

**Title:**

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

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44 **ABSTRACT**

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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.

71 **KEY MESSAGES**

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

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

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

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

99 5) Regionalism can level the playing field for LMICs who share geographical, biological and  
100 infrastructural hazards, but have limited political or financial power in the global multi-lateral system.  
101 However, care must be taken to ensure power imbalances prevalent at the global level are not simply  
102 replicated or perpetuated at the regional level.

103 6) Overlapping and concurrent crises are likely to increase, and the global community must reflect on  
104 maximising yield from its interventions – flexible funding for prevention, preparedness and response  
105 with adequate provisions around transparency and accountability must go to those directly affected  
106 with no strings attached. For initiatives like the OH-JPA and other One Health implementing  
107 instruments, whether global or regional, the financing required to make a real impact on prevention  
108 and preparedness is in the billions per year. Funding that moves beyond subsidising a development  
109 and academic industry in high-income countries and results in measurable technology transfer and  
110 self-sufficiency in LMICs is necessary. This funding should be made available with a view to ensuring  
111 access to global public health goods, human dignity and ensuring real health-related outcomes across  
112 the SDGs, not through a primary focus on pre-determined donor targets derived from economic and  
113 health security self-interest.

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116 **INTRODUCTION**

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

123 As we continue to reflect on the chain of events leading to emergence, amplification and global spread  
124 of SARS-CoV-2,<sup>2</sup> it is clear that preventing epidemic outbreaks requires a much broader outlook that  
125 incorporates and unifies animal, plant, human and ecosystem health where appropriate.<sup>3</sup> Several  
126 anthropogenic factors (Figure 1) contribute to the likelihood of emergence of infectious diseases (and  
127 other public health hazards), including human and domesticated animal population growth, the  
128 climate change crisis and land use change<sup>4,5</sup> (e.g. agricultural intensification, extractives industries,  
129 industrialisation, unplanned urbanisation) which can bring wildlife populations into close proximity to  
130 humans and domestic animal populations.<sup>6</sup> More often than not, the brunt of these detrimental  
131 changes affects the most vulnerable, marginalised and deprived populations of the Global South.

132 In the first paper of this Lancet series, Zinsstag and colleagues (2022)<sup>7</sup> outline the historical and  
133 operational dimensions of a One Health approach. The approach has evolved over time and now  
134 explicitly considers health, welfare and well-being within socio-ecological systems (SES), including the  
135 role of health-sustaining environments, and our socio-cultural, material and ecological  
136 circumstances.<sup>8-10</sup> The recently published definition<sup>11</sup> by the One Health High-Level Expert Panel  
137 (OHHLEP, see Box 1 for definitions) explicitly recognises the integrative and transdisciplinary approach  
138 needed to coordinate actors from a wide range of disciplines beyond human and domestic animal  
139 health while demonstrating the added value of collaboration by identifying co-benefits and trade-  
140 offs.<sup>3,11</sup>

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

147 In this fourth Lancet Series article, using a grounded theory approach and in-depth case studies we  
148 focus on four challenges to the global governance for One Health; silos amongst disciplines and

149 professions, weaknesses in the interfaces of global health public goods and the international legal  
150 system, asymmetrical power dynamics regionally and globally, and flaws in crisis-driven financing.  
151 Detailed methods and results for our content analysis of 25 international legal instruments is included  
152 online in Supplementary Annex 1. Case studies in the panels demonstrate the interplay of these issues.  
153 Finally, we offer 12 recommendations to address these challenges.

#### 154 **CHALLENGE 1: Sectoral, professional and institutional silos in One Health**

155 At the global level, there are a number of agencies and actors with a remit relevant to One Health,  
156 including those directly related to human, animal, plant and environmental health. Despite the  
157 theoretical emphasis on One Health offering a holistic approach, politics and professional legacies of  
158 dominance have shaped One Health networking and partnerships (paper 2 of this series). As such,  
159 there have been significant challenges in attempting to breakdown silos and foster collaboration  
160 between sectors, and between institutions. The establishment of the “Tripartite” in 2010,<sup>14</sup> a  
161 collaboration between World Health Organization (WHO), Food and Agriculture Organization (FAO)  
162 and World Organisation for Animal Health (WOAH, formerly OIE), was a key step towards promoting  
163 cross-sectoral collaboration and integration at a global scale. Initially, the Tripartite existed to address  
164 health threats at the human-animal-ecosystem interface, and had prioritised zoonoses, food safety  
165 hazards and antimicrobial resistance (AMR). Notably, in its first decade since establishment, the  
166 Tripartite did not include sufficient representation from agencies with a role in the environment,  
167 ecosystems and wildlife. Issues such as climate change, land and water use management, biodiversity  
168 and wildlife health are integral parts of One Health,<sup>15</sup> important in their own right, as well as being  
169 proximal factors that contribute to the likelihood of emerging infectious diseases (EIDs, see Figure  
170 1).<sup>4,9</sup> Although specialised UN agencies and programmes existed in these fields, they often acted as  
171 secondary implementing partners to the Tripartite rather than alongside it in steering and leadership  
172 roles.

173 The recent addition of the United Nations Environment Programme (UNEP) in early 2022 to form the  
174 ‘Quadripartite’ has been a much welcomed and necessary step towards improving the coherence and  
175 implementation of One Health. Encouragingly, the Quadripartite have now developed a One Health  
176 Joint Plan of Action (OH-JPA, 2022-2026) with six ambitious action tracks to strengthen coordination  
177 between the four agencies and support global efforts to operationalise the approach.<sup>16</sup> This will  
178 require a step-change in the funding envelope (in the order of billions of USD per year) to achieve the  
179 desired global health security (GHS) goals and move beyond the limited success of the previous  
180 Tripartite configuration, particularly on environmental issues and drivers of disease.

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182 Despite the economic slow-down caused by the current pandemic, urbanisation and industrialisation  
183 are continuing rapidly across the globe through grand initiatives such as China’s Belt and Road  
184 Initiative. Ongoing degradation of air, soil and water quality through ‘business-as-usual’ large-scale  
185 industrial activity, and inappropriate waste and hazard management including that associated with  
186 pandemic response activities, continue to threaten health across species and the environment. One  
187 key role that UNEP and the broader environmental sector can play is to firmly support improving and  
188 embedding environmental and health impact assessment into large-scale industrial projects. This  
189 must now include components relating to the risks of disease emergence and propagation through  
190 land-use change and interventions to prevent or mitigate them. As such, groupings such as the  
191 Quadripartite must engage with development banks that provide financing and set standards for  
192 industrial projects, the relevant UN agencies that support them (such as UNIDO, UNHABITAT and  
193 UNDP) and sector-specific industry bodies that embed and encourage best practice such as the  
194 International Association of Impact Assessment (IAIA).<sup>17</sup> Some success has already been achieved in  
195 this area with OGP-IPIECA, the global oil and gas industry association, integrating modules on  
196 emerging infectious diseases into the most recent edition of their standards for health and  
197 environmental impact assessment.<sup>18</sup> The evidence base for cross-sectoral action must be  
198 strengthened, and new global initiatives launched in the wake of the pandemic such as OHHLEP and  
199 the Quadripartite OH-JPA can play an important role in undertaking and promoting this work.

