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## **ONE HEALTH AS A PILLAR FOR A TRANSFORMATIVE PANDEMIC TREATY**

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## EXECUTIVE SUMMARY

Shortcomings in local, national, and global governance are recognized as key drivers of the emergence and re-emergence of diseases of animal origin, the devastating impacts of which have been highlighted by the COVID-19 pandemic. In this policy brief, we explain the pivotal role that an equity-oriented One Health (OH) approach can play in pandemic prevention and preparedness. We recommend that the OH approach be integrated into the prospective pandemic treaty, and we articulate how, by harnessing multisectoral coordination mechanisms (MCMs), a OH-informed pandemic treaty can complement and enhance connectivity among existing international agreements; advance pandemic prevention and preparedness, as well as human, animal, and environmental health more broadly; and generate significant cost-savings.

The recently initiated collaboration for OH between the OIE-FAO-WHO tripartite and the UNEP is among several high-level endeavours with the potential to cement the OH approach within global health, sustainability agendas and policies. However, OH undertakings to date have, although widely endorsed, resulted in predominantly 'soft' forms of global health governance, such as the Manhattan and Berlin Principles, as well as, more recently, several G20 declarations. Although principles, declarations, and voluntary guidelines can contribute significantly to OH institutionalization and implementation, the COVID-19 pandemic and a multitude of interlinked global health and sustainability challenges, including not only the risk of emerging and re-emerging infectious diseases, but also climate change, antimicrobial resistance (AMR), and food insecurity, underscore the urgent need for proactive OH approaches to pandemic prevention and preparedness. These proactive OH approaches must address: 1) the inherent limitations of the International Health Regulations (IHR) and existing treaties of relevance for human, animal, and environmental health, 2) challenges associated with the regulation of animal health, including with respect to wildlife trafficking and live animal markets and 3) barriers to effective legislation regarding AMR, food safety, land use, and biodiversity loss and other policy issues that impinge on pandemic prevention and preparedness.

The prospective pandemic treaty is a powerful opportunity to 1) incentivize the establishment of OH infrastructure, including integrated OH surveillance systems that, in partnership with international organisations and countries, connect and share data on infectious pathogens in wildlife, companion animals, livestock, humans, and the environment (i.e. soil and water), as well as on risk factors for disease emergence; 2) build OH capacity and pandemic preparedness monitoring and assessment into the global governance architecture, which will depend on the adoption of an inter-/transdisciplinary OH evaluation framework and methodology, including metrics for measuring OH success; and 3) help establish a permanent global One Health structure that, among other tasks, could oversee and provide technical and scientific support during treaty implementation, review and resolve evolving policy issues, and contribute to current and forthcoming pandemic protocol and guideline negotiations. In carrying out these activities, the structure would work in close collaboration with relevant initiatives such as the One Health High-Level Expert Panel (OHHLEP) and other relevant global entities. Clear financial and technical support mechanisms are necessary to ensure global solidarity and equitable allocation of resources. In this regard, we also call for OH to be fully embedded in the funding architecture for pandemic prevention, preparedness, and response.

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## 1. INTRODUCTION

The COVID-19 pandemic has highlighted the importance of the One Health (OH) approach for preventing emerging infections and better understanding their epidemiology and management. Infectious diseases that are transmitted between animals and humans, called zoonoses, can have a devastating impact on human and animal health, livelihoods, agricultural systems, societies, and economies, resulting in periods of prolonged decline and long roads to recovery (1). The drivers of infectious disease emergence and re-emergence, as well as the subsequent establishment of zoonotic agents, are complex, including shortcomings in local, national, and global governance (2).

**This policy brief demonstrates why the OH approach should be integrated into the pandemic treaty** that will be discussed at a special session of the World Health Assembly in November 2021. The brief is based on a rapid scan of relevant international treaties, agreements, declarations, and widely accepted principles, with the aim of identifying entry points for OH in the pandemic treaty negotiations.<sup>1</sup> This brief first sets out some of the basic principles of the OH approach and examines whether and how these principles are embedded in existing global governance practices and relevant international treaties and regulations. Next, it describes the OH policy elements and governance mechanisms that should be promoted as part of a pandemic treaty and explains how these would complement existing international agreements. Finally, the brief discusses key elements for global monitoring and evaluation of the OH approach. However, we acknowledge that there is no ‘one size fits all’ approach to achieving the intersectoral collaboration, resource mobilisation, and political cooperation required to operationalize OH (3).

