of health workers and health service organizations, a number of key questions and strategies have been identified as associated with good learning strategies. These include the following:

- Are there positive and negative outliers in providing health services? For example, are there differences between states within a country, communities within a district, or neighbourhoods within a community? Are there differences between vulnerable groups and other segments of society? Are there differences across different service delivery organizations? Differences may exist in terms of high and low performance or in population groups. Look for a range of available sources of data, including both routine health information systems and informal mechanisms, for example key informants or the media. Consider the way in which analysis is related to actions taken by decision-makers, be they frontline providers of services, managers within a service delivery organization, senior executives or policymakers, or regulatory and membership bodies.
- What are the unintended consequences of the strategy? When implementing health interventions, most people tend to look only at the intended results, but it is also important to look at any possible unintended consequences outside the narrow focus of the intervention itself.
- Does the strategy create the right incentives for critical organizations and people to work towards a common purpose? Changes in laws, regulations, leadership, macro organization changes, or economic or political shocks can radically affect the way health services are implemented. Trying to anticipate many of these shocks may be very difficult, but it may be more important to be able to recognize when they are occurring as soon as possible, and to take corrective steps. This again involves good information gathering and feedback mechanisms.

One conclusion of the proposed learning-based approach is that interventions and institutional changes should not be undertaken in isolation. One reason is to be

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able to identify and address the unintended consequences of any reform effort or attempt to influence markets; they are likely to affect the different players differently. Another reason is that partnerships are needed, not only to ensure sufficient scale of service provision but also to construct new social contracts and institutional arrangements within which providers are embedded. There are many learning technologies and processes that should be integral parts of any major efforts to strengthen health market systems, but it is just as important that they should involve all actors likely to influence their outcomes. If the outcomes are to benefit the poor, their participation in learning processes to influence health markets is particularly important, along with institutional arrangements that focus on achieving these benefits.

References

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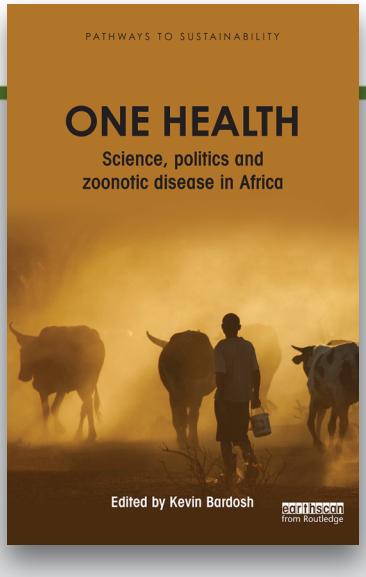
CHAPTER

6

IMAGINED FUTURES

NEW DIRECTIONS FOR ONE HEALTH



This chapter is excerpted from

One Health: Science, Politics and Zoonotic Disease in Africa

edited by Kevin Bardosh.

Learn more

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NEW DIRECTIONS FOR ONE HEALTH

Excerpted from *One Health: Science, Politics and Zoonotic Disease in Africa*

Kevin Bardosh

This book has emphasized the fact that zoonotic pathogens are deeply interwoven into the broader political economies that pervade our modern world. Dynamics of power and politics shape the origin, distribution and consequences of zoonotic infections, as well as the assemblages of research and policy processes that accompany them, in complex and context-specific ways. While these are often hidden from view, this book has sought to untangle these relationships, and reveal how understanding them is an essential step forward in envisioning and enabling more sustainable and equitable futures, both in Africa and elsewhere.

A series of diverse case studies have mapped out this conceptual terrain, exploring the interrelationships between human, animal and ecosystem health, and the systems of surveillance, preparedness, response and prevention that surround them. This included attention to the various narratives circulating around One Health in research and policy circles at the global level, the characteristics and evolution of Nipah virus scientific networks and the multiple science-policy controversies surrounding trypanosomiasis control. It involved the politics of brucellosis research among Fulani pastoralists in Northern Nigeria, as well as the relationships between endemic disease, health systems and biosecurity funding in remote research stations, like the 'Lassa lab' in post-conflict Sierra Leone. It has concentrated on how different narratives about disease dynamics, expertise and development shape zoonoses response pathways in Ghana and Zambia. And it has included delving into contested histories and institutional landscapes, where deep-seated inequalities and exclusions influence preparedness and response systems to epidemics of Rift Valley fever in Kenya and Ebola in West Africa.

