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Global and Regional Governance of One Health and Implications for Global Health Security

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ABSTRACT

The apparent failure of global health security to prevent or prepare for the COVID-19 pandemic has highlighted the need for closer cooperation between human, animal (domestic and wildlife) and environmental health sectors. However, the vast number of institutions, processes, regulatory frameworks and legal instruments with a direct and indirect role in the global governance of One Health, has led to a fragmented global multilateral health security architecture. We explore four challenges: first, the sectoral, professional and institutional silos and tensions existing between human, animal and environmental health; second, the challenge which the international legal system, state sovereignty and existing legal instruments pose for the governance of One Health; third, the power dynamics, and asymmetry in power, between countries represented in multilateral institutions and its impact on priority-setting; fourth, the current financing mechanisms which predominantly focus on response to crises, and the chronic underinvestment for epidemic and emergency prevention, mitigation and preparedness activities. We illustrate the global and regional dimensions to these challenges and how they relate to national needs and priorities, through three case studies on compulsory licensing, the governance of water resources in the Lake Chad basin and the desert locust infestation in East Africa. Finally, we propose 12 recommendations for the global community to address these challenges. Despite its broad and holistic agenda, One Health continues to be dominated by human and domestic animal health experts. Significant efforts must be made to address the socioecological drivers of health emergencies such as emerging, re-emerging and endemic infectious diseases. These include climate change, biodiversity loss and land use change and therefore requires investment, capacity building and integration of other sectors and professionals beyond health.
KEY MESSAGES

1) One Health approaches to global health security (GHS) must expand beyond zoonoses and infectious diseases of pandemic potential. The entry points for One Health issues frequently begin with human behaviours, our interactions with the environment and wider ecosystem stability. To address these, the One Health community must bring on board environmental scientists, social scientists and communities with lived experiences at the interface of ecosystem degradation, climate change and marginalisation to address the divides in delivering a holistic One Health approach to GHS across both academia, research and implementation.

2) A grounded theory analysis of the legal frameworks that are meant to guarantee and facilitate One Health multi-sectoral approaches reveal largely negative findings; the majority of the reviewed international legal instruments allow significant flexibility in their interpretation of obligations and they continue to uphold politically complex and poorly utilised compliance mechanisms in the fields of global health and global environmental governance. Conversely, treaties in international trade and finance have often had more defining roles in shaping health outcomes and are more robustly applied.

3) Health-related legal instruments must be strengthened with real political commitment and protective mechanisms to ensure compliance, including addressing the economic disincentives to good implementation. LMICs can take advantage of the slow-changing and fragmented global multilateral system by using the health-related provisions of non-health related treaties including for example provisions for compulsory licensing, insisting more robustly on IP waivers where relevant, leveraging the sovereignty principle and pooling their resources for legal action.

4) UNEP’s recent addition into the Tripartite, now known as the Quadripartite, is a step in the right direction but it will still need to integrate fully into activities, complementing national bridging workshops already undertaken by WOAH-WHO-FAO, contributing to joint risk assessments and support for proactive environmental/health impact assessments of large private sector land-use change projects, while providing resource surveillance data into existing systems (e.g. the Global Early Warning System from WOAH-FAO-WHO). The operational launch of the global One Health Joint Plan of Action (OH-JPA) represents a clear opportunity to ensure this and move beyond the limited collaboration and modest achievements of the previous Tripartite configuration.

5) Regionalism can level the playing field for LMICs who share geographical, biological and infrastructural hazards, but have limited political or financial power in the global multi-lateral system. However, care must be taken to ensure power imbalances prevalent at the global level are not simply replicated or perpetuated at the regional level.
6) Overlapping and concurrent crises are likely to increase, and the global community must reflect on maximising yield from its interventions – flexible funding for prevention, preparedness and response with adequate provisions around transparency and accountability must go to those directly affected with no strings attached. For initiatives like the OH-JPA and other One Health implementing instruments, whether global or regional, the financing required to make a real impact on prevention and preparedness is in the billions per year. Funding that moves beyond subsidising a development and academic industry in high-income countries and results in measurable technology transfer and self-sufficiency in LMICs in necessary. This funding should be made available with a view to ensuring access to global public health goods, human dignity and ensuring real health-related outcomes across the SDGs, not through a primary focus on pre-determined donor targets derived from economic and health security self-interest.
INTRODUCTION

The emergence and spread of SARS-CoV-2, resulting in the unprecedented COVID-19 pandemic, has highlighted the weakness in public health systems worldwide. Despite the past decade’s increasing focus on strengthening global capacities to prevent, prepare, detect, respond to and recover from emerging infectious diseases threats,¹ the failures associated with COVID-19 have been alarming; strikingly in many well-resourced states that were expected to respond much more effectively than they have.

As we continue to reflect on the chain of events leading to emergence, amplification and global spread of SARS-CoV-2,² it is clear that preventing epidemic outbreaks requires a much broader outlook that incorporates and unifies animal, plant, human and ecosystem health where appropriate.³ Several anthropogenic factors (Figure 1) contribute to the likelihood of emergence of infectious diseases (and other public health hazards), including human and domesticated animal population growth, the climate change crisis and land use change⁴⁵ (e.g. agricultural intensification, extractives industries, industrialisation, unplanned urbanisation) which can bring wildlife populations into close proximity to humans and domestic animal populations.⁶ More often than not, the brunt of these detrimental changes affects the most vulnerable, marginalised and deprived populations of the Global South.

In the first paper of this Lancet series, Zinsstag and colleagues (2022)⁷ outline the historical and operational dimensions of a One Health approach. The approach has evolved over time and now explicitly considers health, welfare and well-being within socio-ecological systems (SES), including the role of health-sustaining environments, and our socio-cultural, material and ecological circumstances.⁸-¹⁰ The recently published definition¹¹ by the One Health High-Level Expert Panel (OHHLEP, see Box 1 for definitions) explicitly recognises the integrative and transdisciplinary approach needed to coordinate actors from a wide range of disciplines beyond human and domestic animal health while demonstrating the added value of collaboration by identifying co-benefits and trade-offs.³¹¹

Despite the traction gained over the past 20 years, including over the COVID-19 pandemic, there have been significant challenges in both the operationalisation and governance of One Health.¹² Given the broad definition of One Health, a vast number of institutions, processes, regulatory frameworks and legal instruments have a direct and indirect role in its global governance,¹³ including those related to human, animal (domestic and wildlife), plants and environment health, and to the trade of food, agriculture, natural resources, medical and veterinary products.

In this fourth Lancet Series article, using a grounded theory approach and in-depth case studies we focus on four challenges to the global governance for One Health; silos amongst disciplines and...
professions, weaknesses in the interfaces of global health public goods and the international legal
system, asymmetrical power dynamics regionally and globally, and flaws in crisis-driven financing.
Detailed methods and results for our content analysis of 25 international legal instruments is included
online in Supplementary Annex 1. Case studies in the panels demonstrate the interplay of these issues.
Finally, we offer 12 recommendations to address these challenges.

CHALLENGE 1: Sectoral, professional and institutional silos in One Health
At the global level, there are a number of agencies and actors with a remit relevant to One Health,
including those directly related to human, animal, plant and environmental health. Despite the
theoretical emphasis on One Health offering a holistic approach, politics and professional legacies of
dominance have shaped One Health networking and partnerships (paper 2 of this series). As such,
there have been significant challenges in attempting to breakdown silos and foster collaboration
between sectors, and between institutions. The establishment of the “Tripartite” in 2010, a
collaboration between World Health Organization (WHO), Food and Agriculture Organization (FAO)
and World Organisation for Animal Health (WOAH, formerly OIE), was a key step towards promoting
cross-sectoral collaboration and integration at a global scale. Initially, the Tripartite existed to address
health threats at the human-animal-ecosystem interface, and had prioritised zoonoses, food safety
hazards and antimicrobial resistance (AMR). Notably, in its first decade since establishment, the
Tripartite did not include sufficient representation from agencies with a role in the environment,
ecosystems and wildlife. Issues such as climate change, land and water use management, biodiversity
and wildlife health are integral parts of One Health, important in their own right, as well as being
proximal factors that contribute to the likelihood of emerging infectious diseases (EIDs, see Figure
1). Although specialised UN agencies and programmes existed in these fields, they often acted as
secondary implementing partners to the Tripartite rather than alongside it in steering and leadership
roles.