## 2. BASIC ELEMENTS OF THE OH APPROACH

The OH approach recognizes that the health of all living organisms is interdependent, the product of connections among humans, animals, plants, and the environment they share. The COVID-19 pandemic and other emerging infectious diseases (EIDs), as well as well-established endemic zoonoses and the continuing threat of antimicrobial resistance (AMR), demonstrate the importance of the connections between the health of animals and humans, as they interact with and within their shared environment, and of the urgent need to address human, animal, and environmental health challenges holistically.

Among EIDs, up to 75 percent result from infectious agents of animal origin that may be able to infect and spread among humans (4). Population growth and the associated increasing demands for food, as well as the destructive impacts of climate change (which include, among others, scorching heat, droughts, wildfires, floods, and shifting temperatures) and the spread of foreign investment and multinational corporations, have resulted in the rapid conversion of natural habitats to agricultural land. This pushes domestic animals, humans, wildlife, and their habitats into closer and more frequent contact and conflict, heightening the risk that infectious agents from wildlife will infect humans or domestic animals, and vice versa (5). Deforestation and other land use changes also play important roles in the emergence of new infectious agents (6), including by fuelling climate

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<sup>1</sup> The rapid scan was conducted by searching for the terms “One Health”, “multisectoral” and other proxy terms for OH (see Appendix.1) in relevant international treaties, codes and regulations; assessing the context in which these terms were mentioned; and deducing lessons for a potential pandemic treaty. This was complemented with a rapid review of the academic literature on global OH implementation. Going forward, a more systematic analysis of various treaties and regulations and a more methodical scoping literature review should be conducted to better inform the prospective pandemic treaty from a OH perspective.

change, which is closely linked to the emergence, re-emergence, and establishment of infectious diseases (e.g., post-flooding cholera outbreaks and changes in parasite and vectors host ranges) (7,8), as well as an alarming loss of biodiversity (9). OH recognizes these interdependencies, promoting coordination across disciplines and sectors to better understand and manage the associated risks. While this brief highlights gaps in the application of OH, there are already examples of successful and highly beneficial OH implementation at the global level (see Box 1).

### Box 1. Example of Successful OH Implementation

The fight against highly pathogenic avian influenza is coordinated through an OIE-FAO global network of expertise on animal influenza, working to reduce the negative impacts of animal influenza viruses by promoting effective collaboration between animal health experts and the human health sector (which reports via the Global Influenza Surveillance and Response System - GISRS). The animal health community provides early recognition and characterisation of emerging influenza viral strains in animal populations and effective management of known infections, thereby better managing the risk to human health and supporting global food security, animal health and welfare, and other community benefits derived from domestic animals and wildlife (10).

The ethos that steers OH implementation includes five key principles: 1) equity; 2) holism and systems thinking; 3) inter- and transdisciplinarity, intersectorality and multilateralism; 4) intersectionality (recognition that race, class, gender, and other social identities work together to make some groups more vulnerable to the impacts of infectious disease); and 5) OH leadership and governance (11).

**At the heart of OH implementation are multisectoral coordination mechanisms (MCMs).** MCMs are any formalized, standing groups that strengthen coordination across the sectors responsible for addressing zoonotic diseases and other health concerns at the human-animal-environment interface. MCMs have routine, ongoing functions and are responsible for governing efforts among the relevant sectors to achieve jointly determined and agreed common goals (12). MCMs facilitate collaboration among and coordination of a wide range of actors, ensuring that “policy decisions are based on accurate and shared assessments of the situation; proposed regulations, policies, and guidelines are realistic, acceptable, and implementable by all sectors; technical, human, and financial resources are effectively used and equitably shared; and gaps in infrastructure, capacity and information are identified and filled” (12). Therefore, the OH approach is not only pertinent to zoonotic disease prevention and preparedness, but also to other contexts, including the human-animal-food security interface (13) and the prevention and management of non-zoonotic infections and non-communicable diseases.