200 Historically, the work of UNEP which anchors global environmental issues, has had mixed results in  
201 engaging on health matters. Structural issues with its governance, finance and status have resulted in  
202 ineffective coordination and a fragmented global system, undermined by other institutions and  
203 agendas.<sup>19</sup> Despite these challenges, it has collaborated with the Tripartite on some priority areas such  
204 as AMR and has been successful in establishing and monitoring some health-related international  
205 environmental laws in the past, most notably the 1987 Montreal Protocol (to phase out ozone-  
206 depleting substances) and the 2012 Minamata Convention on Mercury.<sup>19</sup> Part of the challenge in  
207 trying to strengthen the governance of environmental health issues through the global multilateral  
208 system, is the centrality of trade, production, finance, and “market actors” in environmental  
209 governance and politics.<sup>20</sup> Often transnational companies are both producers and regulators of  
210 environmental problems, meaning that an exclusive focus on end-result environmental damage  
211 ignores the upstream politics, industry actors and market factors that produce them in the first place.  
212 The laws and frameworks governing downstream global public goods in One Health, such as  
213 international regulations of food safety, animal welfare and food security, mirror these same politics  
214 and remain subordinate to wider trade objectives in agro-business, for example. For its part, the OH-  
215 JPA will attempt to address these challenges through an action track dedicated to sectoral integration,



216 collaboration and coordination.<sup>16</sup> However, it remains to be seen how well these will be resourced  
217 and actively supported.

218 The implications are significant for all nations; the lack of integration explains, in part, the mismatch  
219 in performance of even well-resourced countries in managing COVID-19. It is possible that, had more  
220 consideration had been given to the voices of social scientists and grassroots organisations, spread in  
221 vulnerable communities without the social or financial capital to isolate and protect themselves could  
222 have been better mitigated.<sup>21</sup> Without overcoming these institutional and sectoral silos, One Health  
223 governance will remain patchy and incomplete, as well as exacerbating existing health inequalities.

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

225 The international legal system is considered a powerful tool in the governance of global issues, with  
226 the potential to enhance health and influence its socio-economic determinants.<sup>22</sup> A number of legal  
227 instruments exist with a direct or indirect role in One Health and their bindingness and stringency has  
228 been explored in our Supplementary Material. Overall, our analysis shows that the power of a legal  
229 tool remains subject to which sector it regulates and what instruments are available to enforce  
230 judgements. Furthermore, legal tools can be used to open windows of opportunity for radical change,  
231 or alternatively through their years-long development processes and procedural intricacies can merely  
232 delay substantive action.

233 International trade law generally succeeds more consistently in shaping economic matters, while  
234 health and social justice laws consistently fail to achieve social progress.<sup>23</sup> Trade treaties offer  
235 politically appealing gains, and are backed by strong global institutions for monitoring, evaluation and  
236 compliance, and have a powerful lobby of non-state actors to support their goals. Contrastingly,  
237 international legal instruments for health often fail to significantly advance health matters due to their  
238 economic disincentives, limited compliance and punitive action mechanisms, a reliance on  
239 discretionary actions, and a lack of financing arrangements to support their successful  
240 implementation.<sup>24</sup>

241 The extent to which an international health treaty (human or animal) affects trade is linked to its  
242 success. Treaties which financially penalise states, despite good implementation, demonstrate the  
243 conflict between national interest and a global public good. For example, there are financial losses  
244 associated with the loss of travel-related business or animal trade restrictions when a state reports an  
245 infectious disease outbreak in accordance with the International Health Regulations (IHR).<sup>23,25</sup>  
246 However, prioritising the national economy instead, may have negative health externalities including  
247 suppressed reporting, delayed action, diluted outbreak response and eroded public trust. These

248 perverse incentives must be acknowledged and prevented with timely, relevant protections,<sup>26</sup> which  
249 could include the guaranteed provision of speedy assistance (for example, a committed vaccine  
250 supply) or the disbursement of sufficient emergency funding to affected states without strings  
251 attached. These mechanisms can reduce economic disruption and help secure investor confidence in  
252 early containment, thereby ensuring market stability. Without linking positive economic incentives to  
253 implementation, global health-related treaties may undermine their own objectives. The proposed  
254 WHO 'pandemic preparedness treaty' may suffer the same fate as the IHR if it ignores some crucial  
255 reasons for poor compliance, and merely adds additional administrative and financial burdens to  
256 those applying it.<sup>27</sup>

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

264 As our analysis shows, States continue to erode the legitimacy of the international legal system, by  
265 choosing to avoid or actively contest it at whim, and despite the theoretical threat of economic  
266 sanctions (see Box 2, Case Study 1 and Supplementary Material). At the same time, this flaw in  
267 international legal instruments presents an opportunity to exploit them in the interests of a One  
268 Health approach. Treaties that show consistent alignment and positive engagement, largely those in  
269 trade, can be leveraged for wider global public goods when selectively used at the right time by a  
270 group of states working together. LMICs can pool their legal expertise and finances to sustain disputes,  
271 establish consistent applications of legislation regionally as foundation for new customary law and  
272 also opportunistically use 'emergency' provisions to establish an evidence base for longer-term  
273 change. LMICs should also exploit the gap in regulation on wildlife health and trade by becoming early  
274 advocates for it to shape the landscape in their favour. Additionally, One Health practitioners should  
275 expand their scope to legal instruments that are useful but largely ignored, such as environmental  
276 treaties that contain health provisions of which there are numerous (e.g. the 2012 Minamata  
277 Convention). Even environmental treaties with no explicit health-related provisions may still have  
278 positive effects on global governance for One Health,<sup>28</sup> for example, through air/water pollution  
279 reduction measures. A variety of databases and reports summarise and highlight best practice from  
280 the application of such treaties, for example HEIDI (the Health and Environment Interplay Database)  
281 or UNEP's Annual Law Division Report.<sup>29</sup> Given the limitations of global health-related treaties,

282 decision makers may find both international trade and environmental law a useful cross-disciplinary  
283 tool to secure political commitment for One Health.<sup>30</sup>

284 Lastly, the sovereignty principle of nation states should not always be perceived as a hindrance; it can  
285 redress power imbalances between countries by allowing less powerful states to forum-shop the legal  
286 tools and fora they wish to engage in, and contest a law on the basis of an alternative binding law.<sup>31</sup>  
287 An example of this is Indonesia's claim to 'viral sovereignty' under the Convention of Biological  
288 Diversity (CBD), contesting the obligation to share biological samples under the revised IHR 2005. As  
289 retaliation to unfair and exploitative practices by the global North and pharmaceutical vaccine  
290 developers during the avian flu crisis,<sup>32</sup> Indonesia successfully argued that the viral samples were its  
291 sovereign property under the CBD and therefore could override IHR. This led to an intergovernmental  
292 process that eventually produced the Pandemic Influenza Preparedness Framework, a more equitable  
293 and sustainable attempt at sample-sharing and vaccine manufacture.<sup>33</sup> Indonesia's ability to take  
294 advantage of the lack of legal alignment between international treaties highlights the contemporary  
295 challenges and opportunities in governing One Health through the fragmented global multilateral  
296 system. Thus, while sovereignty principles pose a significant challenge to the international legal  
297 system, with the right legal expertise, it can potentially empower smaller states to challenge the  
298 dominance of the global North in health security. This paradox is aptly summarised by Suarez and  
299 Aubry (2014):<sup>34</sup> "Global governance is a relatively recent development and a highly fluid and contested  
300 game that is determined more by power politics than by law. This explains the existence of soft-law  
301 instruments that are powerful mainly because powerful actors impose them, while some hard-law  
302 instruments tend to be weak because the powerful refuse to abide by them."