The recent addition of the United Nations Environment Programme (UNEP) in early 2022 to form the
‘Quadripartite’ has been a much welcomed and necessary step towards improving the coherence and
implementation of One Health. Encouragingly, the Quadripartite have now developed a One Health
Joint Plan of Action (OH-JPA, 2022-2026) with six ambitious action tracks to strengthen coordination
between the four agencies and support global efforts to operationalise the approach. This will
require a step-change in the funding envelope (in the order of billions of USD per year) to achieve the
desired global health security (GHS) goals and move beyond the limited success of the previous
Tripartite configuration, particularly on environmental issues and drivers of disease.
Despite the economic slow-down caused by the current pandemic, urbanisation and industrialisation are continuing rapidly across the globe through grand initiatives such as China’s Belt and Road Initiative. Ongoing degradation of air, soil and water quality through ‘business-as-usual’ large-scale industrial activity, and inappropriate waste and hazard management including that associated with pandemic response activities, continue to threaten health across species and the environment. One key role that UNEP and the broader environmental sector can play is to firmly support improving and embedding environmental and health impact assessment into large-scale industrial projects. This must now include components relating to the risks of disease emergence and propagation through land-use change and interventions to prevent or mitigate them. As such, groupings such as the Quadripartite must engage with development banks that provide financing and set standards for industrial projects, the relevant UN agencies that support them (such as UNIDO, UNHABITAT and UNDP) and sector-specific industry bodies that embed and encourage best practice such as the International Association of Impact Assessment (IAIA). Some success has already been achieved in this area with OGP-IPIECA, the global oil and gas industry association, integrating modules on emerging infectious diseases into the most recent edition of their standards for health and environmental impact assessment. The evidence base for cross-sectoral action must be strengthened, and new global initiatives launched in the wake of the pandemic such as OHLEP and the Quadripartite OH-JPA can play an important role in undertaking and promoting this work.

Historically, the work of UNEP which anchors global environmental issues, has had mixed results in engaging on health matters. Structural issues with its governance, finance and status have resulted in ineffective coordination and a fragmented global system, undermined by other institutions and agendas. Despite these challenges, it has collaborated with the Tripartite on some priority areas such as AMR and has been successful in establishing and monitoring some health-related international environmental laws in the past, most notably the 1987 Montreal Protocol (to phase out ozone-depleting substances) and the 2012 Minamata Convention on Mercury. Part of the challenge in trying to strengthen the governance of environmental health issues through the global multilateral system, is the centrality of trade, production, finance, and “market actors” in environmental governance and politics. Often transnational companies are both producers and regulators of environmental problems, meaning that an exclusive focus on end-result environmental damage ignores the upstream politics, industry actors and market factors that produce them in the first place. The laws and frameworks governing downstream global public goods in One Health, such as international regulations of food safety, animal welfare and food security, mirror these same politics and remain subordinate to wider trade objectives in agro-business, for example. For its part, the OH-JPA will attempt to address these challenges through an action track dedicated to sectoral integration,
collaboration and coordination. However, it remains to be seen how well these will be resourced and actively supported.

The implications are significant for all nations; the lack of integration explains, in part, the mismatch in performance of even well-resourced countries in managing COVID-19. It is possible that, had more consideration been given to the voices of social scientists and grassroots organisations, spread in vulnerable communities without the social or financial capital to isolate and protect themselves could have been better mitigated. Without overcoming these institutional and sectoral silos, One Health governance will remain patchy and incomplete, as well as exacerbating existing health inequalities.

**Challenge 2: The international legal system and state sovereignty**

The international legal system is considered a powerful tool in the governance of global issues, with the potential to enhance health and influence its socio-economic determinants. A number of legal instruments exist with a direct or indirect role in One Health and their bindingness and stringency has been explored in our Supplementary Material. Overall, our analysis shows that the power of a legal tool remains subject to which sector it regulates and what instruments are available to enforce judgements. Furthermore, legal tools can be used to open windows of opportunity for radical change, or alternatively through their years-long development processes and procedural intricacies can merely delay substantive action.

International trade law generally succeeds more consistently in shaping economic matters, while health and social justice laws consistently fail to achieve social progress. Trade treaties offer politically appealing gains, and are backed by strong global institutions for monitoring, evaluation and compliance, and have a powerful lobby of non-state actors to support their goals. Contrastingly, international legal instruments for health often fail to significantly advance health matters due to their economic disincentives, limited compliance and punitive action mechanisms, a reliance on discretionary actions, and a lack of financing arrangements to support their successful implementation.

The extent to which an international health treaty (human or animal) affects trade is linked to its success. Treaties which financially penalise states, despite good implementation, demonstrate the conflict between national interest and a global public good. For example, there are financial losses associated with the loss of travel-related business or animal trade restrictions when a state reports an infectious disease outbreak in accordance with the International Health Regulations (IHR). However, prioritising the national economy instead, may have negative health externalities including suppressed reporting, delayed action, diluted outbreak response and eroded public trust. These
perverse incentives must be acknowledged and prevented with timely, relevant protections, which could include the guaranteed provision of speedy assistance (for example, a committed vaccine supply) or the disbursement of sufficient emergency funding to affected states without strings attached. These mechanisms can reduce economic disruption and help secure investor confidence in early containment, thereby ensuring market stability. Without linking positive economic incentives to implementation, global health-related treaties may undermine their own objectives. The proposed WHO ‘pandemic preparedness treaty’ may suffer the same fate as the IHR if it ignores some crucial reasons for poor compliance, and merely adds additional administrative and financial burdens to those applying it.

Economic pressures can also be strategically applied to sanction non-compliance, as is used more commonly in trade treaties. For example, within the World Trade Organization (WTO), member states work together to assess breaches of WTO law when friendly negotiations stall between disputing parties. However, the strength of an actor in international law remains as important as the discipline being regulated. This is well demonstrated in our supplementary material and in Case Study 1 on the compulsory licensing of pharmaceuticals, a public health provision within a WTO legal instrument known as the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS).

As our analysis shows, States continue to erode the legitimacy of the international legal system, by choosing to avoid or actively contest it at whim, and despite the theoretical threat of economic sanctions (see Box 2, Case Study 1 and Supplementary Material). At the same time, this flaw in international legal instruments presents an opportunity to exploit them in the interests of a One Health approach. Treaties that show consistent alignment and positive engagement, largely those in trade, can be leveraged for wider global public goods when selectively used at the right time by a group of states working together. LMICs can pool their legal expertise and finances to sustain disputes, establish consistent applications of legislation regionally as foundation for new customary law and also opportunistically use ‘emergency’ provisions to establish an evidence base for longer-term change. LMICs should also exploit the gap in regulation on wildlife health and trade by becoming early advocates for it to shape the landscape in their favour. Additionally, One Health practitioners should expand their scope to legal instruments that are useful but largely ignored, such as environmental treaties that contain health provisions of which there are numerous (e.g. the 2012 Minamata Convention). Even environmental treaties with no explicit health-related provisions may still have positive effects on global governance for One Health, for example, through air/water pollution reduction measures. A variety of databases and reports summarise and highlight best practice from the application of such treaties, for example HEIDI (the Health and Environment Interplay Database) or UNEP’s Annual Law Division Report. Given the limitations of global health-related treaties,
decision makers may find both international trade and environmental law a useful cross-disciplinary tool to secure political commitment for One Health.\textsuperscript{30}

Lastly, the sovereignty principle of nation states should not always be perceived as a hindrance; it can redress power imbalances between countries by allowing less powerful states to forum-shop the legal tools and fora they wish to engage in, and contest a law on the basis of an alternative binding law.\textsuperscript{31}

An example of this is Indonesia’s claim to ‘viral sovereignty’ under the Convention of Biological Diversity (CBD), contesting the obligation to share biological samples under the revised IHR 2005. As retaliation to unfair and exploitative practices by the global North and pharmaceutical vaccine developers during the avian flu crisis,\textsuperscript{32} Indonesia successfully argued that the viral samples were its sovereign property under the CBD and therefore could override IHR. This led to an intergovernmental process that eventually produced the Pandemic Influenza Preparedness Framework, a more equitable and sustainable attempt at sample-sharing and vaccine manufacture.\textsuperscript{33} Indonesia’s ability to take advantage of the lack of legal alignment between international treaties highlights the contemporary challenges and opportunities in governing One Health through the fragmented global multilateral system. Thus, while sovereignty principles pose a significant challenge to the international legal system, with the right legal expertise, it can potentially empower smaller states to challenge the dominance of the global North in health security. This paradox is aptly summarised by Suarez and Aubry (2014):\textsuperscript{34} “Global governance is a relatively recent development and a highly fluid and contested game that is determined more by power politics than by law. This explains the existence of soft-law instruments that are powerful mainly because powerful actors impose them, while some hard-law instruments tend to be weak because the powerful refuse to abide by them.”