Determining the financial benefits of the OH approach is challenging, not only because several sectors are affected, but also because, when successful, the approach prevents negative events from occurring. Despite the difficulty associated with estimating the value of cost-savings related to something that has not happened (i.e., a counterfactual reality), increasingly strong evidence suggests that the OH approach has important financial benefits. The World Bank estimates that, in low- and middle-income countries (LMICs) where zoonoses are highly prevalent, the amount of annual funding required to build well-functioning and integrated human and animal health systems is approximately US \$3.4 billion. This annual investment would generate 10 times the return, with estimated global annual benefits of US \$34 billion (14). In addition to these financial benefits, reducing the prevalence of zoonoses reduces indirect societal losses, including the impact of infectious diseases on the livelihoods of small producers and even entire communities, which can compromise nutrition and education and restrict trade and tourism. When included, these bring the

global costs of some recent zoonotic events, especially recent Ebola outbreaks, but also the COVID-19 pandemic which affected high income countries (HICs) and LMICs alike, up to the trillions of dollars (15). Despite this, and other evidence about the financial benefits of OH (16,17), the presence of OH norms in international treaties and investments in OH capacity to mitigate pandemic risks are still limited.

### 3. THE ROLE OF OH IN EXISTING GLOBAL GOVERNANCE ARRANGEMENTS

Despite growing attention to OH at all levels of governance, there is emerging consensus that OH principles remain insufficiently embedded in existing treaties and institutions (16), with the following limitations: 1) there is significant focus on health emergency response, but less on proactive prevention efforts at the human-animal-environment interface; 2) existing governance mechanisms are siloed, with inadequate attention to the key OH principle of coordinated multisectoral action to safeguard human, animal, and environmental health; 3) there is insufficient global solidarity, including an unmet need for redistributive mechanisms to support OH implementation in LMICs before outbreaks or other crises occur.

Since 2005, as part of pandemic influenza preparedness, there have been multiple efforts to embed OH within global institutions (18). Three institutions – the OIE, FAO, and WHO – have largely been the focus of these efforts, which began with the International Ministerial Conference on Avian and Pandemic Influenza. More recently, this tripartite has partnered with the UNEP. While this process has helped to establish OH within the global policy arena, its operational implementation remains limited. Beyond meetings, there have been few attempts to build and designate a single, global institution for OH leadership and coordination. Instead, implementation has mostly amounted to ‘soft’ global health governance, achieved through principles and declarations that are agreed upon at OH-oriented meetings (e.g., the Manhattan and Berlin Principles) (19); endorsements by international organisations, governments, and other institutional players; and, in some cases, initiation of OH ‘focal points’ within existing institutions (18). These normative commitments have not led to meaningful integration of OH principles in day-to-day practice. For example, the WHO’s *COVID-19 Strategic Preparedness and Response Plan* (20) does not mention OH and only references multisectoral collaboration once. Additionally, early in the pandemic, there was little acknowledgment or study of the potential for pathogen spillback, i.e. SARS-CoV-2 transmission back to animals, typically into new animal hosts, which can lead to viral mutation, as has now been shown to have occurred on several occasions (21).

There has been a failure to meaningfully embed the OH approach in existing global treaties with pandemic relevance. Table 1 lists some relevant treaties and regulations and highlights their limited engagement with OH (see Appendix 1 for a complete overview of the results generated by the treaty scan). This is of particular concern in the case of the IHR, which currently represents the primary legal tool to fight human infectious disease outbreaks of potential global concern. With the signing of the revised IHR in 2005, the international community agreed to improve the detection and reporting of public health emergencies worldwide, by requiring all countries to have the ability to detect, assess, report, and respond to such events. However, the effectiveness of the IHR has been called into question in the context of the COVID-19 pandemic.

Shortcomings in IHR design and implementation include the following: failure to provide timely notification of infectious disease outbreaks to the WHO (22); non-compliance with WHO recommendations during outbreak response; lack of independent mechanisms for monitoring and evaluating compliance with the IHR (23); and a lack of global solidarity, especially with respect to

the inequitable allocation of medical resources. The IHR has also been critiqued as overly reactive rather than proactive, given its focus on outbreak response more so than prevention. Some of these limitations have been acknowledged in the *Report of the Review Committee on the Functioning of the International Health Regulations (2005) during the COVID-19 Response*, presented at the 74th session of the World Health Assembly in 2021. This report notes that “[a]s we reviewed global responses to the pandemic, our Review Committee found, as had earlier Review Committees, that too many countries still did not have the public health capacities in place to protect their own populations and to give timely warnings to other countries and WHO. WHO itself, as well as other international partners, also lack capacities particularly in terms of resources” (24).