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

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

312 One similarity between regionalism and internationalism, is the challenge posed by the asymmetry of  
313 power, finance and information between the states represented in multilateral institutions.<sup>39,40</sup> Fora  
314 that require majority vote operate very differently to those where only a select few retain permanent

315 veto power. States with veto powers do not need to compromise with others, although there is  
316 diplomatic benefit in doing so. Those without such powers need numbers on their side and must  
317 appease many. As funding remains a key priority for many LMICs, wealthy states of the Global North  
318 have and may continue to leverage this need for financial assistance to set their own agendas at  
319 international levels.

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

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

339 Beyond COVID-19, regionalism may support One Health goals in the long term through pooled power  
340 and resources, such as standardising approaches to capacity building in national public health  
341 institutes (NPHIs), manufacturing capacity and multi-disciplinary workforce development. Despite  
342 some successes in Africa that are worth applauding, such as Kenya's well-established Zoonotic Disease  
343 Unit (ZDU), the great majority of these efforts are still funded by external donors and thus heavily  
344 influenced by their priorities. For example donor-sponsored zoonoses prioritization processes in sub-  
345 Saharan African countries resulted in highly pathogenic Avian Influenza being the most highly  
346 prioritized (89% of countries), despite the disease having a minimal disease burden (in terms of  
347 morbidity/mortality and prevalence) or significant economic impact in any of the listed countries.<sup>45</sup>

348 Until, domestic and regionally pooled financing becomes more readily available, sustainability and a  
349 continuing battle over priorities will remain an enduring challenge.

350 Regionalism, however, is not a panacea without failures or risks. Many regional institutions within the  
351 Global South, suffer from poor institutional capacity-building, destabilising members, and the  
352 aforementioned emphasis on ‘extraversion’ to draw external funding flows rather than prioritising  
353 local needs.<sup>46</sup> In Case Study 2 on the Lake Chad Basin Commission (LCBC) we present some of the  
354 challenges of regionalism and how this can impact on health security, particularly with the chronic and  
355 dangerous mix of climate-change, conflict, militarisation, and socio-political imbalances at community  
356 and leadership levels. With the prime solution offered being a hugely ambitious and costly technical  
357 replenishment project using channelled water from the Congo Basin, this case study shows the  
358 complexity of issues relating to shared resources and priority-setting in regional organisations. Despite  
359 the myriad challenges and significant setbacks over the decades since its creation, the LCBC’s relative  
360 success shows it has potential to leverage large-scale cooperation, even when the political will to apply  
361 more horizontal programmes remains variable.<sup>47</sup>

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

364 Within global health security, most funding is reactive, in response to outbreaks, such as avian  
365 influenza, SARS, and Ebola, in a “cycle of panic and neglect”<sup>48,49</sup> that often means prevention,  
366 mitigation, preparedness and recovery activities are neglected. Funding sources and streams are  
367 patchy overall, both within nations and from external donors, across a range of key One Health issues.  
368 In the same way that there is longstanding recognition of the value of investing in broader health  
369 system strengthening, global health security must recognise the need to strengthen environment and  
370 animal health systems in the selfish interest of human health.

371 Evidence of the chronic underinvestment in health systems was unfortunately demonstrated during  
372 the Ebola outbreak of 2014-2015, at a devastating cost to human life. Attempts to redress this have  
373 been modestly successful but still have far to go. For example, in 2016, the World Bank launched the  
374 Regional Disease Surveillance Systems Enhancement (REDISSE) programme in West Africa, aiming to  
375 develop the necessary technical infrastructure, laboratory capacity and trained staffing needed for the  
376 surveillance of animal and human infectious diseases.<sup>50</sup> The programme finances risk reduction,  
377 largely through loans, with some positive outcomes, but is yet to demonstrate sustained success.  
378 Similarly, Africa CDC has recently established Regional Integrated Surveillance and Laboratory  
379 Network (RISLNET) to coordinate and integrate public health laboratory, surveillance and emergency  
380 response assets, and to support prevention, rapid detection and response to current and emerging

381 public health threats within defined geographic regions of Africa.<sup>51</sup> RISLNET facilitates close  
382 networking among NPHIs, academic institutions, public health laboratories and veterinary networks  
383 for the development and implementation of regionally appropriate plans for health security.  
384 Currently, this is financed by the World Bank's Africa CDC Regional Investment Financing Project but  
385 to sustain and build on its success, initiatives like RISLNET need further financing support from AU  
386 member states themselves.

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

393 In response to this challenge, the World Bank established the Pandemic Emergency Financing Facility  
394 (PEFF)<sup>53</sup> as a mechanism to quickly release funds to the poorest countries in the event of a pandemic.  
395 By using pandemic bonds, the World Bank has brought in money from private investors, with the  
396 private sector taking on the pandemic risk, and donor countries paying the interest of 10-12% each  
397 year that is paid to investors for assuming this risk. During the COVID-19 pandemic, the PEFF insurance  
398 window (which gives coverage of up to \$500million) was used with modest success, for the first time,  
399 to allocate \$195.84 million to 64 countries in April 2020 – a paltry sum given the significant ongoing  
400 costs associated with the pandemic response. In contrast, the WHO's COVID-19 Response Fund, which  
401 relies on voluntary contributions from governments and other agencies, had estimated a need for  
402 \$1.96 billion, received \$0.99 billion and was awaiting \$544 million [as of July 2022].<sup>54</sup> One of the  
403 difficulties in relying on the private sector to finance global health security, is that the predetermined  
404 disbursement criteria depend on the Bank's contract with private investors and their priorities, rather  
405 than measures of impact on the population.<sup>55,56</sup> Given the lack of transparency on these contracts,  
406 and the fact that any associated surveillance or modelling may be considered proprietary, it is difficult  
407 for professionals or civil society to challenge these decisions.