In a field where critical social science analyses have been few and far between (Dry and Leach, 2010; Scoones, 2010; Craddock and Hinchliffe, 2015), this final chapter asks: what are the implications in moving an appreciation of power and politics to the forefront of current zoonosis research and policy approaches, and what does this mean for the 'operationalization' of One Health in Africa? Centred on collaboration and integration between disciplines and sectors, One Health has been presented as a 'renaissance movement' (Karesh and Stephen, 2014), redefining the contours of how zoonotic disease should be conceptualized and approached.[1] This book has questioned important aspects of these burgeoning

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rhetorical claims by providing contextualized knowledge about the particular, real-world challenges faced in Africa. This has allowed us to unpack the prevailing discourses surrounding One Health – discourses that are fast becoming accepted orthodoxies, and guiding significant research and policy agendas across the globe.

The case studies presented showed how zoonotic infections connect disparate domains – between culture, society, economy, infrastructure, technology, politics, biology and ecology – in ways that create particular conundrums for research and control. As assemblages that span the local and global, they relate different material, cognitive and biological worlds, from the 'risky practices' of remote rural villages to the variety of global resource flows and governance structures that have an impact on them (Collier and Ong, 2005). Zoonotic infections should not be viewed in isolation; rather, such connections link pathogens to a series of interrelated global challenges – from food insecurity, systemic poverty, climate change, environmental degradation and dysfunctional governance and political regimes. These not only influence epidemiological patterns, but also mediate the ability for different actors – from global agencies, states, civil society, the private sector, universities, local governments and communities – to understand and respond to them.

Without deeper consideration of the everyday connections and disconnections between social, political and ecological worlds, the risk is that One Health will perpetuate the current compartmentalization between science, health, development and politics. The expansive vision of 'One World, One Health' may, in turn, become 'sidetracked' and 'siloed' within new sets of expert-driven agendas, lofty rhetoric detached from local realities and priorities, and narrowed, technocratic interventions far removed from the social determinants of health.

This final chapter reflects on these crosscutting themes. It charts out new conceptual territory, delineating some of the ways in which sociopolitical analysis can assist in placing sustainability and social justice at the centre of current zoonosis research and policy landscapes. It asks: What is the value in moving power and politics to the heart of One Health, and how can this be done? What types of systems are needed to ground One Health in particular local contexts, and to address some of the systemic sociopolitical barriers involved? What new forms of knowledge and expertise are required? And how can governance and funding pathways be improved to facilitate this? Revisiting some of the prevailing tensions

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in global health and development outlined in the introduction of this book – the interactions between the global and local; the disjunctions between policy and practice; the tradeoffs between technology and participation; and dynamics of knowledge and expertise – this chapter offers both theoretical and practical suggestions for how current programmes and policies can be improved by paying attention to power and politics, and what types of methodological innovations are needed to advance this agenda.

Shifting conceptual boundaries: from pathogens to politics

The case studies in this book have shown that conceptual standpoints matter; how we understand and approach the problem of zoonotic disease is important because it shapes the object of research and informs the logics of response, intervention and policy. Animal-borne infections are viewed differently by different social groups, and these divergent perceptions are influenced by issues of power, knowledge, interests and values (Keeley and Scoones, 2003). Different narratives about problems and solutions create incompatible priorities, as we have seen, between people, land, animals, economy and the environment that need to be appreciated and engaged with.

In this sense, the book has questioned the focus of much current zoonosis research and policy effort, and argued that the current movement towards interspecies and ecological health needs to include more explicit recognition of the complex, multiscale dynamics between pathogens and their wider social, political and environmental contexts. Shifting the boundaries of the problem away from an emphasis on the *containment* of pathogens to the *configurations* that surround, perpetuate and sustain them is imperative to realizing a more holistic and accurate view (Rosenberg, 1992; Wilcox and Colwell, 2005). Wallace et al. (2015) have called this 'structural One Health' – locating the roots of zoonotic health ecologies in histories, shifting cultural boundaries and economic geographies, including a focus on markets, industries and governance regimes.