**Table 1. Relevant International Regulations and Treaties**

Treaty	How OH is mentioned	Context in which it is mentioned (or should be mentioned)	Lessons for the pandemic treaty
<b>International Health Regulations (IHR)</b>	<p>No direct references to OH</p> <p>Some reference to the zoonotic, veterinary, vector, collaboration, multidisciplinary, and multisectoral search terms</p> <p>No specific guidelines on how to implement OH or multisectoral collaboration</p>	<p>IHR are meant to increase capacity for multisectoral teams to respond to events that may constitute a public health emergency of international concern</p> <p>Voluntary OH capacity assessment can be performed as part of Joint External Evaluations</p>	<p>Pandemic treaty should facilitate more comprehensive intersectoral action at the human-animal- environment interface, including regular joint OH capacity and risk assessments</p> <p>Pandemic treaty should provide greater guidance and resources to support proactive work to prevent spillover and outbreaks</p> <p>Pandemic treaty should contain redistributive financing mechanisms for capacity building in LMICs</p>
<b>Sendai Framework for Disaster Risk Reduction</b>	<p>No direct reference to OH</p> <p>Multisectoral collaboration is discussed</p> <p>No specific guidelines on how to implement OH or multisectoral collaboration</p>	<p>Multisectoral collaboration seen as crucial in disaster response and for building people-centred, multi-hazard forecasting and early warning systems</p>	<p>The Bangkok Principles promote the systematic integration of health into national and sub-national disaster risk reduction through multi-sectoral policy coordination and a whole-of-government approach</p> <p>Although there are numerous guidelines built around multisectoral collaboration (Article 24 &amp; 27), they tend to be vague and all-encompassing, undermining momentum for implementation</p>
<b>Convention on Biological Diversity (CBD)</b>	<p>No direct reference to OH</p> <p>Reference to human health</p>	<p>Biological diversity is described as a critical element of human health; modified living organisms are described as a threat to human health</p>	<p>Limited integration of OH principles shows need for better coordination of policies across environmental and health (animal and human) sectors, including the need for better integration of OH in National Biodiversity Strategies and Action Plans</p>



<p>United Nations Convention to Combat Desertification</p>	<p>No direct reference to OH</p> <p>Multidisciplinary and integrated approaches discussed</p>	<p>The convention has a strong emphasis on collaboration at all levels, from domestic to international, and grassroots to government.</p>	<p>While the Convention is legally binding, there are no enforcement mechanisms</p> <p>The pandemic treaty should improve coordination between health and environmental sectors</p>
<p>Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)</p>	<p>No direct reference to OH</p>	<p>One mention of public health and veterinary terms, but in a context that indicates that CITES cannot overrule existing or future domestic and international measures or obligations</p>	<p>Need for increased capacity for wildlife surveillance, as few countries voluntarily feed into the OIE World Animal Health Information System (OIE-WAHIS), which is the sole standardized database for intergovernmental reporting of wildlife disease events</p>
<p>Agreement on Sanitary and Phytosanitary (SPS) Measures</p>	<p>No direct reference to OH</p>	<p>Discusses relations between human, animal, and plant health</p>	<p>Since the agreement foresees the creation of different standards and guidelines, a reference to OH at this level would provide a strong incentive for standards to search for greater synergies that could have a strong impact on early detection and prevention</p>
<p>Framework Convention on Tobacco Control (FCTC)</p>	<p>No direct reference to OH</p> <p>Multisectoral policy measures and partnerships discussed</p> <p>No guidelines on how to implement multisectoral collaboration</p>	<p>Multisectoral policy measures and partnerships seen as central to developing effective tobacco control programs</p>	<p>Article 5.2(a) of the World Health Organization Framework Convention on Tobacco Control (the WHO FCTC) requires each Party to the Convention to, in accordance with its capabilities, establish or reinforce and finance a national coordinating mechanism or focal points for tobacco control</p> <p>Demonstrates potential for OH within the pandemic treaty to act as a global complement to regional, national, and local level action for pandemic preparedness and prevention. Even before the FCTC was adopted, while the negotiations were in progress, a number of governments took action to strengthen their legislation and programs on tobacco control</p>

