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Ethical Hotspots in Infectious Disease Surveillance for Global Health Security Social justice and Pandemic Preparedness

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At the time of writing, the world remains in the grip of the COVID-19 pandemic. Approximately 14.9 million people have died and every country in the world has been affected directly or indirectly (WHO 2022a). This, together with recent experiences of Ebola and Zika, has led to calls for the development and implementation of international strategies for pandemic preparedness, response, and prevention. An Independent Panel established by the Director-General of WHO has called for,

> *[…] a fundamental transformation designed to ensure commitment at the highest level to a new system that is co-ordinated, connected, fast-moving, accountable, just, and equitable – in other words, a complete pandemic preparedness and response system on which citizens can rely to keep them safe and healthy* (WHO Independent Panel 2021: 4).

World leaders have proposed a 'new international treaty for pandemic preparedness and response' arguing that,

> *Today, we hold the […] hope that as we fight to overcome the COVID-19 pandemic together, we can build a more robust international health architecture that will protect future generations. There will be other pandemics and other major health emergencies. No single government or multilateral agency can address this threat alone. The question is not if, but when. Together, we must be better prepared to predict, prevent, detect, assess and effectively respond to pandemics in a highly coordinated fashion. The COVID-19 pandemic has been a stark and painful reminder that nobody is safe until everyone is safe. […]* (Bainimarama et al. 2021)

These calls have been supported by leading public health scientists (Khor and Heymann 2021; Duff et al. 2021), and philanthropists (Gates 2022). Such calls are, of course, not new (Fidler 1996). However, at the time of writing, the WHO is indeed coordinating work on a new pandemic treaty (WHO, 2022b).

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Requirements for Effective Pandemic Preparedness

The factors implicated in the emergence of new infectious diseases with pandemic potential are increasingly well understood. Most new pathogens are zoonotic, having their origins in shifts from transmission between animals – wildlife and livestock - to transmission among humans (G20 Independent Panel 2021). Relatively recent examples of infectious diseases with zoonotic origins include three new coronaviruses, a number of new and highly pathogenic influenza viruses, Zika, and Ebola (Carroll et al. 2021). The emergence of these pathogens and their transformation into human infectious diseases with pandemic potential is increasingly being driven by intensified land use, environmental degradation, and urbanisation and is further enhanced by significant economic and social inequalities, climate change, and increased global connectedness (Carroll et al 2021).

Taken together, this suggests five possible courses of action which together might be required for an effective model of pandemic preparedness. The first might be thought of as *preventative*. These would be actions of various kinds aimed at creating the conditions in which zoonotic transmission is less likely to happen. This would include policies to encourage moves away from (the harmful aspects of) current farming and land use practices, and interventions to halt and reverse processes of environmental degradation. A second cluster of actions might be thought of as *containment*, *mitigation*, and *suppression*, an approach called for most recently by the WHO Independent Panel (WHO Independent Panel 2021). This would include surveillance-informed interventions aimed at elimination. A third requirement is going to be *health system strengthening and resilience* to ensure that health services are sufficiently robust to cope with the additional pressures of an epidemic/pandemic (G20 Independent Panel 2021). A fourth would be the building and maintaining of sustainable infrastructure, scientific resources, and economic arrangements for *rapid production and equitable distribution of diagnostics, therapeutics, and vaccines*. The fifth would be the development of regulations and agreed practices to protect the effectiveness of existing drugs through *coordinated action to address antimicrobial resistance (AMR)*.

This list is not intended to be comprehensive or particularly fine-grained. Its purpose is to map out in broad terms the range and scale of interventions likely to be needed as part of any effective global approach to pandemic preparedness. All of these interventions are interconnected and interdependent. For example, increasing success in *prevention* would make efforts in *containment, mitigation, and suppression* more effective, as would the development of more *resilient health systems*, and *coordinated action to address AMR*.