**Challenge 3: Priority setting in the global multilateral system and regional economic communities**

In relation to One Health and global health security, health threats must cross multiple borders, and therefore regions, unchecked and unmitigated, to become politically and economically relevant enough for global discussion. Regionalism in this field is therefore unsurprising given the importance of shared geography in One Health; states may share environmental risks, cultural practices, cross-border security risks, infrastructural limitations, as well as the same political and economic vulnerabilities in their relationships with other actors on the global stage.\textsuperscript{35-38} Furthermore, more immediate legacies of shared peoples, histories and resources can provide stronger cultural and political pushes towards commitment and accountability.\textsuperscript{38}

One similarity between regionalism and internationalism, is the challenge posed by the asymmetry of power, finance and information between the states represented in multilateral institutions.\textsuperscript{39,40} Fora that require majority vote operate very differently to those where only a select few retain permanent
veto power. States with veto powers do not need to compromise with others, although there is
diplomatic benefit in doing so. Those without such powers need numbers on their side and must
appease many. As funding remains a key priority for many LMICs, wealthy states of the Global North
have and may continue to leverage this need for financial assistance to set their own agendas at
international levels.

In One Health, this has meant that emerging infections and zoonotic diseases with pandemic or
epidemic potential have been prioritised above endemic infectious diseases and other neglected
diseases (in both humans and animals); the latter disproportionately burdening LMICs. This has tended
to be combined with a focus on surveillance, detection and containment of emerging pathogens rather
than prevention, in line with the perception that these activities are primarily to protect populations
in the Global North. Like global health and international development, more broadly, One Health is
subject to the same long-standing tensions in reconciling country priorities, donor expectations and
global standards.\footnote{41}

For countries in the Global South, particularly for small states, forming alliances and blocs with political
allies, economic partners or regional neighbours, is an important way to strengthen capacity and
power internationally. For example, the Africa Centre for Disease Control and Prevention (Africa CDC),
a specialised technical institution of the African Union (AU), mobilised an early continent-wide
response to COVID-19.\footnote{42} By 22nd February 2020, just a week after Africa reported its first COVID-19
case, Health Ministers from AU Member States had met and adopted the Africa Joint Continental
Strategy for COVID-19. Africa CDC, AU Member States, WHO AFRO and other partners then
established the African Taskforce for Coronavirus Preparedness and Response, responsible for
implementing seven key priorities, from surveillance to communications to stockpiling.\footnote{43} Despite
initial concerns that African nations were the least prepared for the COVID-19 pandemic, many African
countries have been relatively successful in containing the virus thus far.\footnote{44}

Beyond COVID-19, regionalism may support One Health goals in the long term through pooled power
and resources, such as standardising approaches to capacity building in national public health
institutes (NPHIs), manufacturing capacity and multi-disciplinary workforce development. Despite
some successes in Africa that are worth applauding, such as Kenya’s well-established Zoonotic Disease
Unit (ZDU), the great majority of these efforts are still funded by external donors and thus heavily
influenced by their priorities. For example donor-sponsored zoonoses prioritization processes in sub-
Saharan African countries resulted in highly pathogenic Avian Influenza being the most highly
prioritized (89% of countries), despite the disease having a minimal disease burden (in terms of
morbidity/mortality and prevalence) or significant economic impact in any of the listed countries.\footnote{45}
Until, domestic and regionally pooled financing becomes more readily available, sustainability and a continuing battle over priorities will remain an enduring challenge.

Regionalism, however, is not a panacea without failures or risks. Many regional institutions within the Global South, suffer from poor institutional capacity-building, destabilising members, and the aforementioned emphasis on ‘extraversion’ to draw external funding flows rather than prioritising local needs. In Case Study 2 on the Lake Chad Basin Commission (LCBC) we present some of the challenges of regionalism and how this can impact on health security, particularly with the chronic and dangerous mix of climate-change, conflict, militarisation, and socio-political imbalances at community and leadership levels. With the prime solution offered being a hugely ambitious and costly technical replenishment project using channelled water from the Congo Basin, this case study shows the complexity of issues relating to shared resources and priority-setting in regional organisations. Despite the myriad challenges and significant setbacks over the decades since its creation, the LCBC’s relative success shows it has potential to leverage large-scale cooperation, even when the political will to apply more horizontal programmes remains variable.

Challenge 4: Underinvestment in prevention, mitigation and preparedness activities and infrastructure – harmonising and integrating strategies

Within global health security, most funding is reactive, in response to outbreaks, such as avian influenza, SARS, and Ebola, in a “cycle of panic and neglect” that often means prevention, mitigation, preparedness and recovery activities are neglected. Funding sources and streams are patchy overall, both within nations and from external donors, across a range of key One Health issues. In the same way that there is longstanding recognition of the value of investing in broader health system strengthening, global health security must recognise the need to strengthen environment and animal health systems in the selfish interest of human health.

Evidence of the chronic underinvestment in health systems was unfortunately demonstrated during the Ebola outbreak of 2014-2015, at a devastating cost to human life. Attempts to redress this have been modestly successful but still have far to go. For example, in 2016, the World Bank launched the Regional Disease Surveillance Systems Enhancement (REDISSE) programme in West Africa, aiming to develop the necessary technical infrastructure, laboratory capacity and trained staffing needed for the surveillance of animal and human infectious diseases. The programme finances risk reduction, largely through loans, with some positive outcomes, but is yet to demonstrate sustained success. Similarly, Africa CDC has recently established Regional Integrated Surveillance and Laboratory Network (RISLNET) to coordinate and integrate public health laboratory, surveillance and emergency response assets, and to support prevention, rapid detection and response to current and emerging
public health threats within defined geographic regions of Africa.\textsuperscript{51} RISLNET facilitates close networking among NPHIs, academic institutions, public health laboratories and veterinary networks for the development and implementation of regionally appropriate plans for health security. Currently, this is financed by the World Bank’s Africa CDC Regional Investment Financing Project but to sustain and build on its success, initiatives like RISLNET need further financing support from AU member states themselves.

Furthermore, the huge gap between requirements and commitments/disbursements is evidence of the challenge in relying on donor countries’ willingness to finance response and recovery. The Ebola Recovery Tracking Initiative, a partnership between the governments of Guinea, Liberia, Sierra Leone, and various UN agencies, calculated that the total assistance required post-Ebola would be $9.1 billion. Pledges of $4.5 billion were made, but this only materialised as $1.8 billion of commitments and $1.4 billion of disbursements.\textsuperscript{52}

In response to this challenge, the World Bank established the Pandemic Emergency Financing Facility (PEF)\textsuperscript{53} as a mechanism to quickly release funds to the poorest countries in the event of a pandemic. By using pandemic bonds, the World Bank has brought in money from private investors, with the private sector taking on the pandemic risk, and donor countries paying the interest of 10-12% each year that is paid to investors for assuming this risk. During the COVID-19 pandemic, the PEF insurance window (which gives coverage of up to $500 million) was used with modest success, for the first time, to allocate $195.84 million to 64 countries in April 2020 – a paltry sum given the significant ongoing costs associated with the pandemic response. In contrast, the WHO’s COVID-19 Response Fund, which relies on voluntary contributions from governments and other agencies, had estimated a need for $1.96 billion, received $0.99 billion and was awaiting $544 million [as of July 2022].\textsuperscript{54} One of the difficulties in relying on the private sector to finance global health security, is that the predetermined disbursement criteria depend on the Bank’s contract with private investors and their priorities, rather than measures of impact on the population.\textsuperscript{55,56} Given the lack of transparency on these contracts, and the fact that any associated surveillance or modelling may be considered proprietary, it is difficult for professionals or civil society to challenge these decisions.