This book has offered a number of pertinent examples. Bardosh et al., for example, showed the ways in which normative framings of the West African Ebola outbreak depoliticized the origins of the crisis, which was rather located in a series of systemic and historically embedded inequalities in income, health and political

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voice. Ducrotoy et al. discussed the roots of marginalization and stigmatization among Fulani pastoralists in Nigeria, and how this shaped the research process for brucellosis in the Kachia Grazing Reserve. Wilkinson highlighted how biosecurity funding, together with wider government policy neglect, sidelined field outreach activities and attention to wider questions of disease ecology for Lassa fever in Sierra Leone, including rodent dynamics, socioeconomic status and the potential effects of international mining. In Zambia, Grant et al. revealed the ways in which trypanosomiasis is influenced by changes in markets and livelihoods, including the cotton industry, demand for charcoal from growing urban centres, trends in human migration and tourism.

While the importance of these wider political economies are increasingly being acknowledged, we have also seen how there remains a prevailing tendency for more narrow perspectives. The biosciences, in many cases, continue to view disease as a predominately pathophysiological process, detached from ecological and social realities (Baer et al., 2003). Although One Health proponents emphasize the need to incorporate a social-ecological perspective into epidemiology and intervention (Zinsstag et al., 2015b), these are also being used to support grand claims of 'predicting' disease emergence and 'preventing' future pandemics (Wolfe, 2005). New tools – immunological techniques, genomics, phylogenic analysis, and geospatial modelling – are being applied in the hopes of unravelling what are very complex spatial and temporal relationships. The goal is to model risk in order to inform public policy.

However, incredibly complex feedback-loops and non-linear relationships generate interpretative problems for causal analysis that need to be accounted for (Stirling and Scoones, 2009; Myers et al., 2013; Lloyd-Smith et al., 2015). In most cases, the quantitative, statistical and generalizable continue to reign supreme in zoonosis modelling and science, where risk is commonly assessed through 'science-based' models (Bickerstaff and Simmons, 2004; Leach and Scoones, 2013). However, as Stirling and Scoones (2009) argued in light of the avian influenza crisis, claims of 'rigorous science' are nonetheless supported by utilitarian assumptions, fragmented knowledge and methodological shortcomings.[2]

As these new zoonosis models try to influence policy, questions remain as to what the ultimate purpose and consequences will be. Too often the assumption is disease models will generate knowledge that leads to rational policy decisions and

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effective implementation. There can be a dangerous overconfidence in these models, where simplifications are hidden under the banner of 'sound science' (Stirling and Scoones, 2009). The result can be an erasure of the local and complex, and of ambiguities and uncertainties, making 'the messy world of public health . . . to look, here and there, like a bench science laboratory' (Adams, 2013, p65). This book has questioned this linear, depoliticized perspective, and highlighted alternative sources of knowledge that should now be considered. To avoid a narrowing of perspective and a disconnect between science and society, more attention needs to be given to the embedded human behaviours, cultural artefacts and systems of sociopolitical relationships involved in zoonotic disease transmission, and in the models that claim to represent them (Leach and Scoones, 2013). This has all become more apparent in policy circles due to the failures in the Ebola response in West Africa (Abramowitz et al., 2015; Funk et al., 2010). The burgeoning science of scenario planning offers one alternative attempt to get to grips with these uncertainties, helping us to identify a range of possible future disease scenarios and their related social and ecological dynamics.[3]

Shifting conceptual boundaries from pathogens to politics also redirects attention to the root drivers of zoonotic disease, and who is ultimately responsible for addressing them. The focus on the biological and ecological has tended to perpetuate an overemphasis on 'bad' or 'risky' behaviours of often poor and marginalized people – as in wet market trading or bushmeat hunting – rather than the structural inequalities that generate risk (Singer, 2015). These discourses place the onus of improving biosecurity on local communities without appreciating the structural barriers involved. Placing structural inequalities and political ecologies at the forefront of our understanding of zoonotic disease renews our attention to the failures of development in Africa that generate disease risk and underpin local vulnerabilities – in livelihoods, ecologies and governance systems. For example, there is a need to consider how interrelationships between populations, and their biological and sociopolitical relationships, foster the clustering of coinfection and risk across the human–animal–ecosystem interface (Singer and Clair, 2003; Rock et al., 2009). In this sense, discussions about 'hotspots' should also be discussions about 'non-state' regions – geographies where the state–citizen contract is severed or nonexistent (Prince, 2014).