The Central Role of Surveillance

The majority of the remainder of this chapter will focus on the role of infectious disease surveillance in informing containment, mitigation, and suppression. Calls for more effective infectious disease surveillance and intelligence have been particularly prominent in the light of the COVID-19 pandemic and Zika and Ebola prior to this, and a central role has been claimed for surveillance in recent high-level calls for action on pandemic preparedness. For example, the WHO Independent Panel urges,

> *[…] WHO to establish a new global system for surveillance, based on full transparency by all parties, using state-of-the-art digital tools to connect information centres around the world and including animal and environmental health surveillance, with appropriate protections of people's rights* (WHO Independent Panel 2021: 53).

As did an independent panel established by the G20,

> *We must prioritize installing a global genomic and epidemiological surveillance program within the next five years to prevent and detect cross-species spillovers and to rapidly share data* (G20 Independent Panel 2021:32).

These calls echo those made by many leading scientists in the area.

> *Key to these efforts is building a surveillance system that spans wildlife, livestock, and human populations. Such a system would use known geographical 'hotspots' for early detection of any viral transfer into human and livestock populations, and pre-emptively disrupt further transmission of the virus locally* (Carroll et al 2021: 2).

In addition to its prominence in post-COVID calls for pandemic preparedness, a second reason for my focus on surveillance in this chapter is that programmes of infectious disease surveillance – particularly when combined with measures for containment, mitigation, and suppression – raise problems of social justice in a particularly acute way. This suggests that an exploration of the moral and political significance of requirements for effective surveillance may offer an interesting and productive starting point for thinking about questions of justice in pandemic preparedness more broadly. It also has the potential to offer a perspective from which to reflect upon the implications of different conceptualisations of 'global health security'.

What Does Surveillance Entail for Those who Are Surveilled?

Given the scientific consensus that almost all pandemics have their origins in wildlife and that their transmission to humans 'involve[s] dynamic interactions between wildlife, livestock and people, within rapidly changing environments' (Daszak et al. 2007), an effective surveillance system will need to be capable of spanning wildlife, livestock, and human populations (Carroll et al. 2021). A particularly important focus will be the 'biosecurity of the wild-life domestic animal interface' (Zinstag et al. 2020). A central feature of any such system would be routine viral surveillance of humans and animals to enable early detection of spillover from wildlife into livestock and humans. This involves collecting and analysing data about viruses in wildlife, livestock, and humans in ways that are sufficiently intensive and rapid to be capable of identifying such spillover in real time to anticipate and interrupt high consequence epidemics and pandemics (Caroll et al. 2021:3).

An important component of this early warning system is going to be the sequencing of pathogen genomes and the identification and analysis of transmission networks. The value of this was illustrated in Ebola, where

> *A recent analysis of 1,610 Ebola virus genomes – approximately 5% of all cases – reconstructs the movement of the virus across West Africa and reveals drivers of its spread* (Gardy and Loman 2017: 12).

Such approaches were also used effectively in response to Zika (Worobey 2017) and in COVID-19 (Viana et al. 2022). The achievement of this kind of analysis, particularly in the context of outbreaks, depends in turn upon fast, affordable sequencing of pathogen genomes directly from collected samples with portable sequencing platforms (Gardy and Loman 2017). To be effective, at scale and in remote locations, this in turn is going to depend upon better techniques for recovering and analysing viral genetic material from low-quality samples (Worobey 2017).

When it comes to human health, viral surveillance will need to be supplemented by the routine analysis of other forms of health-related information. This will include the collection and real time sharing of information from routine medical sources such as clinical reports, notifiable diseases reporting systems, laboratory reports, pathology results, diseases registries and death records (Morse 2006). It will also need to be supplemented by other forms of health-related data sometimes referred to as 'syndromic'. These include: pharmacy records, ambulance calls information, data on absences from work, and emergency department records (Morse 2007).