408 The African Risk Capacity (ARC), established by the AU in 2012 as an index-based weather risk  
409 insurance pool and early response mechanism that combines the concepts of early warning, disaster  
410 risk management, and risk finance, is similar to the PEFF in that it offers coverage for emergencies.  
411 Unlike the PEFF, it requires AU member states to complete a 9-12 month capacity building programme  
412 in order to meet the eligibility for coverage, thus helping countries to both prepare and respond to  
413 disasters. Despite disbursement criteria that are informed by risk modelling, the ARC has shown it can

414 be swayed by political and civic pressure; in 2016, after significant delay it paid out \$8 million to  
415 Malawi despite an initial decision of no pay-out.<sup>57</sup> This delay of funding can leave communities  
416 devastated in the immediate aftermath of a disaster, highlighting the importance of both technical  
417 and community-based input into any financing mechanisms and the need for agile forms of payment  
418 release across hazard/emergency categories (see Box 3).

419 In Case Study 3, we outline the impact of concurrent emergencies, the desert locust infestation and  
420 the COVID-19 pandemic on communities in Africa and Asia. The cost of recovery has been estimated  
421 to be as high as \$8.5 billion,<sup>58</sup> with a tiny fraction of this received so far. Given the damage acute health  
422 emergencies can inflict on already overwhelmed health systems, poor and unsustainable recovery  
423 efforts in regions already suffering from other chronic emergencies such as food/nutrition insecurity,  
424 only increases the vulnerability of these systems to further fracture and collapse. As described in paper  
425 3 of this series, the importance of evaluating co-benefits and the potential trade-offs of investments  
426 and financing becomes even more critical in calibrating the response to multiple, concurrent  
427 emergencies and should be integral to the eligibility assessment criteria used for the release of such  
428 funds (see Box 3).

429 Despite many financial innovations and instruments existing for pandemics, most do not strengthen  
430 prevention and preparedness for crises. This challenge is acknowledged by the World Bank's  
431 International Development Association (IDA) and its Crisis Response Window (CRW) which proposes  
432 to "pivot to prevention (when crisis risks can be mitigated) and preparedness (when they cannot)".  
433 Importantly, IDA includes climate change mitigation as one of its five priorities, and promotes  
434 investment in public health infrastructure.<sup>59</sup> Another key challenge in prioritising prevention,  
435 mitigation and preparedness activities, is that if cheap resources are available after a crisis, this may  
436 actually lead to a perverse incentive against spending scarce domestic resources on these areas.<sup>60</sup>  
437 Proponents of a new pandemic preparedness treaty emphasise the potential opportunity of explicitly  
438 creating a clear global financial mechanism in a specialised binding instrument for pandemics,  
439 although the potential for such a mechanism to sit outside of the WHO once again raises concerns  
440 about the ongoing fragmentation of global health financing and governance.<sup>61,62</sup> For its part the World  
441 Bank, in response to the COVID-19 pandemic, has recently announced the launch of a Financial  
442 Intermediary Fund (FIF fund) for Pandemic Prevention, Preparedness and Response.<sup>63,64</sup> Touted as its  
443 bold new instrument for supporting UN Member States to build relevant health security capacities,  
444 this multi-billion USD facility again promises to adopt a One Health approach (not dissimilar to the  
445 REDISSE fund) – as with past initiatives the details of the eligibility criteria, the associated  
446 conditionalities and the structures (loans, grants etc) and agility of the instrument will ultimately  
447 determine its success or lack thereof.

448 Spending on prevention and preparedness is associated with a high cost-benefit ratio. It has been  
449 estimated that a yearly investment in animal and human health of \$1.9-3.4 billion would generate \$30  
450 billion of savings each year.<sup>48</sup> This potential saving is likely to be an underestimate given the  
451 astronomical economic impact of COVID-19; for comparison, the European Union's post-pandemic  
452 recovery fund is €2.02 trillion (or \$2.06 trillion), and still considered to be insufficient for the level of  
453 damage.<sup>65</sup> Importantly, there is an urgent need to make the economic case for investment in  
454 environmental and wildlife health, including climate change mitigation. As our case studies have  
455 shown, the acute crisis often masks the underlying environmental issues and upstream determinants.

#### 456 **The way forward**

457 The global governance of One Health is plagued by the same sectoral, institutional, political and  
458 financial inefficiencies and power imbalances that the global health sphere has yet to successfully  
459 tackle. However, these challenges in combination pose a greater barrier to coalition-building between  
460 human, animal and environmental health that sits at One Health's core. Without increasing  
461 involvement of environmental health practitioners, wildlife biologists, economists, social scientists,  
462 legal expertise, as well as researchers and practitioners from low-income countries, marginalised  
463 communities and society as a whole, key areas of focus will be missed. This includes the ecological  
464 drivers of emerging/re-emerging and endemic infectious disease, the benefits reaped through rapid  
465 flexible financing measures, the need for long-term cost-effectiveness studies of One Health, and the  
466 acknowledgement that until One Health is perceived as locally-driven and locally-understood, it will  
467 remain as part of a prescribed 'globalist' package. Our recommendations (see Box 4) outline  
468 mechanisms for addressing the inequality currently built into the global multilateral system, for  
469 example leveraging non-health treaties in the trade and environmental sectors to achieve positive  
470 externalities in health or using regional bodies to share the responsibility and commitments of  
471 investment without the loss of locally-responsive processes. These mechanisms, however, require  
472 significant investment in capacity-building in technical, legal and political spheres for the successful  
473 translation into One Health practice. Above all, commitments must be tangible, proactive, grounded  
474 in equity and sustained.<sup>11</sup> They must reflect in their obligations the very real threat that hazards across  
475 the whole SES pose, both in generating and amplifying global health emergencies, and through their  
476 debilitating effect on the resilience of all living species and the planet.



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487

488 **DECLARATION OF INTERESTS**

489 All authors have an interest in One Health. All authors declare no conflicts of interest. The views and  
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491

492

493

494 **BOX 1: DEFINITIONS AND KEY CONCEPTS**

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

496 **'Global Governance'**: The non-hierarchical co-ordination system in place, which uses various  
497 mechanisms such as legal, financial, political, diplomatic, technical and normative, and public (civil  
498 society and media) to support activities. Global governance 'with a purpose' is defined as "a system  
499 of rules, processes and institutions which functions and operates at the global level and provides the  
500 frame within which actors interact and take decisions on priorities and direction."<sup>13</sup>

501 **'Global Governance for Health'**: Refers mainly to "those institutions and processes of global  
502 governance which do not necessarily have explicit health mandates, but have a direct and indirect  
503 health impact, such as the United Nations, the World Trade Organization or the Human Rights  
504 Council".<sup>13</sup>

505 **'Good Governance'**: That which champions the principles of equity, inclusive participation,  
506 transparency and accountability.<sup>66</sup>

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

515 **'Environment'**: Refers to the surroundings and resources required for human living, and thus is  
516 human-centric

517 **'Ecosystem'**: Refers to the living organisms and physical environment, and their interactions together  
518 in a system, and is therefore more bio-centric