While this may all seem obvious, the consequences are not. Ultimately, our understanding and framing of these problems have far-reaching implications for

how we prioritize funding and respond to zoonotic disease threats.

Science, technology, and participation

Viewing zoonotic diseases as assemblages of sociopolitical relationships draws attention to the importance of new modes and systems of action. What are the implications, and the possibilities for change? One Health is premised on a new ethos of doing health; however, the case studies of this book have questioned important aspects of current capacities and priorities in public health, veterinary, agriculture and conservation regimes in Africa to operationalize this lofty rhetoric. The issue is not only about getting different experts to work together on research questions and projects, but also about challenging entrenched norms around technology, poverty and citizen participation. As Scoones showed with trypanosomiasis, the tendency for quick techno-fixes leads to a narrowing of framings where technologies become tied to specific researcher interests, prestige, resources and institutional logics. The focus becomes about the next magic bullet and the perennial promise of 'big impact' just around the corner (Kelly and Beisel, 2011). But this discourse narrows the organizational and institutional relationships needed to enact more grassroots change. This is not to say that new technologies are not urgently needed, as discussed in the book 'One Health: Science, Politics and Zoonotic Disease in Africa'. Millstone et al., for example, showed how a new Rift Valley fever (RVF) vaccine could significantly improve RVF preparedness and response pathways. Wilkinson similarly discussed the benefits of new Lassa fever diagnostics in addressing knowledge gaps about incidence and epidemiology, which then helped drive greater policy attention. Rather, it is to realize that an overemphasis on particular applications of science and technology hide important alternative pathways.

There are, after all, important trade-offs generated by competing perspectives and their accompanying priorities. Leach and Scoones (2006) discussed three framings of science and technology for development: the magic bullet, the technology transfer and the citizen engagement model. The latter was identified as the 'slow race' to making science and technology work for the poor, where magic bullets are replaced with a much more nuanced appreciation of people, places and the participatory process. As new sets of surveillance and response infrastructures and

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technologies (such as web-based surveillance and mobile technologies) and knowledge networks proliferate under the One Health banner, 'big data' and 'big systems' need to be accompanied with 'small data' and localized systems. But even where seemingly appropriate technologies do exist, challenges of implementation – in access, delivery, adoption and use – are often problematic and contingent. There is, for example, a so-called 'toolbox' of validated control options, grounded in decades of research findings, already in circulation for the neglected zoonotic diseases (NZDs), but major knowledge 'gaps' are still pervasive in how to move these interventions into different local contexts, scale them up and generate real, lasting impact (Molyneux et al., 2011).[4] Even 'basic' interventions – such as rabies vaccination, passive surveillance of animal deaths, mass treatment of livestock with veterinary drugs, stopping open defecation and improving slaughterhouse and wet market hygiene – often flounder (Bardosh et al., 2014b). There are reasons for this – but uncovering the multifaceted mosaic of factors involved is very often removed from the concerns of project logics and scientific concerns; despite its benefits, funding into the 'implementation gap' continues to receive relatively modest attention (Allotey et al., 2008).

The interface between technologies, delivery and use in Africa is one fraught with sociopolitical complexities. Biomedicine is not monolithic, but seen as somewhat unpredictable and fragmented in a pluralistic medical landscape where health systems are poor and politics pervasive (Prince, 2014). Attention to issues of access and use have become paramount in global health, but are compounded in the field of zoonoses through the need to consider wider system dynamics – livestock extension systems, crop and landscape changes, vector control, market systems and conservation, among others. One major consideration is the need to foster sustainable capacity within district and local outreach teams and to promote community-based surveillance, treatments, prevention and resilience. This book has shown the importance of addressing this gap. Millstone et al., for example, revealed how community-based animal health workers (CAHWs) and pastoralists could play significant roles in improving prediction, forecasting and early warning systems for RVF in Kenya. With Lassa fever, Wilkinson discussed the need for more innovative rodent trap techniques and community outreach. Similar examples were given with brucellosis in Nigeria, trypanosomiasis in Zambia and Ebola in West Africa.