> *Most modern surveillance systems use human, animal, environmental and other data to carry out disease-specific surveillance, in which a single disease is monitored through one or more data streams, such as positive*

> *laboratory test results or reportable communicable disease notifications. {…} Syndromic surveillance systems might leverage unique data streams such as school or employee absenteeism, grocery store or pharmacy purchases of specific items or calls to a nursing hotline as signal of illness in a population. Increasingly, digital streams are being used as an input to these systems [including] the automated analysis of trending words or phrases on social media sites […] such as Twitter* (Gardy and Loman 2017: 14).

Beyond animal and human health, an effective surveillance system will also need to be capable of monitoring and analysing environmental degradation, infrastructure developments such as major road programmes, increases in farming activity, and changes to smallholder livestock practices and live animal markets (Zinstag et al. 2020). Much of this will involve the use of drones and satellite imagery. Patterns of human movement can also be identified and analysed using mobile phone data or the 'patterns of city lights at night' (Gardy and Loman 2017: 15). This is important because it is possible that by using such sources of information, including, 'monitoring sewage, social media, mobility data, or crowdsourced reports, we can identify threats much faster than the traditional microbiology surveillance system did' (Davies et al. 2021).

Any successful surveillance strategy with these highly complex, diverse, and contextual sources of data is going to need to find ways to combine national, regional, and global data in a way that is fast, accurate, and globally coordinated and connected. This will involve the development of sophisticated digital tools, novel methods of analysis including the application of machine learning and artificial intelligence, and cutting-edge informatics resources (WHO Independent Panel 2021). It will also require the development of secure and effective forms of data storage and capacity building to ensure that there are skills, institutions, and experience locally to successfully engage with the data including training and the provision of necessary IT support and resources. The effectiveness of global coordination and cooperation in the context of a great many different data formats and sources depends crucially upon the agreement and implementation of shared international data standards. The data systems will need to be interoperable and compatible. An important component of this is going to be the development and sharing of 'standardised case definitions for influenza-like illnesses and severe acute respiratory influenza' (Carroll et al 2021: 3). Meaningful scientific work across multiple diverse settings depends crucially upon shared disease definitions and practices of classification. There is a need for worldwide coordination of data standards and systems, and for the appropriate training and retraining of clinicians and health officials (Morse 2007).

The technical and data harmonisation requirements are daunting. However, even well-curated data are not useful unless they are shared. Perhaps most importantly of all, therefore, it will be crucial to achieve high-level international agreement about the *importance* of sharing data. It is vital that those who direct health information systems relating to wildlife, livestock, and humans are committed to sharing knowledge, information, and diagnoses (Morse 2007). There needs to be real time sharing of samples and of data, including data on new pathogens and genomic sequences (Haseltine 2021; G20 Independent Panel 2021). Enhanced molecular diagnosis and surveillance capacity are only going to be effective if they are coupled with agreed and supported open data principles and platforms, and data sharing frameworks (Gardy and Loman 2017). And this in turn depends upon the establishment of governance systems capable of achieving the well-founded trust and confidence of publics and of governments and scientists in very different parts of the world.

A Global Focus on the Local: Where Will Surveillance Actually Happen?

Despite the rhetoric, the reality is that global infectious disease surveillance is unlikely to be truly global. An effective pandemic preparedness surveillance system will be one in which particular attention is paid to known geographical 'hotspots' for any viral transfer from wildlife into human and livestock populations and to pre-emptive disruption of any further transmission of the virus locally (Carroll et al. 2021:2). As described above, the factors creating the greatest risk of spillover from wildlife to livestock and ultimately into humans are well-

known (Allen 2017). They include recent demographic changes and environmental degradation, increasing farming activity, and high wildlife diversity (particularly among mammals) (Jones et al. 2008). The evidence suggests that the focus of surveillance activities will need to be on locations fitting this description in Africa, Latin America and Asia (Jones et al. 2008: 992).

The establishment of an effective infectious disease surveillance system will turn hotspots within these regions and the populations living and working within them into some of the most highly surveilled, mapped, and intervened-upon people and communities in the world in the interests of the health of the global population. Data sharing and the analysis of data may well be a global endeavour. However, the vast majority of the data will come from these regions. Those who are the objects of surveillance for pandemic prevention will almost exclusively be those living and working in places with the characteristics listed above. That is, they will mostly be poor and living on the margins. What does this mean for people living and working in these regions?