519 **'Zoonosis' (and 'anthropozoonosis')**: an infection naturally transmitted from animals (animal  
520 reservoir) to humans in an ongoing fashion (or from humans to animals; anthropozoonosis). The  
521 animal reservoir may be domesticated (e.g. livestock), as is the case in the majority of zoonoses, or  
522 wildlife. The majority of these pathogens are bacterial in nature but they may be viruses, fungi,  
523 parasites or prions.<sup>67</sup>

524 **'Emerging infectious disease'**: A disease that has appeared and affected a population for the first time,  
525 or has previously existed but is rapidly spreading, either in terms of the number of people infected, or  
526 its existence in a new geographical area.<sup>68</sup> Thus, the term is vague and needs re-examination<sup>2</sup> as it

527 includes all novel pathogens, re-emerging pathogens, known pathogens emerging in new geographies  
528 and variants on pathogens detected, as with antimicrobial resistance. The majority of emerging  
529 infectious diseases are of animal origin, and often from wildlife (“spillover”), with the risk greater in  
530 areas with an interface between humans, livestock and wildlife.<sup>67</sup>

531

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

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

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

558 As COVID-19 has shown, times of acute crisis can provide the political impetus and pushback in an  
559 uneven multilateral system, potentially influencing international customary law. India and South

560 Africa's application for IP waivers relating to COVID-19 technologies in late 2020, supported by the  
561 majority of countries was stalled at the WTO with fierce opposition from the EU and UK in particular.  
562 The argument put forth by opponents of an IP waiver is that mechanisms such as 'compulsory  
563 licensing' are already available to improve access to medicines under TRIPS. However, the history of  
564 compulsory licensing use would suggest that it remains a complex and administratively burdensome  
565 procedure (particularly for medicines-for-export), with limits on marketing exclusivity and data-  
566 sharing, and an inability to address technology transfer. Examples of these issues are outlined in Case  
567 Study 1. In contrast, an IP waiver would overcome many of these issues, without the delays of  
568 individual product-by-product compulsory licensing and the procedural burdens linked to exporting  
569 to countries with limited manufacturing capacities.<sup>77</sup>

570 The WHO, Government of Costa Rica, the Medicines Patent Pool and other partners have launched  
571 the COVID-19 Technology Access Pool (C-TAP), initially intended to support technology transfer,  
572 expanded manufacturing and access to medical tools in LMICs.<sup>78</sup> The first and only licensing  
573 agreement, since it was established in 2020, has been for COVID-19 serological antibody technology  
574 from the Spanish National Research Council, under a global, non-exclusive and transparent voluntary  
575 license.<sup>79,80</sup> Whilst this is a promising move from the public sector, it must be accompanied by a call to  
576 encourage large corporations to do the same.

577 The momentum around the TRIPS waiver, technology transfer and compulsory licensing may provide  
578 the 'window for opportunity' to invest and scale up local and regional manufacturing capacity in  
579 LMICs; over time, this may guarantee both a reliable local supply and bargaining power on the global  
580 stage. Meanwhile, countries should not expect this opportunity to last forever in an increasingly  
581 complex web of trade relations, intellectual property law and innovative R&D elsewhere.<sup>81,82</sup>

582

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

585 Food security and food safety globally remains a major risk to global health security – in 2021, 345  
586 million people were acutely food insecure (a rise from 135 million in 2019) across 55  
587 countries/territories and globally hunger has risen to 828 million people worldwide.<sup>83</sup> This has been  
588 further exacerbated over 2022 with food price rises as a result of war in Ukraine. Access, availability,  
589 safety and nutritional values of food provisions show substantial variations across regions,<sup>84</sup> and are  
590 susceptible to conflict, insecurity and economic shocks, as well as events such as drought, the desert  
591 locust plague and COVID-19. As such, recovery funding must take into account the nature of these  
592 concurrent crises, and the vulnerabilities they amplify. This should consider the calls that have already

593 been made to embed food security in social protection systems in food-crisis prone countries, to  
594 preserve critical humanitarian support, to scale up support for supply chain stability and to continue  
595 to monitor food security in 'real-time'.<sup>84</sup> Multilateral mechanisms that provide resources directly to  
596 states should allow them to adapt response funding, from previous and current crises to address  
597 overlapping ones. Recovery should be holistic, with coordinated measures across regional and global  
598 structures that govern agriculture, food security, climate change and trade.<sup>3</sup> At national levels, this  
599 will require local ministries to work together on cohesive government food security and safety, and  
600 health security strategies, strengthened by One Health links that already exist between agriculture  
601 and veterinary medicine, and where new links integrating human health practitioners, environmental  
602 scientists, meteorological services and social scientists can develop as well. Pegging these strategies  
603 against human nutritional outcomes, as well as animal health, climate change mitigation and  
604 economic outcomes, will ensure alignment and synergy towards true One Health, taking into account  
605 the momentum and the range of the Sustainable Development Goals (SDGs).<sup>3</sup>

606

Recommendations	Explanatory Notes
<p>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</p>	<p>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,</p>
<p>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</p>	<p>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</p>
<p>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</p>	<p>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.</p>
<p>Recommendation 4: Strengthen the legal expertise and bargaining power of small states and low- and middle-income countries (LMICs) through improved use of non-health legal instruments, opportunistic use of</p>	<p>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</p>

<p>emergency provisions and pooled resources at the regional level.</p>	<p>threat of a compulsory license and d) case studies and customary laws around the world that can galvanise proposals in LMICs (e.g. deaths linked to air pollution in HIC)</p>
<p>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</p>	<p>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.</p>
<p>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.</p>	<p>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.</p>
<p>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</p>	<p>This can be facilitated by HEIDI (the Health and Environment Interplay Database),<sup>28</sup> 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)</p>

<p>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</p>	<p>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.</p>
<p>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</p>	<p>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.</p>
<p>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</p>	<p>Addressing the wider vulnerabilities amplified by the COVID-19 crisis, such as food security, by using re-directed 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</p>
<p>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</p>	<p>Addressing the wider vulnerabilities amplified by the COVID-19 crisis, such as food security, by using re-directed 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</p>



	<p>as well. New instruments like the World Bank FIF-fund<sup>63,64</sup> should consider carefully how to make such instruments sufficiently agile and flexible while adhering to principles of good governance and accountability.</p>
<p>Recommendation 12: Assess and appraise existing and proposed global legal and financial health security instruments against a framework of One Health principles.</p>	<p>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<sup>11</sup></p>

608

609 **CASE STUDIES**

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

611 Compulsory licensing is a legal way of expanding access to medicines under TRIPS.<sup>82</sup> It involves the  
612 issuance of a license by a government for a third-party manufacturer to develop generic equivalents  
613 of patented pharmaceutical products. This usually occurs in the interest of public health during a  
614 health emergency or due to unreasonably high prices for in-demand patented drugs. Historically, the  
615 majority of successful attempts to pursue compulsory licensing has been for the supply of  
616 antiretroviral medications for the treatment of HIV/AIDS in LMICs.<sup>85</sup> Even when compulsory licensing  
617 fails to materialise, attempts to pursue it directly by government or through pressure from non-  
618 government entities, can still yield positive results; this can include successful price negotiation with  
619 the original holders of the patent, or the issuance of a ‘voluntary’ license instead.<sup>69</sup> Nonetheless, the  
620 law is designed in favour of strong patent protection and tends to favour alternative outcomes to  
621 compulsory licensing at all costs, including price negotiation or even legal action at international level.  
622 <sup>81,86</sup>