The African Risk Capacity (ARC), established by the AU in 2012 as an index-based weather risk insurance pool and early response mechanism that combines the concepts of early warning, disaster risk management, and risk finance, is similar to the PEFF in that it offers coverage for emergencies. Unlike the PEFF, it requires AU member states to complete a 9-12 month capacity building programme in order to meet the eligibility for coverage, thus helping countries to both prepare and respond to disasters. Despite disbursement criteria that are informed by risk modelling, the ARC has shown it can
be swayed by political and civic pressure; in 2016, after significant delay it paid out $8 million to Malawi despite an initial decision of no pay-out.\textsuperscript{57} This delay of funding can leave communities devastated in the immediate aftermath of a disaster, highlighting the importance of both technical and community-based input into any financing mechanisms and the need for agile forms of payment release across hazard/emergency categories (see Box 3).

In Case Study 3, we outline the impact of concurrent emergencies, the desert locust infestation and the COVID-19 pandemic on communities in Africa and Asia. The cost of recovery has been estimated to be as high as $8.5 billion,\textsuperscript{58} with a tiny fraction of this received so far. Given the damage acute health emergencies can inflict on already overwhelmed health systems, poor and unsustainable recovery efforts in regions already suffering from other chronic emergencies such as food/nutrition insecurity, only increases the vulnerability of these systems to further fracture and collapse. As described in paper 3 of this series, the importance of evaluating co-benefits and the potential trade-offs of investments and financing becomes even more critical in calibrating the response to multiple, concurrent emergencies and should be integral to the eligibility assessment criteria used for the release of such funds (see Box 3).

Despite many financial innovations and instruments existing for pandemics, most do not strengthen prevention and preparedness for crises. This challenge is acknowledged by the World Bank’s International Development Association (IDA) and its Crisis Response Window (CRW) which proposes to “pivot to prevention (when crisis risks can be mitigated) and preparedness (when they cannot)”. Importantly, IDA includes climate change mitigation as one of its five priorities, and promotes investment in public health infrastructure.\textsuperscript{59} Another key challenge in prioritising prevention, mitigation and preparedness activities, is that if cheap resources are available after a crisis, this may actually lead to a perverse incentive against spending scarce domestic resources on these areas.\textsuperscript{60} Proponents of a new pandemic preparedness treaty emphasise the potential opportunity of explicitly creating a clear global financial mechanism in a specialised binding instrument for pandemics, although the potential for such a mechanism to sit outside of the WHO once again raises concerns about the ongoing fragmentation of global health financing and governance.\textsuperscript{61,62} For its part the World Bank, in response to the COVID-19 pandemic, has recently announced the launch of a Financial Intermediary Fund (FIF fund) for Pandemic Prevention, Preparedness and Response.\textsuperscript{63,64} Touted as its bold new instrument for supporting UN Member States to build relevant health security capacities, this multi-billion USD facility again promises to adopt a One Health approach (not dissimilar to the REDISSE fund) – as with past initiatives the details of the eligibility criteria, the associated conditionalities and the structures (loans, grants etc) and agility of the instrument will ultimately determine its success or lack thereof.
Spending on prevention and preparedness is associated with a high cost-benefit ratio. It has been estimated that a yearly investment in animal and human health of $1.9-3.4 billion would generate $30 billion of savings each year. This potential saving is likely to be an underestimate given the astronomical economic impact of COVID-19; for comparison, the European Union’s post-pandemic recovery fund is €2.02 trillion (or $2.06 trillion), and still considered to be insufficient for the level of damage. Importantly, there is an urgent need to make the economic case for investment in environmental and wildlife health, including climate change mitigation. As our case studies have shown, the acute crisis often masks the underlying environmental issues and upstream determinants.

The way forward

The global governance of One Health is plagued by the same sectoral, institutional, political and financial inefficiencies and power imbalances that the global health sphere has yet to successfully tackle. However, these challenges in combination pose a greater barrier to coalition-building between human, animal and environmental health that sits at One Health’s core. Without increasing involvement of environmental health practitioners, wildlife biologists, economists, social scientists, legal expertise, as well as researchers and practitioners from low-income countries, marginalised communities and society as a whole, key areas of focus will be missed. This includes the ecological drivers of emerging/re-emerging and endemic infectious disease, the benefits reaped through rapid flexible financing measures, the need for long-term cost-effectiveness studies of One Health, and the acknowledgement that until One Health is perceived as locally-driven and locally-understood, it will remain as part of a prescribed ‘globalist’ package. Our recommendations (see Box 4) outline mechanisms for addressing the inequality currently built into the global multilateral system, for example leveraging non-health treaties in the trade and environmental sectors to achieve positive externalities in health or using regional bodies to share the responsibility and commitments of investment without the loss of locally-responsive processes. These mechanisms, however, require significant investment in capacity-building in technical, legal and political spheres for the successful translation into One Health practice. Above all, commitments must be tangible, proactive, grounded in equity and sustained. They must reflect in their obligations the very real threat that hazards across the whole SES pose, both in generating and amplifying global health emergencies, and through their debilitating effect on the resilience of all living species and the planet.
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AUTHOR ROLES AND CONTRIBUTIONS:

OD, DH, RK and AZ ideated the Lancet Theme Series on ONE-HEALTH and GLOBAL HEALTH SECURITY and developed the outline for the articles. AE, OMA and OD performed the literature search, analysed the data and developed the first draft. RK, AZ and DH edited and contributed to several drafts of the manuscript. All authors contributed to the writing and finalization of the manuscript.

DECLARATION OF INTERESTS

All authors have an interest in One Health. All authors declare no conflicts of interest. The views and opinions expressed in this article are those of the authors and not of their institutions.
BOX 1: DEFINITIONS AND KEY CONCEPTS

In the context of this paper, we define the following:

‘Global Governance’: The non-hierarchical co-ordination system in place, which uses various mechanisms such as legal, financial, political, diplomatic, technical and normative, and public (civil society and media) to support activities. Global governance ‘with a purpose’ is defined as “a system of rules, processes and institutions which functions and operates at the global level and provides the frame within which actors interact and take decisions on priorities and direction.”

‘Global Governance for Health’: Refers mainly to “those institutions and processes of global governance which do not necessarily have explicit health mandates, but have a direct and indirect health impact, such as the United Nations, the World Trade Organization or the Human Rights Council”.

‘Good Governance’: That which champions the principles of equity, inclusive participation, transparency and accountability.

‘One Health’: As defined by the One Health High-Level Expert Panel (OHHLEP), “One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.”

‘Environment’: Refers to the surroundings and resources required for human living, and thus is human-centric.

‘Ecosystem’: Refers to the living organisms and physical environment, and their interactions together in a system, and is therefore more bio-centric.

‘Zoonosis’ (and ‘anthropozoonosis’): an infection naturally transmitted from animals (animal reservoir) to humans in an ongoing fashion (or from humans to animals; anthropozoonosis). The animal reservoir may be domesticated (e.g. livestock), as is the case in the majority of zoonoses, or wildlife. The majority of these pathogens are bacterial in nature but they may be viruses, fungi, parasites or prions.