It is here, in these local service delivery and citizen–state relationships, that

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lasting changes in resilience and sustainability for One Health will most likely be generated. Many of the 'implementation gaps' discussed in global policy circles are, in effect, the result of a lack of basic foresight, appropriate expertise and capacity. While no panacea, improvements can certainly be made by giving more attention to local needs and the process of implementation (Parker and Allen, 2013; Crawshaw et al., 2014; Coffin et al., 2015; Sripa et al., 2015). Sometimes rather small changes, implemented with attention to local contexts over time, can generate the most lasting impacts, even with relatively modest sums of funding (Bardosh, 2015).

Thinking critically about local systems, of technology and participation, also demands a more explicit engagement with the nuances of 'community' than is given in current One Health practice. A 'community' is not amorphous, and reifying them is counterproductive. Social differentiation across class, gender, ethnicity, religion, identity and livelihood activities is important (Scoones, 2009). Without delving into the complex textures of these local settings, in an attempt to 'ground One Health', simplistic assumptions will be glossed over, perpetuating divides between research and policy actors and the publics they seek to engage (Briggs, 2003).

Local people and field staff have to innovate, to understand the burden of zoonoses and to appreciate the social and environmental changes around them. As we saw with Ebola and RVF, local logics and incentives are often behind the drivers of 'resistance', and more attention to understanding the histories of, and incentives for, local involvement and change are urgently needed (Paul et al., 2015). This includes the full spectrum of community participation, from compliance with passive reporting of animal deaths to broader citizen-driven change. What are the opportunities for behaviour and structural change, what mediation and facilitation is needed and what are the limitations? Greater attention to participatory approaches are certainly needed, helping to ground research questions and interventions more in local priorities, and assist in moving beyond predetermined plans towards more iterative, long-term and adaptive approaches (Montavon et al., 2013) – a theme much more emphasized in EcoHealth than in more mainstream One Health circles (Charron, 2012).

But considering community participation as an integral component of a One Health approach should not result in routinized lip-service, whereby participation

is rendered technical, reinforcing established power dynamics and providing shallow interpretations of community dynamics (Cooke and Kothari, 2001). Learning from the wider debates within international development circles about 'participation' should help to avoid such practical and methodological shortcomings.

At the core of the One Health venture, then, should be an attempt to redefine researcher–community–policy relationships. If politics, and not necessarily pathogens, are the overarching focus, then the focus on systems becomes more about addressing biosocial relations, in context and as process, and tracing their relationships with zoonotic infections across local, national, regional and global scales.

Plural forms of knowledge and expertise

This book has also shown how disciplinary divides still run deep, how sectors remain siloed in important and longstanding ways and that divisions of power between different actors generate longstanding conflicts. Embedded interests run against generating transdisciplinary knowledge, while relationships between researchers and policymakers can be weak. Policy circles and professional incentives do not necessarily encourage working across divides, or fostering long-term community–researcher networks needed to enact these changes.

These are very real challenges. One Health advocates have strived to address them – through fostering partnerships, promoting new competences through trainings and aspiring towards a shared language emphasizing integrated thinking. This has increasingly occurred through new courses at universities, the establishment of centres of excellence and north–south exchanges, with many occurring in Africa (Travis et al., 2014; Bonfoh et al., 2015). Over time, there has also been more emphasis on longer-term capacity building documented in the literature. Regional networks have developed, funded by the major international donors: these include the Regional Network for Asian Schistosomiasis and Other Helminth Zoonoses, the Asia Partnership on Emerging Infectious Diseases Research (APEIR), the Afrique One consortium and OH-NextGen, to name but a few (Yang et al., 2010; Travis et al., 2014; Okello et al., 2015). A number of country-specific research initiatives and government platforms have also proliferated, such as the

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Kenyan Zoonotic Disease Unit.[5] Their sustainability and impact are hard to gauge, however.