Global Justice and Infectious Disease Surveillance

Broadly speaking, justice questions relating to pandemics might be said to arise in two quite different ways. There are questions arising in the context of pandemic response. These include considerations of the equitable distribution of vaccines, the impacts of non-pharmaceutical interventions such as 'lockdowns' on already disadvantaged groups and individuals, the need to decide how to prioritise between prevention of health risks and the impact of school closures on life chances of children, and so on. These kinds of questions have become very familiar during the current COVID-19 pandemic. The discussion above, however, suggests another domain in which important and urgent questions of justice arise. Partly driven by technological and scientific developments and partly by post-COVID calls for action, it is increasingly clear that important questions in social justice, and in ethics more broadly, also arise with respect to the impacts of pandemic preparedness and prevention in the periods between pandemics. Infectious disease surveillance is a particularly important example.

The achievement of a world free of, or effectively protected from, emerging infectious diseases with pandemic potential would be good for everyone. As we have all seen and to differing degrees learnt from experience during COVID-19, such diseases have the potential for devastating impact on well-being, and particularly on those who are already disadvantaged and do not have access to effective health systems. So too do the measures – such as lockdowns - introduced to address their spread. The emergence of infectious diseases is a profound threat to all and is particularly so to those who are already disadvantaged. Against this backdrop, the need for establishment of an effective system of infectious disease surveillance is of great urgency and moral importance.

Pandemic Preparedness as a Collective Action Problem

The mapping out above of the requirements for effective pandemic preparedness, and in particular those for effective emerging infectious disease surveillance has highlighted the scale and complexity of this hugely important task. Solutions need to be found, but the demands of achieving these are not going to be easy to meet, even for well-meaning people and states. The securing of a world free of, or effectively protected from, infectious diseases with pandemic potential cannot be achieved by individuals and/or single states (Bainimarama et al. 2021). This is not only because of the complexity and scale of the problem but also because, although its achievement would be good for everyone, those actors whose actions are essential to its success have other competing interests. It is a situation in which all – individuals, institutions, nations – would be better off through collaboration but where competing values, commitments, and interests make such collaboration unlikely.

At the level of the state, a truly effective global health surveillance system will require countries to relinquish some aspects of national sovereignty. There may be legitimate worries about the possibility that information sharing will present risks to national security. Information about infectious disease risk may affect tourism and other aspects of the national economy, as might imposed changes in farming practices. Sharing information may

have the potential to affect public and international perception of the competence of the government. And in some cases, it may be judged contrary to the national interest for marginal regions and the situation of those who live there to be visible at all. Tensions are also likely to arise for individuals, families, and communities. Changes in farming practices, control on uses of antibiotics, the regulation of animal markets, and controls on land use, for example, may all have the potential to undermine the livelihoods of those who are already living in poverty (OUCRU 2016). The collection, sharing, and analysing of this data and its use in the design, targeting and implementation of strategies for containment, mitigation, and suppression may well all have negative impacts on farmers, communities, and families living in hotspots.

Its potential as a tool for avoiding or controlling the emergence of infectious diseases with epidemic or pandemic potential means that there is good prima facie reason for countries and citizens to collaborate to achieve effective surveillance. This is, however, a problem the solution to which cannot be found in appeal to the interests of individual states, communities, and farmers. It is a complex and very demanding cluster of collective action problems.