623 As the COVID-19 pandemic has shown, the pharmaceutical industry’s argument that compulsory  
624 licensing and intellectual property (IP) waivers reduce incentives for future drug development does  
625 not always stand. In particular, COVID-19 vaccine development was a direct result of investment and  
626 breakthroughs from publicly-funded academic institutions (e.g. the US National Institutes of Health  
627 and Oxford University) with most of the risk borne by the public sector, and taxpayers.<sup>87,88</sup>  
628 Furthermore, the private sector was protected from this risk through guaranteed purchasing of  
629 developed vaccines and indemnified by governments against legal action from any adverse effects.  
630 Meanwhile, all profits from vaccine sales are awarded to the pharmaceutical companies.

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

637 For example, despite Colombia’s threats to issue compulsory licensing in 2016 for the leukaemia drug  
638 Glivec, produced by Novartis, the country opted to pursue a 44% price drop instead. Novartis claimed  
639 there were other generics freely available to the Colombian market, whilst the government claimed  
640 Novartis had thwarted those offerings through threats to sue generic manufacturers for patent  
641 infringement.<sup>89</sup> The fraught negotiations between the nation and the patent holder were mired for

642 several months; they included a formal threat of legal action against the Colombian government in an  
643 international arbitration tribunal for breach of a separate investment treaty with Switzerland, as well  
644 as an indirect suggestion by concerned embassy officials in the US that such unilateral moves could  
645 threaten the US-backed Paz Initiative peace efforts, an upcoming bilateral free trade agreement and  
646 Colombia's ascension to the OECD.<sup>89,90</sup> Under such pressure, and the potential loss of \$450 million,  
647 Colombia had to yield.<sup>90</sup>

648 Despite its experienced pharmaceutical sector and strong legacy of generics production and export,  
649 even India has only once issued a compulsory license for domestic use. Although it can make good on  
650 any of its threats to produce a generic product, pressure to fully comply with wider IPR systems and  
651 to maintain a predictable investor- and research-friendly economy, has resulted in infrequent  
652 attempts at compulsory licensing.<sup>91</sup>

653 Perversely, the race for treatment for COVID-19 has seen several developed states attempt to secure  
654 the patented anti-viral Remdesivir for their populations through legislation that aims to facilitate  
655 compulsory licensing; sometimes, these have been the very same states that have historically warned  
656 against its use.<sup>82</sup> This begs the question – if powerful nations are willing and allowed to undermine IPR  
657 in the interests of their public health emergencies, where and why is the line drawn for less powerful  
658 states? Incentives in the pharmaceutical industry must move beyond patent protection, and towards  
659 measures that offer compensation without threatening access to medicines. Unsurprisingly,  
660 alternative mechanisms, such as voluntary patent pools, have had limited success due to their  
661 voluntary nature and the pressure of vested interests. Clearer mechanisms for all countries to invoke  
662 their rights under TRIPS equally and fairly, and to be protected from threats of punitive actions by  
663 high-income industry stalwarts, must be ensured through both numbers, binding obligations and  
664 committed leadership.

665 The tide is slowly turning; countries such as India and South Africa who have proposed the use of  
666 certain TRIPS rights during COVID-19 times have found support from a wide range of states recently,  
667 from Bolivia to Egypt, as well as regional blocs such as the 'African Group' at the WTO. Empowering a  
668 wave of support, particularly from regional economic blocs, can apply a sense of pressure and urgency  
669 to changing the IP environment to better serve public health; today, support for the adoption of  
670 emergency IP waivers represent a key step in this direction.<sup>77</sup> Conclusively, an acknowledgement that  
671 IP must change and will change, with or without high-income players, must be boldly and consistently  
672 declared from all sides.

673

674 **Case study 2: One Health and regional health security - politics and governance of shared water**  
675 **resources in the Lake Chad Basin**

676 The Lake Chad Basin is situated in northern central Africa, centred around Lake Chad, a freshwater  
677 body providing sustenance to more than 30 million people in the populations of its four surrounding  
678 countries (Nigeria, Cameroon, Niger and Chad).<sup>47</sup> Although now partially recovered from shrinkages  
679 in size due to severe droughts in the 1970s and 1980s, pressures on local resources have intensified.  
680 This can be attributed to increased migration into the Basin (both forced and voluntary), poorly  
681 planned upstream hydrological and agricultural projects, climate change, and increasing  
682 militarisation.<sup>92</sup> An estimated 10.7 million people in the area require humanitarian assistance, with 5  
683 million acutely food insecure.<sup>47</sup> Joint management of water resources, therefore, remains of  
684 paramount importance to regional health security.

685 The Lake Chad Basin Commission (LCBC) was originally set up in 1964 to coordinate access and use of  
686 resources in and around the Lake.<sup>93,80</sup> Initially composed of the aforementioned four states, it has since  
687 expanded to include the Central African Republic (CAR), Libya and four observer states (Sudan, Egypt,  
688 the Republic of Congo and the Democratic Republic of Congo).<sup>94,95</sup> Members of the LCBC have acceded  
689 to a legally binding Water Charter in 2012 that aims to address fair water use management, establish  
690 rules for surrounding wetlands and fish stocks, maintain water quality, prevent water-related disease  
691 and ecological harm, harmonise monitoring, evaluation and communication tools, and support civil  
692 society participation in the above.<sup>96</sup> Failure to comply with the legally binding Water Charter can result  
693 in political and legal ramifications.<sup>94</sup>

694 However, the Commission has been met with political and technical limitations in its ability to manage  
695 the complex situations present in the basin area. The Commission is a political body straddled between  
696 African Union Regional Economic Communities that represent West African states (ECOWAS) and  
697 Central African states (ECCAS), and it must therefore contend with competing economic interests and  
698 limited resource pools to operate, frequently relying on funding raised through international  
699 multilateral mechanisms instead.<sup>96,97</sup> Sustainable economic development has failed to materialize and  
700 the LCBC is mainly notable for providing a high-level platform for cross-border military cooperation,  
701 including joint military efforts against militant groups such as Boko Haram, through its Multinational  
702 Joint Task Force (MNJTF).<sup>98</sup>

703 The political interest in managing the securitisation of the area reflects the interests of the region's  
704 hegemonic powers. Nigeria remains the heavyweight in the LCBC – it contributes to nearly half of the  
705 Commission's operating budget, commands the MNJTF and has supplied all nine Executive Secretaries  
706 in the Commission's history.<sup>96,99</sup> Although the LCBC is supervised and controlled by a Council of

707 Ministers, directed by Heads of State at biannual summits, its decisions are executed by a centralised  
708 Executive Secretariat, where power is ultimately rooted in the personality and agenda of the Executive  
709 Secretary themselves.<sup>96</sup> As a result, Nigeria has had key influence in policy, agendas and settlements  
710 and has historically tried to maintain that sphere of influence.