Nonetheless, much of the current fanfare continues to be about getting vets and medics together. For many zoonoses, especially those deemed emerging or 'pre-emerging', fundamental scientific questions, of biological transmission, ecology, infection, pathogenesis and treatment, remain tremendously important. More attention to these scientific questions and complexities are, in many cases, fundamental. But social science expertise is highly pertinent to all these issues. To date, however, social science has been marginal at best. Some efforts are underway to change this.[6] A number of current projects are, for example, emphasizing getting together other experts, including economists, ecologists, medical anthropologists, political scientists and wildlife experts.[7] Communities of practice, widely promoted in fostering the related EcoHealth movement, have been shown to be important avenues towards fostering multidisciplinary research groups, and can also help generate links between different research and policy networks (Stephen and Daibes, 2010; Bertone et al., 2013; McKellar et al., 2014). The recent Ebola Response Anthropology Platform is one step in the right direction, representative of contemporary attempts at developing transnational knowledge networks.[8]

Transdisciplinary research demands attention to reframing the boundaries of problems, methodologies and collaborations (Wickson et al., 2006). As the trumpet-call for interdisciplinary research and action continues under the One Health banner (Min et al., 2013), this book has highlighted the need to reconsider the continued divides between the natural and social sciences (Rosenfield, 1992; Albert et al., 2008, 2015) and the gaps between research and policy (Meagher et al., 2008).

Integrating political economy and community-based participatory analysis, as well as other research methodologies, into the evolving practice of One Health will require learning and adaptation by research and practitioner networks (Rowe and Frewer, 2000; Draper et al., 2010). A number of case studies in this book, for example, have highlighted the importance of trust, leadership, incentives and relationships to facilitating more holistic research and policy approaches. In order for plural forms of expertise and knowledge to be prioritized, new institutional linkages and policy–research networks are required. A critical praxis is important to maintain, guided by problem solving and acceptance of multiple forms of data

and evidence.

Innovations in governance and policy pathways

The diffusion and evolution of a One Health approach to zoonotic disease will be especially shaped by different governance and policy regimes. This will require shifting prevailing institutional hierarchies, relationships and norms at multiple levels – from the global, regional, national and local – which are structured and maintained by broader systems of funding and patronage. Realigning bulky bureaucracies, shifting incentives for research, building capacities and multi-sectoral partnerships, prioritizing the needs of the poor and understanding context are not easy. This is especially the case when we consider the broader political economy of global health and development funding, dictated by fads, fashions and whims, and the tendencies to 'depoliticize' aid and interventions (Ferguson, 1994; Mosse, 2011).

This book has highlighted multiple, overlapping governance challenges. These include donor-driven and technocratic agendas, fragmented national policy systems, short-term grant cycles, elite capture, competing priorities between sectors, weak district capacities for implementation, poor communication between stakeholders and top-down consultations. We have seen how diseases like RVF are left to languish in neglect between inter-epidemic periods. Funding of the Lassa lab in Kenema, Sierra Leone raised questions about the prioritization of bench-science and defence priorities in comparison to other pathways. In Ghana, Waldman et al. report on the 'politics of precaution' that predominated around unknown bat-associated zoonotic threats in contrast to other risks and priorities. And we also saw in Nigeria how researcher interests and longstanding stigmatization of the Fulani led to inappropriate research aims to investigate brucellosis.

One Health advocates need to take a much more complex view of the policy process, away from linear models and towards consideration of narratives, actors, interests, governance arrangements, issues of resilience and questions of equity (Keeley and Scoones, 2003). Dominated by donor and biosecurity agendas, funding for zoonoses tends to be tied to specific policy narratives – around biosecurity, trade, conservation, technology or poverty alleviation. These lock-in around specific

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logics and pathways in ways that can severely limit the ability to adapt to emerging challenges and engage interlocking priorities and system dynamics. This critique has been most heavily voiced in relation to the top-down and 'one-size-fits-all' approach to avian influenza (e.g. Scoones, 2010; Mwacalimba, 2012; Okello et al., 2014b). Moving funding and policy models away from the crisis and emergency mode, however, may prove to be rather difficult. Significant resources are mobilized around pandemic threats, and they offer a 'policy window' to propel zoonoses into the limelight. Some scholars have emphasized that this can be used to stretch across the emerging/endemic disease divide, and support improved systems for endemic diseases of the poor (Parkes et al., 2005; Halliday et al., 2012; Schwind et al., 2014). But there remain real dangers with this 'piggybacking' approach as it can lead to piecemeal application and cooptation.