‘Emerging infectious disease’: A disease that has appeared and affected a population for the first time, or has previously existed but is rapidly spreading, either in terms of the number of people infected, or its existence in a new geographical area. Thus, the term is vague and needs re-examination as it
includes all novel pathogens, re-emerging pathogens, known pathogens emerging in new geographies and variants on pathogens detected, as with antimicrobial resistance. The majority of emerging infectious diseases are of animal origin, and often from wildlife (“spillover”), with the risk greater in areas with an interface between humans, livestock and wildlife.67

Box 2: Legal tools to support local and regional manufacturing of diagnostics, vaccines and therapeutics

For less economically developed states, without the capacity to produce their own diagnostics, vaccines, therapeutics or compensate others for theirs, the avenues to expand access to medicines whether for humans or animals remain insufficient (as demonstrated in Case Study 1).69 Without the help of manufacturing states, such as India, their security relies on collaborative goodwill in the spirit of the Doha Declaration or improving their bargaining power through expensive long-term investment in local supply chains. From a One Health perspective, such long-term investment will likely yield cross-sectoral benefit and offers shared utility for both human and animal health diagnostics,50 vaccines and therapeutics that may have similar raw materials, active pharmaceutical ingredients, excipients, machinery and production processes, packaging materials and even shared knowledge bases.70,71 For LMICs with uncompetitive pharmaceutical industries, many of these listed items are imported, before being ‘finished’ into their final market-facing product more locally, with additional costs associated such as freight, customs and value-added tax increasing overheads.72 Nonetheless, when done correctly, local manufacturing can be more cost-competitive than imports. However, this requires both scale and utilisation to be held constant, pharmaceutical talent being skilled and retained, and strong coordination and regulation amongst ministries of health, agriculture, finance, industry and trade.73

For continents like Africa, regional manufacturing ‘hubs’ may offset the significant investment needed in scaling up its overall manufacturing capacity by providing economies of scale. This regionalised approach can also feed into wider pharmaceutical regulation and harmonisation strategies such as the newly signed Africa Medicine Agency (AMA) treaty.73,74 These regional hubs combined with an effective regional regulator, may also provide solutions to uniquely ‘local’ problems, such as counterfeit or specific sub-standard therapeutics that are disseminated through informal networks, creating sustainable internal markets at affordable prices, and targeting endemic diseases that would be otherwise ignored.75,76

As COVID-19 has shown, times of acute crisis can provide the political impetus and pushback in an uneven multilateral system, potentially influencing international customary law. India and South
Africa’s application for IP waivers relating to COVID-19 technologies in late 2020, supported by the majority of countries was stalled at the WTO with fierce opposition from the EU and UK in particular. The argument put forth by opponents of an IP waiver is that mechanisms such as ‘compulsory licensing’ are already available to improve access to medicines under TRIPS. However, the history of compulsory licensing use would suggest that it remains a complex and administratively burdensome procedure (particularly for medicines-for-export), with limits on marketing exclusivity and data-sharing, and an inability to address technology transfer. Examples of these issues are outlined in Case Study 1. In contrast, an IP waiver would overcome many of these issues, without the delays of individual product-by-product compulsory licensing and the procedural burdens linked to exporting to countries with limited manufacturing capacities.

The WHO, Government of Costa Rica, the Medicines Patent Pool and other partners have launched the COVID-19 Technology Access Pool (C-TAP), initially intended to support technology transfer, expanded manufacturing and access to medical tools in LMICs. The first and only licensing agreement, since it was established in 2020, has been for COVID-19 serological antibody technology from the Spanish National Research Council, under a global, non-exclusive and transparent voluntary license. Whilst this is a promising move from the public sector, it must be accompanied by a call to encourage large corporations to do the same.

The momentum around the TRIPS waiver, technology transfer and compulsory licensing may provide the ‘window for opportunity’ to invest and scale up local and regional manufacturing capacity in LMICs; over time, this may guarantee both a reliable local supply and bargaining power on the global stage. Meanwhile, countries should not expect this opportunity to last forever in an increasingly complex web of trade relations, intellectual property law and innovative R&D elsewhere.

Box 3: Financing response to concurrent complex emergencies; the nexus of food and health security

Food security and food safety globally remains a major risk to global health security – in 2021, 345 million people were acutely food insecure (a rise from 135 million in 2019) across 55 countries/territories and globally hunger has risen to 828 million people worldwide. This has been further exacerbated over 2022 with food price rises as a result of war in Ukraine. Access, availability, safety and nutritional values of food provisions show substantial variations across regions, and are susceptible to conflict, insecurity and economic shocks, as well as events such as drought, the desert locust plague and COVID-19. As such, recovery funding must take into account the nature of these concurrent crises, and the vulnerabilities they amplify. This should consider the calls that have already
been made to embed food security in social protection systems in food-crisis prone countries, to
preserve critical humanitarian support, to scale up support for supply chain stability and to continue
to monitor food security in ‘real-time’. Multilateral mechanisms that provide resources directly to
states should allow them to adapt response funding, from previous and current crises to address
overlapping ones. Recovery should be holistic, with coordinated measures across regional and global
structures that govern agriculture, food security, climate change and trade. At national levels, this
will require local ministries to work together on cohesive government food security and safety, and
health security strategies, strengthened by One Health links that already exist between agriculture
and veterinary medicine, and where new links integrating human health practitioners, environmental
scientists, meteorological services and social scientists can develop as well. Pegging these strategies
against human nutritional outcomes, as well as animal health, climate change mitigation and
economic outcomes, will ensure alignment and synergy towards true One Health, taking into account
the momentum and the range of the Sustainable Development Goals (SDGs).
### BOX 4: RECOMMENDATIONS