Infectious Disease Surveillance as a Global Public Good

What kinds of obligations might the value of surveillance be said to generate for individuals, states, and international bodies? One way of grounding reasons to participate in interventions of this and similar kinds is to understand them as global public goods (Kaul et al. 1999). The concept of the global public good aims to solve collective action problems of this kind by explaining why coordinated action is required (to those who would otherwise think in market terms, focus on the moral obligations of individuals, or be motivated by narrower, more local concerns). It is a useful reminder that the value of many important goods cannot be understood or realised individually, or even in terms of the interests of individual states. A global public good is defined by Kaul, Grunberg, and Stern as one that is non-rivalrous in consumption, non-exclusionary, and of global importance. The sustainable achievement of a world free (or at least well protected from) from the emergence of infectious diseases with epidemic or pandemic potential clearly meets all of the requirements of a global public good. It is non-rivalrous in consumption because the fact that one person benefits from the a world free of or protected from such diseases does not mean that others cannot. It is non-exclusionary because wherever they are in the world, people cannot easily be excluded from the benefits of a world free from such diseases. Finally, a world free of or well-protected from diseases with pandemic potential is undoubtedly of profound global importance (Khor and Heymann, 2021:e357).

Does the fact that a world free or effectively protected from infectious diseases with pandemic potential meets the requirements of a global public good mean that an effective system of infectious disease surveillance also meets them? Infectious disease surveillance cannot by itself do all the work of effective pandemic preparedness or prevention. It needs to be combined with resilient health systems, preventative actions eg reducing/reversing environmental degradation, rapid production and distribution of vaccines, diagnostics, and therapeutics and so on. Surveillance is nonetheless, however, an essential requirement for the achievement of a profoundly important global public good.

Surveillance and Social Justice

The concept of global public goods is a useful way of highlighting the fact that pandemic preparedness and response are best thought of as morally significant public health goals unachievable through the actions of individuals or single states. What is doing the ethical work here is not the mere fact that surveillance requires collective action but that its achievement has important implications for well-being. The establishment of an effective and sustainable surveillance system is a necessary condition for successful pandemic preparedness and for the achievement of conditions necessary for flourishing lives. A world free of infectious diseases with pandemic potential is one in which it is more likely that basic needs will be met. The key role of surveillance in

promoting and protecting the well-being of the most disadvantaged provides good reason to collaborate and also generates important obligations for all, including those living in emerging infectious disease hotspots. Surveillance, even if combined with effective containment, mitigation, and suppression will clearly not *guarantee* flourishing lives. However, it is clear that without these measures flourishing lives will be harder to sustain. This provides the basis of a strong obligation on states and individuals to participate in pandemic preparedness.

What Is Owed to Those who Are Surveilled?

The moral importance of effective efforts at pandemic preparedness and prevention cannot be overstated. States, international organisations, institutions, and individuals with the opportunity to make a difference all have important obligations to contribute to its achievement. But what is owed to those who live and work on the infectious disease surveillance frontline and whose contribution is likely to be central? This is an important moral question because the burdens on those living in infectious disease hotspots are likely to be significant. Although calls for action on infectious disease surveillance have tended to focus on the roles of states and international bodies the reality is that its successful achievement will require action – and sacrifices – primarily from people living in these regions. Importantly, those who are going to be the focus of surveillance and asked to do most in the cause of global health security are often people who are already significantly disadvantaged. This is an important consideration because whereas most people both now and in the future stand to gain from the achievement of a world free from infectious diseases with pandemic potential, it is possible that the combination of surveillance, containment, mitigation, and suppression would result in those who are on the frontline being made significantly worse off.

Many of the most effective interventions to disrupt transmission from wildlife to livestock and humans are going to disproportionately impact small scale farmers, many of whom are already living on the edge of poverty and inevitably have pressing concerns other than freedom from emerging infectious diseases. What is it going to be like to live in a pandemic preparedness hot spot? What will containment, mitigation and suppression mean for those who are subject to them? It is likely that this will involve significant restrictions on liberty and requirements to adapt to interventions such as changes to farming practices and land use, combined with various forms of control, regulation, and oversight that have the potential for real hardship. It is also important to note that many of these populations will already be subject to other pre-existing forms of structural injustice. In addition to the possibility of it leading to interventions with a range of harmful effects, an effective global health surveillance system will also require individuals and communities, often living in authoritarian states, to give up significant amounts of privacy. As outlined above, surveillance will include not only the collection of a wide range of health information including genomic sequences, phylogenetic mapping of pathogens with the potential to identify transmission pairs and broader patterns of transmission, statistics about hospital admissions, pharmacy records, and absences from work, but also the collection and analysis of information such as social media, mobile phone mobility data, analyses of sewage, and observation by drones. It will involve not only the collection and global sharing of information about farming practices and animal markets, but also satellite imagery analysis of land use, environmental degradation and infrastructure change.