One Health advocates are acutely aware of the need to mobilize resources from funding agencies and generate buy-in from funders, agencies, governments and others, something that underpins the interest in new metrics to reveal 'value-for-money' and 'win–win' scenarios. Some perils, of course, exist. One is the fact that focused disciplinary questions – around biological or ecological dynamics – and pilot studies of new technologies tend to garner the most support, where quantitative indicators, linear notions of causation and short-term impacts prevail. There is an inevitable politics attached to funding, given current resource-allocation regimes. These are difficult social arenas to operate in, and ones that generate tensions between different goals, disciplines and notions of impact. More holistic framings of problems – of the connectivities and conundrums discussed at length in this book – are key to advancing more interdisciplinary knowledge, as well as stronger knowledge-to-action initiatives with impact.

One Health must go beyond the rhetoric and develop practical field-based examples, especially those that directly engage with the complex world of political economy. There has been a vast proliferation in expert commissions and consultations on ecosystems and human health – the Millennium Ecosystem Assessment,[9] the Intergovernmental Panel on Climate Change,[10] and reports on Biodiversity and Human Health[11] and Planetary Health (Whitmee et al., 2015). These all establish ambitious policy goals, but they may simply represent 'talking shops' unless such high-level discussions are followed by concerted efforts to address the systemic barriers to change. Tackling real-world One Health problems demands long-term investments. A good example of this has been with the

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Excerpted from *One Health: Science, Politics and Zoonotic Disease in Africa*

International Development Research Center's (IDRC) investment in building the field of EcoHealth over nearly two decades (Charron, 2012). Other major funders – from the Bill & Melinda Gates Foundation, Wellcome Trust, Rockefeller Foundation, US National Institutes of Health (NIH), National Science Foundation (NSF), Department for International Development (DFID), United States Agency for International Development (USAID), the European Union and others – are also fostering One Health initiatives. Other efforts are involving the private sector, through public–private partnerships (PPPs) – for example for the long-term control of zoonotic sleeping sickness in Uganda (Welburn and Coleman, 2015). A central lesson from this book is that all these initiatives – if they are to live up to their claims of being holistic, cross-sectoral and transdisciplinary – must start to take social dimensions and political economy more seriously.

Conclusions

This book has revealed how emerging and endemic zoonotic diseases connect disparate social, political and biological domains, cutting across divides and demanding new perspectives and approaches. Tensions between different priorities and interests abound, and have major implications for the resilience of global surveillance, response, preparedness and prevention systems. This book has offered a fresh perspective from the social sciences on these debates, oriented around the burgeoning One Health movement that seeks to connect human, animal and ecosystem health. It has sought to unpack the lofty rhetoric – around collaboration and integration across disciplines and sectors – that promotes a particular type of globalism surrounding the research and control of zoonotic diseases. With a series of case studies from Africa, our aim has been to situate the rhetoric of One Health in the uncertain, real world – a world where divergences of power, knowledge construction, material resources, norms and values predominate.

Without a more concerted appreciation of One Health as a sociopolitical movement, the aspirations of researchers, practitioners and policymakers in advancing a more holistic understanding and engagement with zoonotic diseases will fail to live up to expectations. One Health promises to break down divides and shift conceptual boundaries about disease, health and the environment. This is played out in particular settings – from boardrooms, field offices, rural villages and

remote forests – and a better consideration of these social and political human worlds is paramount to rethinking what the One Health approach means in practical terms.

Ultimately, as discussed throughout this book, it is counterproductive to separate One Health from larger questions of development in Africa. In order to support more resilient and equitable futures, new knowledge and forms of action for zoonotic disease research and policy are urgently needed. In this sense, advancing healthier people, animals and environments will require shifting away from narrow, technocratic research and policy agendas and towards greater attention to power, politics, participation, transdisciplinarity and systems thinking. Moving an appreciation of political economy to the forefront of the agenda is one important step forward.

Notes

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