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<th>Recommendations</th>
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<td>Recommendation 1: Strengthen the role of the environment and wildlife sector in governing and operationalising One Health, including through political, technical and financing support for the OH-JPA.</td>
<td>Similar to current WOAH-WHO National Bridging Workshops ensuring continuity and synergy between Joint External Evaluation and the Performance of Veterinary Services activities, UNEP should be encouraged to integrate workplans with a focus on joint risk assessments, environmental impact assessments, strategic environmental assessments (EIAs/SEAs) surveillance and implementation of the CBD. Additionally, specific resource-based UNEP focal points can help provide the additional arguments for financing and sustainability where the conservation of shared global public goods in One Health is concerned (e.g. water resource management) and identifying how wildlife/environment expertise can be linked to existing surveillance systems. UNEP and FAO, for example, already work together on the Sustainable Food Systems Programme and have released joint publications such as Legislative Approaches to Sustainable Agriculture and Natural Resources Governance – these existing linkages should be capitalised on. Lessons learned in managing wildlife health for pandemic prevention and preparedness should be assessed at multi-sectoral workshops, for example drawing on the Republic of Korea’s National Wildlife Health Research Centre or Brazil’s virtual Centre for Information on Wildlife Health, and then adequately reported in national reports and action plans. WOAH’s Wildlife Health Framework is a useful resource to promote multisectoral coordination for wildlife health. Support for the implementation of the OH-JPA (2022-2026) will be key for coordinating and accelerating collaboration and capacity building in the run-up to the SDGs 2030.</td>
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<td>Recommendation 2: Engage social scientists, economists and communities in cross-disciplinary and participatory research and policy to ensure equitable representation of stakeholders in priority-setting, policy-making and implementation.</td>
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<td>Recommendation 3: Strengthen the role of global One Health coordination platforms such as OHHLEP and the Quadripartite, and advocate for One Health goals, including representing One Health at legal and trade fora – supported by experts, particularly in international environmental, trade and health law.</td>
<td>Consideration should be given to the following four areas: a) previous successes of forum shopping and consubstantial contestation e.g. Indonesia and the CBD; b) regional conventions that are stricter than their international counterparts (e.g. Bamako convention compared to Basel convention) that LMICs can enforce as a bloc; c) exemptions that ‘force’ the hands of larger organisations such as getting a price drop under the</td>
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<td>Recommendation 5: Increasing the regulatory and legal pressure on R&amp;D industries supplying technologies in times of a health emergency and wider global intellectual property reform should be rapidly coordinated and applied by political leaders, civic society and One Health professions with a view to improving technology transfer and access to diagnostics, vaccines and therapeutics</td>
<td>Respect and reward for the private sector should not be secondary to access to medicines and health technologies in times of acute crisis, particularly when financial risks around development remain largely public-funded. Coordinated application of pressure, using legal tools such as waivers of WTO obligations or novel whole-scale intellectual property reforms, should form a key part of global efforts to build a more effective and equitable global health security architecture. Industry lobby groups defending industry profit over population health and equity should be subject to greater scrutiny and regulation of their activities.</td>
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<td>Recommendation 6: Use economic incentives (including financial safety-nets and insurance schemes) and address established disincentives, in order to promote good implementation of international commitments.</td>
<td>The African Risk Capacity and other similar instruments must be more flexible in terms of modelled thresholds for pay-out of risk insurance schemes and contingency funds to actually deliver on its stated goals, stop negative perceptions of its function and help increase uptake of these schemes; and must consistently engage with ministries of finance (who pay into these schemes and take money out of these schemes) regarding proactive ‘One Health’ capacity building around disaster risk reduction and avoid perverse incentives.</td>
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<td>Recommendation 7: Academic institutions should systematically analyse the existing legal frameworks across health and non-health domains, and identify all of the legal tools that can empower One Health advocates who have been taught and trained in cross-disciplinary settings</td>
<td>This can be facilitated by HEIDI (the Health and Environment Interplay Database), the InforMEA portal (United Nations Information Portal on Multilateral Environmental Agreements e-learning platform on international environmental law), the Global Judicial Portal, and UNEP’s Law Division 2020 annual report which highlights best practice and tools for advancing environmental rights. UNEP itself can provide advisory services to nations and legal bodies e.g. LAC’s PARLATINO and the Montevideo Environmental Law Programme (no current activities launched yet, will commence 2021-2022).</td>
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<td>Recommendation 8: Build institutional and professional capacities and capabilities in LMICs through strengthened peer-to-peer, regional and international collaboration and investment in workforce and ‘One Health’ career development initiatives</td>
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<td>Accelerated funding for and full establishment of the African Medicines Agency for example, could help increase regional manufacturing capacity, create quality assurance mechanisms for the internal market, supporting the sharing of intellectual property/technology transfer, harmonise regulation in times of emergency and facilitate access to the raw materials needed for medical countermeasures across human, animal, environment and plant health. This could be replicated in other global geographies. Similarly, support must be given to regional initiatives such as the Lake Chad Basin Commission in West Africa whose wider stabilisation strategy if implemented transparently, could support the sustainability of development goals across health, food and water security, while protecting against acute crises and providing employment and safety for local communities. Reducing an over-reliance on external donor and funders for such initiatives is integral to sustained success.</td>
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<th>Recommendation 9: Strengthen regional governance and regulatory infrastructure for medical countermeasures and preventative measures, particularly in drug/vaccine manufacturing, licensing and procurement in human, animal and plant health</th>
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<td>Building on current examples of funding models for capacity building, such as REDISSE in West Africa and RISLNET in Central Africa to foster joint environmental, human and animal health surveillance activities. At a global level, increasing the role of the environment within surveillance systems (e.g. integrating UNEP into the GLEWS system) and monitoring drivers of disease emergence across ecosystems and society will address more comprehensively prevention of One Health disasters/emergencies.</td>
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<th>Recommendation 10: Urgent investment in the upstream determinants/drivers of disease and optimal human, animal and environmental health, particularly in climate change mitigation, land use, disaster risk reduction and joint multisectoral disease control activities</th>
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<td>Addressing the wider vulnerabilities amplified by the COVID-19 crisis, such as food security, by using redirected response funding transparently and accountably towards overlapping crises, earmarking funds towards SDG outcomes, not procedural actions, and providing direct cash transfer as well as relief assistance to promote flexible and relevant usage by affected households. At national levels, this requires local ministries to work together to integrate government food security and health security strategies, strengthened by One Health links that already exist between agriculture and veterinary medicine, and where new links integrating human health practitioners, environmental scientists, meteorological services and social scientists can develop</td>
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<th>Recommendation 11: Flexible funding to be made available for countries to use for preparedness, prevention, mitigation and for response to crises, including where relevant for addressing overlapping issues across food, water and health security while ensuring transparency and accountability</th>
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as well. New instruments like the World Bank FIF-fund\textsuperscript{63,64} should consider carefully how to make such instruments sufficiently agile and flexible while adhering to principles of good governance and accountability.

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<th>Recommendation 12: Assess and appraise existing and proposed global legal and financial health security instruments against a framework of One Health principles.</th>
<th>Relevant global health security instruments undergoing reforms such as the IHR, or that are currently being proposed such as World Bank FIF-Fund or the potential ‘Pandemic Treaty’ should all be appraised against the OHHLEP framework assessing Equity, Sociopolitical Parity, Socioecological Equilibrium, Stewardship and Transdisciplinarity. This will ensure that any instruments purporting to adopt a One Health approach are consciously considering and embedding all its underlying principles\textsuperscript{11}</th>
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CASE STUDIES

Case study 1: Compulsory licensing – a legal tool designed to fail?

Compulsory licensing is a legal way of expanding access to medicines under TRIPS. It involves the issuance of a license by a government for a third-party manufacturer to develop generic equivalents of patented pharmaceutical products. This usually occurs in the interest of public health during a health emergency or due to unreasonably high prices for in-demand patented drugs. Historically, the majority of successful attempts to pursue compulsory licensing has been for the supply of antiretroviral medications for the treatment of HIV/AIDS in LMICs. Even when compulsory licensing fails to materialise, attempts to pursue it directly by government or through pressure from non-government entities, can still yield positive results; this can include successful price negotiation with the original holders of the patent, or the issuance of a ‘voluntary’ license instead. Nonetheless, the law is designed in favour of strong patent protection and tends to favour alternative outcomes to compulsory licensing at all costs, including price negotiation or even legal action at international level.

As the COVID-19 pandemic has shown, the pharmaceutical industry’s argument that compulsory licensing and intellectual property (IP) waivers reduce incentives for future drug development does not always stand. In particular, COVID-19 vaccine development was a direct result of investment and breakthroughs from publicly-funded academic institutions (e.g. the US National Institutes of Health and Oxford University) with most of the risk borne by the public sector, and taxpayers. Furthermore, the private sector was protected from this risk through guaranteed purchasing of developed vaccines and indemnified by governments against legal action from any adverse effects. Meanwhile, all profits from vaccine sales are awarded to the pharmaceutical companies.

The perceived economic losses to established pharmaceutical manufacturers, usually based in the Global North, from the use of compulsory licensing elsewhere has been used to threaten competitor states with unfavourable terms in other economic and political negotiations. In such cases, less developed countries have had to balance access to medicines with their wider diplomatic and economic needs. They may feel obliged to comply with the strong-arm tactics of countries wielding greater power on the global stage.

For example, despite Colombia’s threats to issue compulsory licensing in 2016 for the leukaemia drug Glivec, produced by Novartis, the country opted to pursue a 44% price drop instead. Novartis claimed there were other generics freely available to the Colombian market, whilst the government claimed Novartis had thwarted those offerings through threats to sue generic manufacturers for patent infringement. The fraught negotiations between the nation and the patent holder were mired for
several months; they included a formal threat of legal action against the Colombian government in an international arbitration tribunal for breach of a separate investment treaty with Switzerland, as well as an indirect suggestion by concerned embassy officials in the US that such unilateral moves could threaten the US-backed Paz Initiative peace efforts, an upcoming bilateral free trade agreement and Colombia’s ascension to the OECD.\textsuperscript{89,90} Under such pressure, and the potential loss of $450 million, Colombia had to yield.\textsuperscript{90} Despite its experienced pharmaceutical sector and strong legacy of generics production and export, even India has only once issued a compulsory license for domestic use. Although it can make good on any of its threats to produce a generic product, pressure to fully comply with wider IPR systems and to maintain a predictable investor- and research-friendly economy, has resulted in infrequent attempts at compulsory licensing.\textsuperscript{91} Perversely, the race for treatment for COVID-19 has seen several developed states attempt to secure the patented anti-viral Remdesivir for their populations through legislation that aims to facilitate compulsory licensing; sometimes, these have been the very same states that have historically warned against its use.\textsuperscript{82} This begs the question – if powerful nations are willing and allowed to undermine IPR in the interests of their public health emergencies, where and why is the line drawn for less powerful states? Incentives in the pharmaceutical industry must move beyond patent protection, and towards measures that offer compensation without threatening access to medicines. Unsurprisingly, alternative mechanisms, such as voluntary patent pools, have had limited success due to their voluntary nature and the pressure of vested interests. Clearer mechanisms for all countries to invoke their rights under TRIPS equally and fairly, and to be protected from threats of punitive actions by high-income industry stalwarts, must be ensured through both numbers, binding obligations and committed leadership.