The IHR currently represent the main global platform for operationalizing a OH approach to prevention, detection, and control of public health emergencies of international concern (PHEIC) (25). However, the IHR do not cover OH issues comprehensively. Rather, they refer exclusively to challenges at the human-animal-environment interface in the context of collaboration between the human and animal health sectors to develop better vector surveillance systems. Global efforts to use the IHR as a driving force to better integrate OH into health security resulted in the development of the IHR-Performance of Veterinary Services (PVS) National Bridging Workshops (NBWs) (26,27). These workshops, hosted by the WHO and OIE, provide the opportunity for the animal and human health sectors to jointly review the results of the IHR MEF and PVS pathway, and to identify operational actions to address any gaps in the coordination between the two sectors for the core functions of the IHR (2005).

Other tools complement the IHR MEF, such as the *Handbook for the Assessment of IHR Capacities at the Human-Animal Interface* (28), the *WHO/OIE IHR-PVS [Performance of Veterinary Services] National Bridging Workshops*, and the *OIE Performance of Veterinary Services Pathway*, all of which create opportunities for human and animal health stakeholders to strengthen their coordination (see Table 2) (27). These tools are meant to be used in countries' planning processes and incorporated into their *National Action Plan for Health Security* to accelerate the implementation of IHR core capacities. However, a recent study found that this rarely happens in practice, as the wildlife sector is generally not considered in risk assessments and health security plans, and there is limited wildlife health and disease input into national surveillance systems (29). One study suggests that countries often overestimate their core capacities at the human-animal-environment interface when conducting OH assessments as part of the IHR MEF (25). In addition, existing OH integration tools (see Table 2) are not built into the global governance landscape through legal obligations, nor are they subject to regular OH capacity assessments. Instead, they are available to countries on a voluntary basis. This is even the case for the IHR Joint External Evaluation (JEE). **A pandemic treaty should rectify this by incentivizing the establishment of OH infrastructure and building OH and public health capacity assessments into the global governance architecture.**

A pandemic treaty is meant to complement and expand linkages between existing governance mechanisms, including with the IHR. A pandemic treaty based on OH principles would address important gaps in the IHR, especially by 1) facilitating more comprehensive intersectoral action at the human-animal-environment interface and 2) providing greater guidance and resources to support proactive work to prevent outbreaks in the first place. A treaty could establish a permanent global One Health structure (see section 4) to review and resolve evolving policy issues and to contribute to negotiations of pandemic protocols and guidelines. A pandemic treaty must clearly define its relation to the IHR, but must also reach far beyond the current scope of the IHR to establish a stronger framework for prevention and to address the OH issues that remain neglected in global health security agendas. Two examples of such issues are biodiversity and wildlife trade and surveillance (16). There has been limited consideration of their interlinkages with the IHR, with human health more broadly, or with OH operational guidelines. A recent analysis of the gaps in pandemic preparedness and prevention concluded that “despite the likelihood of devastating impacts from epidemics following a spillover event from wildlife to humans, countries are failing to address the environmental components of current health threats” (29). Most of the *National Biodiversity Strategies and Action Plans* submitted to the Biodiversity Commission, for example, failed to account for wildlife health and zoonotic disease (29). As health challenges are increasingly linked to the biological integrity of the planet, it will be crucial to strengthen inter-disciplinary and cross-sectoral approaches that address not only disease prevention but also biodiversity conservation, climate change, and sustainable development overall. A pandemic treaty should engage with existing treaties in this area, such as the Convention of Biological Diversity and the United Nations Convention to Combat Desertification.

There are multiple outstanding policy issues that have not been fully addressed through international treaties or other global governance tools, including the regulation of live, wild animal markets. Such markets are not currently regulated through any international treaty, convention, or other statute. In a recently released statement (30), the WHO, OIE, and UNEP jointly called for the worldwide suspension of the sale of live, wild mammals in traditional markets — also known as wet markets — due to the high risk that such environments pose for infectious agents to cross the species barrier, as also recently highlighted in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) workshop report on biodiversity and pandemics (16). Recognizing that these markets are an important source of food and livelihood for many and have inherent cultural value, a OH approach to regulation would incorporate mitigation measures to protect the food and economic security, as well as the cultural identity, of those affected by market closures. This is an example of the need for comprehensive, equity-based analysis and intersectoral action in pandemic prevention activities, which a pandemic treaty based on OH principles would address.