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

718 The climate-conflict trap in the region has only exacerbated governance challenges for the LCBC. High  
719 rainfall and wide temperature variability, has made it difficult for pastoralists and their livelihoods,  
720 pushing them closer to urban areas. This has brought them in conflict with farmers, or alternatively,  
721 into the arms of armed opposition groups providing the promise of financial security. Food and water  
722 scarcity is then compounded by those forcibly displaced by conflict, and by military and opposition  
723 group restrictions on the movement of peoples.<sup>92,100</sup> Failure of the state to provide basic services  
724 historically, allowing such issues to flourish, undermines the legitimacy of any future governance  
725 mechanisms in a region where social trust is weak, and corruption and human rights abuses abound.<sup>92</sup>  
726 The issues are too broad to be tackled by the mandate of the LCBC alone, which cannot provide the  
727 climate-sensitive economic packages that would improve the adaptive capacity of the local  
728 population.<sup>97,103</sup> These packages should ideally come from national ministries or regional economic  
729 bodies, though they also suffer their own funding, governance and infrastructural challenges.<sup>99</sup>

730 Despite the many challenges, the LCBC, has shown efforts to address longer-term recovery and  
731 resilience in their Regional Stabilisation Strategy.<sup>98</sup> In 2019, \$60 million was raised by UN Development  
732 Programme for the Strategy, with smaller sums of funding provided by several European  
733 countries.<sup>104,105</sup> The ultimate cost-effectiveness and co-benefits should not be ignored, where  
734 maximum yield of One Health-focussed interventions on integrated water resource management,  
735 climate resilience, social cohesion and peace-building can dramatically improve overall availability of  
736 food, healthcare and basic human rights, whilst reducing the associated expenditure in tackling  
737 conflict and insecurity.<sup>92</sup> With significantly more funds generated for a climate-sensitive and market-  
738 sensitive package of interventions, the LCBC has real potential to secure regional health security for

739 some of the world's most vulnerable communities and continue propagating the successes of both  
740 technical and political regionalism.

741

742

743 **Case study 3: No Way Out? The Overlapping Crises of Desert Locust Infestation & COVID-19 in sub-**  
744 **Saharan Africa & South-Western Asia, 2019-2020**

745 The 2019-20 East Africa and South-west Asia desert locust infestation destroyed large expanses of  
746 pasture and cropland. Although locusts do not harm humans or animals, a single 1km<sup>2</sup> swarm can  
747 decimate an expanse of crops that would have fed 35,000 people. Consequently, the recent  
748 infestation has resulted in an acute nutrition emergency and jeopardised the food security of 25  
749 million people across West Africa, the Sahel, the Greater Horn of Africa and South-western Asia.<sup>58</sup>

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

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

773 Over 1 million hectares of land has been 'treated' with ground or aerial pesticide sprays, but the crisis  
774 is far from over. The FAO has requested \$309 million from the international community to manage  
775 this issue but only \$161 million has been received so far (as of July 16 2020). The World Food

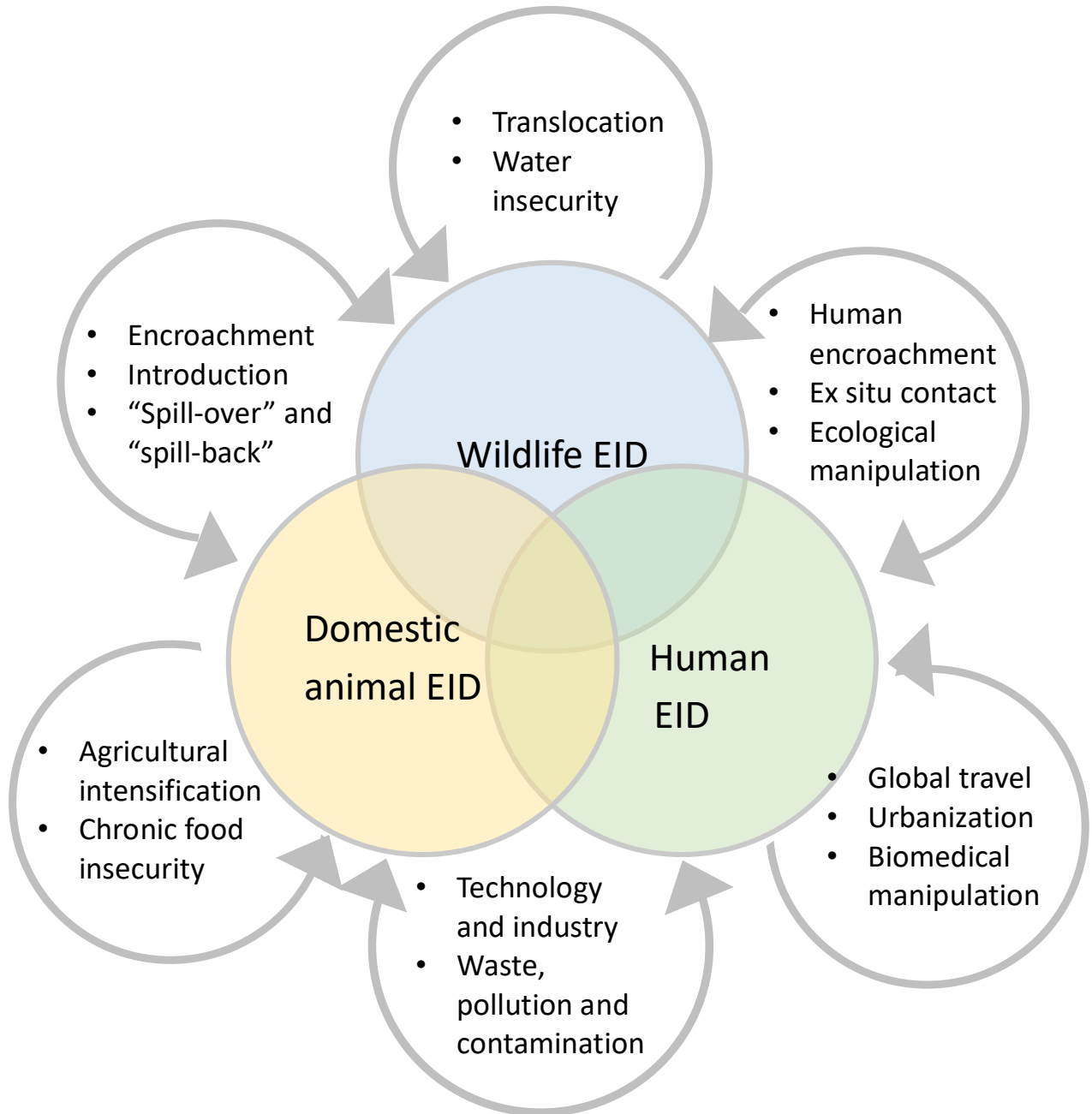
776 Programme estimates that long term recovery costs could top over \$1 billion; elsewhere conservative  
777 estimates by the World Bank for locust losses within the Greater Horn of Africa alone reach \$8.5  
778 billion.<sup>58</sup> Although the World Bank has approved \$500 million for programmes aimed at safeguarding  
779 livelihoods and promoting recovery, the ability of this financing to mitigate the long-term damage of  
780 a ‘crisis-within-a-crisis’ is low.<sup>58,107</sup> There have been some innovative local attempts at preserving the  
781 integrity of the food supply chain in the immediate, such as a successful June 2020 government-  
782 endorsed pilot project in Pakistan where local farmers were paid to collect locusts overnight for  
783 conversion into chicken feed, a project recently mimicked by a private start-up in Kenya. These  
784 initiatives remain small-scale, however, as they cannot rely on locusts collected from areas where  
785 pesticides have already been used and where cash-strapped national authorities have limited funds  
786 for reimbursing collectors.<sup>110,111</sup> They also may represent perverse incentives for ongoing crisis should  
787 they become the only route to financial support for deprived populations in times of famine or food  
788 scarcity. Second-order consequences of such ‘strings attached’ funding must be considered long-term,  
789 although they should not dissuade innovation that aims to be multifunctional and cross-sectoral in  
790 One Health. In the meantime, however, the increasing evidence of the value of direct cash transfer to  
791 vulnerable households, allowing for both flexibility and dignity in its use, should be emphasised to  
792 financial donors to ensure access to basic goods on the ground.<sup>112,113</sup> Response financing must move  
793 beyond donor targets or pre-determined thresholds set by proprietary modelling software.