The tide is slowly turning; countries such as India and South Africa who have proposed the use of certain TRIPS rights during COVID-19 times have found support from a wide range of states recently, from Bolivia to Egypt, as well as regional blocs such as the ‘African Group’ at the WTO. Empowering a wave of support, particularly from regional economic blocs, can apply a sense of pressure and urgency to changing the IP environment to better serve public health; today, support for the adoption of emergency IP waivers represent a key step in this direction.\textsuperscript{77} Conclusively, an acknowledgement that IP must change and will change, with or without high-income players, must be boldly and consistently declared from all sides.
Case study 2: One Health and regional health security - politics and governance of shared water resources in the Lake Chad Basin

The Lake Chad Basin is situated in northern central Africa, centred around Lake Chad, a freshwater body providing sustenance to more than 30 million people in the populations of its four surrounding countries (Nigeria, Cameroon, Niger and Chad). Although now partially recovered from shrinkages in size due to severe droughts in the 1970s and 1980s, pressures on local resources have intensified. This can be attributed to increased migration into the Basin (both forced and voluntary), poorly planned upstream hydrological and agricultural projects, climate change, and increasing militarisation. An estimated 10.7 million people in the area require humanitarian assistance, with 5 million acutely food insecure. Joint management of water resources, therefore, remains of paramount importance to regional health security.

The Lake Chad Basin Commission (LCBC) was originally set up in 1964 to coordinate access and use of resources in and around the Lake. Initially composed of the aforementioned four states, it has since expanded to include the Central African Republic (CAR), Libya and four observer states (Sudan, Egypt, the Republic of Congo and the Democratic Republic of Congo). Members of the LCBC have acceded to a legally binding Water Charter in 2012 that aims to address fair water use management, establish rules for surrounding wetlands and fish stocks, maintain water quality, prevent water-related disease and ecological harm, harmonise monitoring, evaluation and communication tools, and support civil society participation in the above. Failure to comply with the legally binding Water Charter can result in political and legal ramifications.

However, the Commission has been met with political and technical limitations in its ability to manage the complex situations present in the basin area. The Commission is a political body straddled between African Union Regional Economic Communities that represent West African states (ECOWAS) and Central African states (ECCAS), and it must therefore contend with competing economic interests and limited resource pools to operate, frequently relying on funding raised through international multilateral mechanisms instead. Sustainable economic development has failed to materialize and the LCBC is mainly notable for providing a high-level platform for cross-border military cooperation, including joint military efforts against militant groups such as Boko Haram, through its Multinational Joint Task Force (MNJTF).

The political interest in managing the securitisation of the area reflects the interests of the region’s hegemonic powers. Nigeria remains the heavyweight in the LCBC – it contributes to nearly half of the Commission’s operating budget, commands the MNJTF and has supplied all nine Executive Secretaries in the Commission’s history. Although the LCBC is supervised and controlled by a Council of
Ministers, directed by Heads of State at biannual summits, its decisions are executed by a centralised Executive Secretariat, where power is ultimately rooted in the personality and agenda of the Executive Secretary themselves.\textsuperscript{96} As a result, Nigeria has had key influence in policy, agendas and settlements and has historically tried to maintain that sphere of influence.

The regional hegemony by Nigeria has also driven support for panacea technical solutions in their favour, such as the Oubangui inter-basin water transfer project – an ambitious and significantly expensive 2400km long canal construction, to replenish Lake Chad to the cost of roughly 14 billion USD, with support from Italian and Chinese engineering companies.\textsuperscript{96,100} This would re-establish a historical shoreline for Nigeria, allowing for new agricultural and fishing opportunities, as well as presenting a politically attractive, visible and marketable technical solution, despite the governance challenges it masks, and may perpetuate.\textsuperscript{96,101,102}

The climate-conflict trap in the region has only exacerbated governance challenges for the LCBC. High rainfall and wide temperature variability, has made it difficult for pastoralists and their livelihoods, pushing them closer to urban areas. This has brought them in conflict with farmers, or alternatively, into the arms of armed opposition groups providing the promise of financial security. Food and water scarcity is then compounded by those forcibly displaced by conflict, and by military and opposition group restrictions on the movement of peoples.\textsuperscript{92,100} Failure of the state to provide basic services historically, allowing such issues to flourish, undermines the legitimacy of any future governance mechanisms in a region where social trust is weak, and corruption and human rights abuses abound.\textsuperscript{92}

The issues are too broad to be tackled by the mandate of the LCBC alone, which cannot provide the climate-sensitive economic packages that would improve the adaptive capacity of the local population.\textsuperscript{97,103} These packages should ideally come from national ministries or regional economic bodies, though they also suffer their own funding, governance and infrastructural challenges.\textsuperscript{99}

Despite the many challenges, the LCBC, has shown efforts to address longer-term recovery and resilience in their Regional Stabilisation Strategy.\textsuperscript{98} In 2019, $60 million was raised by UN Development Programme for the Strategy, with smaller sums of funding provided by several European countries.\textsuperscript{104,105} The ultimate cost-effectiveness and co-benefits should not be ignored, where maximum yield of One Health-focussed interventions on integrated water resource management, climate resilience, social cohesion and peace-building can dramatically improve overall availability of food, healthcare and basic human rights, whilst reducing the associated expenditure in tackling conflict and insecurity.\textsuperscript{92} With significantly more funds generated for a climate-sensitive and market-sensitive package of interventions, the LCBC has real potential to secure regional health security for
some of the world’s most vulnerable communities and continue propagating the successes of both
technical and political regionalism.
Case study 3: No Way Out? The Overlapping Crises of Desert Locust Infestation & COVID-19 in sub-Saharan Africa & South-Western Asia, 2019-2020

The 2019-20 East Africa and South-west Asia desert locust infestation destroyed large expanses of pasture and cropland. Although locusts do not harm humans or animals, a single 1km² swarm can decimate an expanse of crops that would have fed 35,000 people. Consequently, the recent infestation has resulted in an acute nutrition emergency and jeopardised the food security of 25 million people across West Africa, the Sahel, the Greater Horn of Africa and South-western Asia.\(^{58}\)

For many years, the FAO’s Desert Locust Information Service, working in tandem with national Locust Information Officers, has had rigorous monitoring measures for nations on the endemic ‘frontline’ of locust invasions, including producing daily bulletins, six-week forecasts and operating an early warning system for desert locust plagues.\(^{106}\) However, extraordinary wet weather events in the Indian Ocean, secondary to climate change, have allowed back-to-back locust swarms to form and breed from 2018 onwards, migrating westwards from Asia into Africa. They have also allowed the crises to prolong, minimising recovery time between infestations and making previously consistent forecasting highly unpredictable. In some nations, such as Kenya and Pakistan, the recent outbreak represents the first or worst locust plague in several decades. Extreme weather events continue to jeopardise harvesting, fishing and pastoral conditions throughout these regions.\(^{106,107}\) This comes on a background of chronic global health security risks in these areas, including childhood malnutrition, infectious disease (e.g. the meningitis belt and malaria), pockets of armed conflict and natural disasters. The upsurge of migration across areas in East Africa where desert locusts are less common has applied pressure to already fragile states that are largely under-prepared and underfunded with limited access to bio-pesticide control.\(^{108}\)