Despite some legal instruments regulating the trade of wildlife species (e.g., CITES for listed species), the health of wild animals remains largely unregulated. Except for the OIE-listed diseases, there is no requirement for international reporting or surveillance of diseases in wildlife. Countries are encouraged to contribute to the voluntary report on non OIE-listed diseases in wildlife through the OIE World Animal Health Information System (OIE-WAHIS), which is the sole standardized database for intergovernmental reporting of wildlife disease events; few countries, however, contribute information into this system (31). In 2021, the OIE initiated a Wildlife Health Framework (32) to help integrate wildlife health into OH initiatives. Implementation of this framework would benefit from synergies with other international agencies and national governments, as well as proper regulation to enforce reporting, surveillance, and data management processes. Standard surveillance systems for emerging and zoonotic agents affecting companion animals are also lacking (33). There is also a need to engage with The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to ensure that Indigenous knowledge is protected when accessing the genetic resources used in global health research (34).

Food safety and related legislation are also important contributors to OH. In particular, sanitary and phytosanitary regulatory measures are a crucial element in national OH responses. These impact international trade in food and agriculture products by applying measures to protect human, animal, and plant life or health from risks arising from the introduction, establishment, and spread of pests and diseases and from risks arising from additives, toxins, and contaminants in food and feed. At the global level, the Agreement on Sanitary and Phytosanitary Measures (SPS Agreement) provides clear rules on plant and animal health and on food safety with the aim of limiting trade distortions (35). The SPS Agreement refers to the standards, rules, and recommendations approved by three international standard-setting bodies: the International Plant Protection Convention, the OIE, and the Codex Alimentarius Commission. For animal health and zoonoses, the standards, guidelines, and recommendations are developed under the auspices of the OIE. A pandemic treaty grounded in OH principles could ensure that the SPS Agreement and other treaties and regulations governing animal and plant health are connected to those that govern human health, especially the IHR, thereby enabling stronger coordination at the human-animal-environment interface.

Finally, AMR is a critical health challenge, and because AMR stewardship is linked to effective management of potential multi-species pandemics in the near future, it should be included in a pandemic treaty. National and global implementation of OH approaches are already paving the way for integrated and successful strategies for reducing the use of antibiotics and combating AMR (36). Lessons learned from implementing OH in AMR governance can inform pandemic treaty development. Due to the momentum in discussions about AMR governance, including pre-pandemic

discussions about a potential AMR international treaty (37), the pandemic treaty will need to explore its relationship with such a treaty and ensure complementarity.

Overall, while existing treaties and regulations cover some aspects of the prevention, monitoring, response, control, and management of zoonotic diseases, the global governance architecture would benefit from an overarching pandemic treaty that addresses the gaps left by existing treaties and that ensures appropriate coordination and communication across the participants in these treaties.

**Table 2. Examples of Tools of Non-Binding Character with OH Relevance (38)**

Type	Resource
<b>OH Capacity Assessments</b>	<ul style="list-style-type: none"> <li>● <a href="#">Joint External Evaluation (JEE)</a> for the IHR Monitoring and Evaluation Framework (WHO)</li> <li>● <a href="#">Performance of Veterinary Services (PVS) Evaluations</a>, including PVS Evaluations for Aquatic Animal Health Services (OIE)</li> <li>● National capacity audits</li> </ul>
<b>Resources, Prioritization and Action Planning</b>	<ul style="list-style-type: none"> <li>● <a href="#">National Action Plan for Health Security</a> (WHO)</li> <li>● <a href="#">One Health Zoonotic Disease Prioritization Tool and Workshop</a> (CDC)</li> <li>● <a href="#">PVS Gap Analysis</a> (OIE)</li> <li>● <a href="#">National Adaptation Plans</a> (UNFCCC)</li> <li>● National Action Plans for Disaster Risk Reduction (UNISDR and UNDP)</li> <li>● <a href="#">Health Security Financing Assessment Tool</a> (World Bank)</li> <li>● <a href="#">Strategic Tool for Assessing Risk (STAR) and Vulnerability and Risk Analysis and Mapping (VRAM)</a> (WHO)</li> <li>● <a href="#">Resource Mapping tool</a> (WHO)</li> </ul>
<b>Multisectoral OH systems improvement tools</b>	<ul style="list-style-type: none"> <li>● <a href="#">IHR-PVS National Bridging Workshops</a> (WHO and OIE)</li> <li>● <a href="#">One Health Systems Mapping and Analysis Resource Tool Kit (OH-SMART™)</a> (University of Minnesota and US Department of Agriculture)</li> <li>● <a href="#">One Health Assessment for Planning and Performance (OH-APP)</a>, Multisectoral Coordination Mechanism Self-Assessment Tool (USAID Preparedness &amp; Response project and DAI Global Health)<sup>23</sup></li> <li>● <a href="#">Joint Risk Assessment Operational Tool</a> (Tripartite)</li> </ul>