Taken together, then, the demands of surveillance, and associated interventions necessary for effective pandemic preparedness are likely to impose a significant burden upon some of the most disadvantaged people in the world. The fact that the benefits of a surveillance system are obtained through the contribution of people many of whom are living on or near the threshold below which lives are seriously compromised suggests significant obligations are owed to them. But what is the nature and scope of these obligations, and by whom are they owed?

Once source of such obligation is the fact that, as illustrated above, some who are living in infectious disease hotspots and are currently able through farming or other roles to provide for themselves and their families may as a direct consequence of pandemic preparedness programmes no longer be able to do so. In such cases, it is the actions of others, albeit in the interests of global health security, that will have reduced the quality of their lives.

Those who live and work in infectious disease hotspots can only reasonably be expected to participate in surveillance if this does not involve putting themselves or their families at significant risk of serious harm. This suggests both the success and the moral justifiability of global infectious diseases surveillance system is going to depend upon effective protections and support for these populations whose disadvantage is caused to at least some degree by pandemic preparedness. Importantly, however, obligations generated by the foreseeable consequences of coordinated action for pandemic preparedness and prevention, are likely in such settings to be part of a larger picture of broader and pre-existing obligations of social justice owed by those in high income countries to those who are significantly worse off (Powers and Faden 2006). This suggests obligations to those living in infectious disease hotspots are grounded not only in responsibilities associated with the impact of surveillance but also on broader grounds of social justice.

How might such obligations be met? Any legitimate approach to resolving these important questions of social justice needs to be grounded in genuine co-production and engagement with and leadership by the communities and individuals who live in hotspots and who are going to be subject to surveillance and the interventions informed by it. It is possible to imagine different ways in which such obligations might be met, all of which will involve significant efforts to improve the living conditions of those living in hotspots, guarantees of non-discrimination, and economic support to enable changes such as those of farming practice. One possible component might be an international and national commitment to the creation of sustainable and resilient health systems, which would have the advantage of both improving well-being and contributing to global health security.

A further quite different kind of obligation, one of reciprocity, might also reasonably be said to be owed to those who live in infectious disease hotspots. The fact that surveillance and other activities of containment, mitigation, and suppression all of which come at a significant cost e.g. to privacy are to be endured by those who are disadvantaged in the interests an often wealthier global population might be said to create important obligations of reciprocity. This suggests that obligations to those living or working in infectious disease hotspots might reasonably be thought to go beyond those owed to them solely on the grounds of social justice or arising out of the fact that those who instigated pandemic preparedness have made them significantly worse off. It might be argued that over and above this those who are asked or required to live under conditions of surveillance are owed significant additional obligations of reciprocity.

Three Tests of Ethical Commitment

In this final section, I briefly introduce three additional ways in which difficult questions of justice are likely to arise in the context of infectious disease surveillance for global health security. Each of these presents difficult questions regarding what is owed to those who live in infectious disease hotspots.