Furthermore, COVID-19 has exacerbated the ability to contain this crisis by disrupting the movement of migrant agricultural labour, pesticide product supplies and even humanitarian packages due to requirements on social distancing and movement restrictions.\(^{109}\) It has further impaired the availability of funding to weather such shocks, due to the re-prioritization of foreign aid by states towards pandemic control, and finally the effects of economic standstill and recession, including mass unemployment, that has reduced the purchasing power and crisis resilience of individuals and states alike. Significant crop losses that have occurred have only further contributed to malnutrition, hunger, skyrocketing food prices and resource conflicts.\(^{58,84}\)

Over 1 million hectares of land has been ‘treated’ with ground or aerial pesticide sprays, but the crisis is far from over. The FAO has requested $309 million from the international community to manage this issue but only $161 million has been received so far (as of July 16 2020). The World Food
Programme estimates that long term recovery costs could top over $1 billion; elsewhere conservative estimates by the World Bank for locust losses within the Greater Horn of Africa alone reach $8.5 billion.\textsuperscript{58} Although the World Bank has approved $500 million for programmes aimed at safeguarding livelihoods and promoting recovery, the ability of this financing to mitigate the long-term damage of a ‘crisis-within-a-crisis’ is low.\textsuperscript{58,107} There have been some innovative local attempts at preserving the integrity of the food supply chain in the immediate, such as a successful June 2020 government-endorsed pilot project in Pakistan where local farmers were paid to collect locusts overnight for conversion into chicken feed, a project recently mimicked by a private start-up in Kenya. These initiatives remain small-scale, however, as they cannot rely on locusts collected from areas where pesticides have already been used and where cash-strapped national authorities have limited funds for reimbursing collectors.\textsuperscript{110,111} They also may represent perverse incentives for ongoing crisis should they become the only route to financial support for deprived populations in times of famine or food scarcity. Second-order consequences of such ‘strings attached’ funding must be considered long-term, although they should not dissuade innovation that aims to be multifunctional and cross-sectoral in One Health. In the meantime, however, the increasing evidence of the value of direct cash transfer to vulnerable households, allowing for both flexibility and dignity in its use, should be emphasised to financial donors to ensure access to basic goods on the ground.\textsuperscript{112,113} Response financing must move beyond donor targets or pre-determined thresholds set by proprietary modelling software.
Figure 1: Factors contributing to emerging infectious diseases in Animals (domestic and wildlife) Environment and Human populations. Adapted from Daszak et al. 2000.
SUPPLEMENTARY ANNEX 1

METHODS

We used a grounded theory approach (Supplementary Figure 1) to identify and evaluate the structures and processes underpinning the global and regional governance of One Health and their implications for the global health security.

Firstly, a literature review of the governance architecture of One Health was used to inform the scope and remit of this paper. The results of this review were then applied against the conceptualisation of governance tools as either ‘hard’ or ‘soft’, in their degree of compelling effective implementation. Notably, the literature on One Health, and the activity of key agencies involved, is predominantly focused on soft governance, such as developing normative frameworks, technical instruments and goal-setting to support and influence countries (Supplementary Figure 2). Consequently, we chose to explore the research gaps relating to ‘hard’ governance tools, including the use of legal and financial frameworks in One Health, and the political economy of this approach. We supplemented the systematic review with an additional search of grey literature and by engaging experts.

Secondly, we identified legal frameworks related to the global governance of One Health and analysed their content using Oberthür’s governance framework, which assesses the bindingness and stringency of legislative instruments.114 We included any international legal instruments (e.g. treaties, conventions, agreements) related to human, animal and environmental health, and to the trade of food, agricultural, wildlife, medical and veterinary products, or natural resource extraction. We did not consider customary international law in the analysis.22 One author (AE) analysed the content of each legal instrument using Oberthür’s governance framework.

On the basis of our literature review, discussion with experts and the legal framework analysis, we developed theories that underpin and describe the four major challenges to the governance structures and systems of One Health. This was supported through further review of the literature for each challenge, and the development of three illustrative case studies. Case studies were selected for their in-depth and nuanced exploration on the range and interconnectedness of One Health issues, for highlighting regional or social justice issues and the potential for traction on complex issues.

RESULTS

We identified 25 legal tools (see Supplementary Table 1), and conducted a content analysis using a governance analysis framework by Oberthür (2019).114 which considers four dimensions for each legal tool: formal legal status (binding or non-binding), the prescriptiveness and precision of its language, the nature of obligations demanded of contracting parties, and the accountability mechanisms for
effective implementation and oversight. We explore the main themes identified and our analysis of
the implications for the governance of One Health.

Most instruments identified were legally “binding”, in that they were treaties, regulations, directives
or decisions, with established rules, rights and obligations for signatories. However, this does not
mean all binding treaties are equal in their bindingness, or that non-binding instruments are
ineffective. It is clear from reviewing the instruments that most of the binding treaties leave room for
discretion for actors, through a combination of qualifier phrases (such as “subject to ability” and “as
appropriate”), a lack of prescriptive wording and a reliance on procedural, rather than substantive,
obligations. The majority used “soft” wording, including words such as “urges”, “should” and “may”,
particularly for any substantive obligations, meaning contracting Member States are merely guided
towards strategies of implementation, but rarely are they explicitly mandated to implement
something in a particular way.

Most of the legal instruments had in-built accountability or oversight mechanisms, through annual
reports, monitoring and evaluation or oversight committees. Disputes are settled through friendly
negotiation, usually facilitated by the Director-General of the organisation with whom the relevant
treaty is deposited. If this is not successful, then the matter can go to an arbitration tribunal, or then
be referred to the International Court of Justice or Permanent Court of Arbitration. ‘Soft’ processes
such as third-party arbitration or political diplomacy are encouraged to achieve ‘friendly’ settlements.

Four of the 25 legal frameworks have mechanisms to levy ‘hard’ disincentives such as economic
sanctions and/or security forces, via the WTO (trade) and the UN Security Council (economic and
security), as part of their breach or dispute settlement processes (see Supplementary Table 1). At the
WTO for example, the mechanism available to member states is known as the Dispute Settlement
Understanding (DSU) which can be used to countries who have failed to comply with the outcome of
their resolution process. In 1999, the European Union (EU) refused to comply with a DSU ruling that
said its ban on hormone-treated beef from the United States of America (USA) was not compliant with
standards set in the Agreement on Sanitary and Phytosanitary Measures (SPS). Consequently, the USA
was allowed to impose hefty retaliatory tariffs on imports from the EU at a cost of over $110 million
per year. Countermeasures of such significant scale are rarely reflected in treaties that advocate for
global public goods, such as those for human health or environmental conservation.

However, there are limits to the utility of legally prescribed sanctions as a coercive tool. The DSU
process aims to merely establish if, and to what extent, economic harm has occurred to a member
and is a mechanism that favours a select few high-income states rather than advocates for global
public goods. The DSU process is costly and lengthy, and unsurprisingly, gross domestic product (GDP)
is a strong indicator of users of it. In the aforementioned EU vs USA dispute, the EU has refused to yield despite accusations of disguised protectionism. Where economic disincentives are touted as more likely to achieve results, therefore, these measures are not without disadvantages or limitations in their application.

The findings of this content analysis, combined with the literature review and discussion with experts, were used to identify and explore four key challenges focused on the global governance architecture for One Health and hard governance mechanisms, as outlined in the main text.
**Supplementary Figure 1. Comparison of conventional research and grounded theory methods**

**Conventional research**

1. Read literature
2. Formulate hypothesis
3. Collect data
4. Test hypotheses with data

**Grounded theory**

1. Collect data
2. Analyse data
3. Develop theories
4. Read literature to explain findings

Adapted from Mediani et al. (2017)

**Supplementary Figure 2: Soft-Hard spectrum of governance tools**

- Soft
  - Best Practice
  - Civil society
  - Technical guidelines from professional bodies

- Hard
  - Politics & Diplomacy
  - Economic consequences
  - Legal frameworks
  - Military action
  - Monitoring & Evaluation