794 FIGURES

795 Figure 1: Factors contributing to emerging infectious diseases in Animals (domestic and wildlife)  
796 Environment and Human populations. Adapted from Daszak et al. 2000.<sup>4</sup>

797



798 **SUPPLEMENTARY ANNEX 1**

799 **METHODS**

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

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

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

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

825 **RESULTS**

826 We identified 25 legal tools (see Supplementary Table 1), and conducted a content analysis using a  
827 governance analysis framework by Oberthür (2019),<sup>114</sup> which considers four dimensions for each legal  
828 tool: formal legal status (binding or non-binding), the prescriptiveness and precision of its language,  
829 the nature of obligations demanded of contracting parties, and the accountability mechanisms for

830 effective implementation and oversight. We explore the main themes identified and our analysis of  
831 the implications for the governance of One Health.

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

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

848 Four of the 25 legal frameworks have mechanisms to levy ‘hard’ disincentives such as economic  
849 sanctions and/or security forces, via the WTO (trade) and the UN Security Council (economic and  
850 security), as part of their breach or dispute settlement processes (see Supplementary Table 1). At the  
851 WTO for example, the mechanism available to member states is known as the Dispute Settlement  
852 Understanding (DSU) which can be used to countries who have failed to comply with the outcome of  
853 their resolution process. In 1999, the European Union (EU) refused to comply with a DSU ruling that  
854 said its ban on hormone-treated beef from the United States of America (USA) was not compliant with  
855 standards set in the Agreement on Sanitary and Phytosanitary Measures (SPS). Consequently, the USA  
856 was allowed to impose hefty retaliatory tariffs on imports from the EU at a cost of over \$110 million  
857 per year.<sup>115</sup> Countermeasures of such significant scale are rarely reflected in treaties that advocate for  
858 global public goods, such as those for human health or environmental conservation.

859 However, there are limits to the utility of legally prescribed sanctions as a coercive tool. The DSU  
860 process aims to merely establish if, and to what extent, economic harm has occurred to a member  
861 and is a mechanism that favours a select few high-income states rather than advocates for global  
862 public goods. The DSU process is costly and lengthy, and unsurprisingly, gross domestic product (GDP)

863 is a strong indicator of users of it. In the aforementioned EU vs USA dispute, the EU has refused to  
864 yield despite accusations of disguised protectionism. Where economic disincentives are touted as  
865 more likely to achieve results, therefore, these measures are not without disadvantages or limitations  
866 in their application.

867 The findings of this content analysis, combined with the literature review and discussion with experts,  
868 were used to identify and explore four key challenges focused on the global governance architecture  
869 for One Health and hard governance mechanisms, as outlined in the main text.

870

871 **Supplementary Figure 1. Comparison of conventional research and grounded theory methods**

872 **Conventional research**



874 **Grounded theory**



876 Adapted from Mediani et al. (2017)<sup>116</sup>

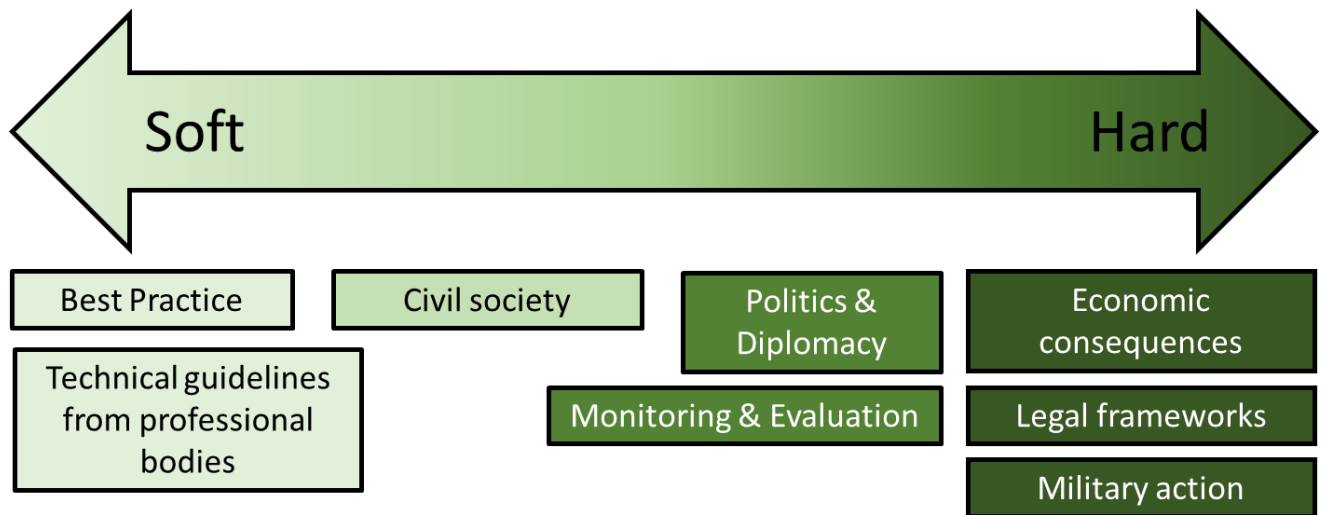
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880 **Supplementary Figure 2: Soft-Hard spectrum of governance tools**

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