Acceptable Sources of Surveillance Data

The sincerity of international commitments to the well-bring of those living in infectious disease hotspots will be tested early. Effective global systems of infectious disease surveillance will involve some uncomfortable ethical trade-offs. To what extent will it, for example, be ethically acceptable to accept important surveillance data from authoritarian regimes, or from countries where information has not been gathered according to internationally acceptable ethical standards? More weakly, should information be accepted from countries that are not meeting their obligations to those who live and work in infectious disease hotspots? How should the international community respond to intelligence that successful interventions to prevent the emergence of infectious diseases with pandemic potential are being imposed by countries without due regard to the well-being of those who are subject to them? Practical politics is likely to require that countries committed to global infectious disease surveillance will need to work closely with countries failing to meet their obligations to those in hotspots to solve these problems of social justice over time - providing assistance and possible incentives. What should they do if

no progress is made? Should they (we) ultimately be willing to accept a less than perfect surveillance system in the interests of global justice, or should they (we) accept less than perfect global justice in the interests of effective pandemic prevention?

Data and Duties of Care

One of the key components of surveillance in infectious disease hotspots is going to be the sequencing of pathogen genomes in both humans and non-human animals and the identification and analysis of transmission networks (Gardy and Loman 2017). Such approaches have already been used in the context of identification of new variants in COVID-19 (Viana, 2022). Phylogenetic analysis is a rapidly developing method of identifying patterns of transmission, and the linking of individuals to 'transmission events.' The identification of new infectious diseases and novel variants, and the mapping and analysis of transmission events and networks in the context of on-going, population-level infectious disease surveillance raises a number of new ethical questions (Johnson and Parker, 2020). Some of these relate to the nature and scope of responsibilities of public health systems, or other bodies, undertaking genomic surveillance, to those who provide the samples for analysis. One example of an issue requiring attention concerns the fact that an approach to sequencing for novel infections is going to have the potential to identify a range of other currently known infections. What should be done with this information? Does its generation create responsibilities of care in those who are undertaking the surveillance? Does its possibility lead to an obligation to provide effective health services? A second set of ethical questions is going to relate to the potential for information about transmission chains and events, and increasingly accurate analyses of the direction of transmission, to be used in ways that are harmful.

Prioritisation Decisions between the Needs of Those in the Future and Those in the Present

Finally, just how much resource should be put into pandemic preparedness and surveillance? In the immediate aftermath and enduring impact of COVID-19, there is likely to be national and international pressure on funders, governments, and public health authorities to place a great deal of weight on and resources into efforts to protect future generations from the emergence and spread of new infectious diseases with pandemic potential (Gates, 2022). But just how much resource should be targeted at pandemic preparedness and prevention is a complex and complicated question. As was seen in the midst of the COVID-19 pandemic reducing mortality and morbidity is often in tension with other important values and commitments. Given other important and urgent priorities in the present and immediate future – underfunded health systems and persistent inequalities which mean that many people do not currently meet any reasonable threshold for a good life – it seems unlikely that a convincing case could be made for pandemic preparedness to be the overriding priority. There are likely to be limits to public support for investment in these kinds of future oriented measures. How should the interests of people in the future to be free of pandemics be judged against the needs of people in the present? It is vital that these difficult questions are addressed as a matter of urgency.

Conclusion: Infectious Disease Hotspots Are also Ethical Hotspots

World leaders have recently argued that,

> *The COVID-19 pandemic has been a stark and painful reminder that nobody is safe until everyone is safe […]* (Bainimarama et al. 2021).

This is not in fact true. It is possible that the vast majority of the world's population could achieve 'safety' by means of the observation and surveillance of, and use of interventions upon, those in hotspots without meeting their obligations to them. This is itself, a rather, 'stark and painful reminder' of the potential for pandemic preparedness and response to greatly increase and intensify existing global health and other inequalities

(Olatunbosun-Alakija 2021). It is not inevitable, however. In this chapter, I have described the various ways in which the development and implementation of an effective system of surveillance capable of offering protection from emerging infectious diseases with pandemic potential – a vitally important global public good – is a highly complex task requiring new and demanding forms of international collaboration and coordination and is also an initiative many of the most important costs of which will be borne by those who live in emerging infectious disease hotspots in Africa, Latin America, and South East Asia. Many of those affected will be poor and living in marginalised communities that are going to be on the frontline of surveillance and of interventions to address emerging infectious diseases with epidemic and pandemic potential. The practices of infectious disease surveillance mean that these populations will become some of the most highly observed, monitored, and intervened-upon in the world. And many of the proposed interventions to address, and protect the wider world from, emerging infectious diseases, have the potential for significant negative impact upon their well-being in ways that could, if unchecked, push them below any meaningful threshold of acceptable well-being. I have argued that significant obligations are owed to those who live in these regions and are at such risk. I have also suggested that in addition to obligations of social justice, obligations of reciprocity may also exist.

These are, however, imperfectly specified obligations and little has been said thus far about those who are their bearers. This is one reason why recent calls for an international treaty for pandemic preparedness and response are potentially of great importance (Bainimarama et al. 2021). For, the negotiation of such a treaty provides a possible mechanism for setting out, even if only in broad terms, what is owed to those who live in infectious disease hotspots by states, international organisations, and by other actors. For this to be achieved, any such treaty needs to engage with the social justice considerations and questions of reciprocity identified above. At a minimum, it has to include clear commitment to ensuring that those who live in emerging infectious disease hotspots are the recipients of interventions that ensure their lives meet the requirements of threshold well-being (Powers and Faden 2006). Many farming practices and other behaviours are driven by poverty. Meeting obligations to such communities may also be an important part of what it takes to achieve the global public good of a world free from, or effectively protected from, the emergence of infectious diseases with pandemic potential. A key part of successful infectious disease management in ways that are respectful and supportive of local communities is likely to require the development through co-production of creative sustainable ways of changing farming practices and reducing environmental degradation in ways that protect existing communities.

A treaty cannot, of course, by itself address these problems of global health justice. Surveillance, and the governance of it, need to be understood as part of a bigger cluster of problems in global health justice a key part of which is going to be the development of mechanisms to ensure health system strengthening and the existence of robust health systems and equitable access in all countries, particularly in the regions under discussion here. They also need to be understood against a background of broader concerns about global health injustice (Olatunbosun-Alakija 2021). This is going to call for careful consideration about the appropriate balance of responsibilities at different levels. For example, whilst emphasising the importance of coordinated international action, it is also going to be important to avoid suggesting that the needs of those in hotspots are solely the responsibility of global actors. This may have the potential to encourage states to come to view their own responsibilities to these populations as thereby lessened.

A final thought. The issues outlined and discussed in this chapter support and illustrate the importance of a number of recent calls for a refocusing of bioethics research and scholarship towards a greater engagement with questions of global justice and equity, and global public health (Kahn et al. 2020; O'Neill 2016; Nuffield Council on Bioethics 2020). It has also shown that achieving this is likely to require bioethicists to develop new methods and theoretical perspectives capable of engaging meaningfully with large, complex problems without oversimplifying them. An important implication of the argument in this chapter is that an infectious disease ethics capable of engaging with the questions of responsibility etc. will need to be able to respond to three dimensions. The first of these is scale. The ethics of surveillance is a complex multi-level problem ranging all the way from difficulty decisions in the clinic, through national level public health policy, up to and including the

making of international global health policy. These levels of analysis and types of ethical problem have tended to be viewed separately in bioethics. Is this a clinical ethics problem, a research ethics problem, a public health ethics problem, or a political philosophy problem? An ethics adequate to the task set out here needs to be coherent and convincing across multiple levels of analysis. It needs to be scalable (Parker 2015). Secondly, in addition to these levels of analysis, in normative terms, there is also the question of how to make sense of the complexity and contextual meaning of the various interconnected moral worlds and moral problems which together constitute the different aspects of global health security. How empirically does one go about making sense of the nature of the ethical problem and the problem of moral responsibility as it arises for different actors and across radically different contexts? How does one speak meaningfully about the nature and scope of responsibility in this kind of complex relational whole? The answer cannot be that it is impossible. A third dimension requiring further attention is the development of an understanding of the moral aspects of the relationships in infectious disease surveillance between infectious disease hotspots and what might perhaps be conceptualised as 'ethical hotspots'.

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