#### 4. EMBEDDING ESSENTIAL OH ELEMENTS IN A PANDEMIC TREATY

OH operationalization in the context of a pandemic treaty is best understood not as a specific set of policies or activities, but as a *set of principles to guide and structure policy and actions*, including the development and implementation of practical guidelines and interventions. Specifically, a OH approach to a pandemic treaty recognizes that: 1) the health of all living beings is the result of the interaction among humans, animals, plants, and their shared environment; 2) safeguarding the rights and well-being of non-human life, including animals, plants, and the ecosystems that support all life, is essential to achieving human health and well-being; and 3) in the context of a pandemic treaty, this means adopting a OH approach during all stages of pandemic prevention and preparedness, response, and recovery.

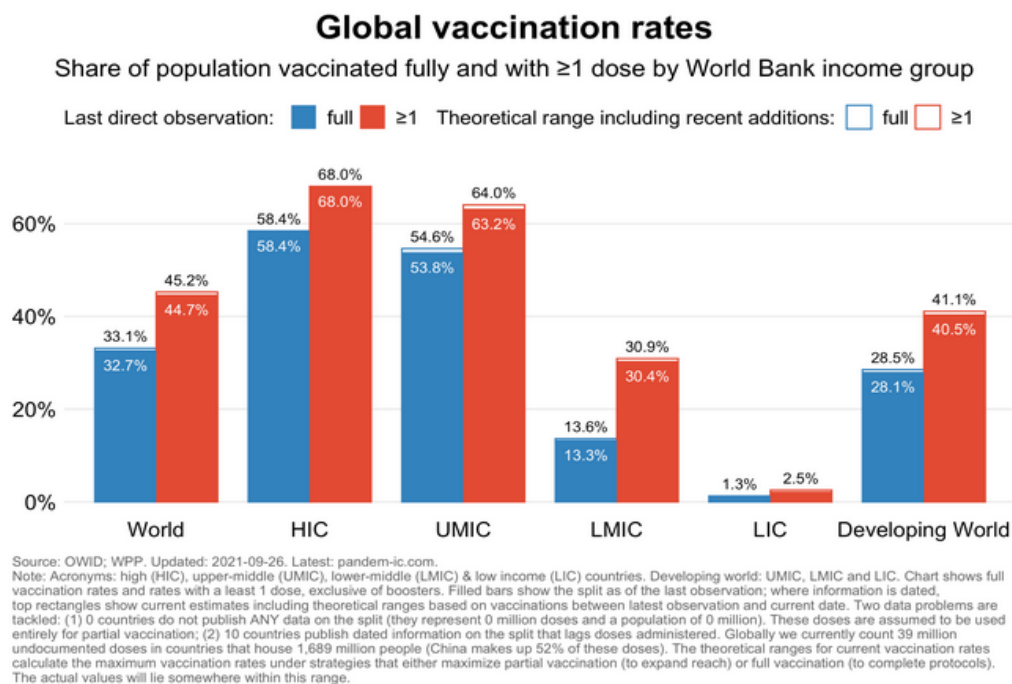
To achieve these goals, **a pandemic treaty should create (or support the creation of) a permanent global One Health structure that provides technical and scientific support in the form of guidelines and capacity building for OH implementation.** This new body could be modelled on the Science and Policy Interfaces (GPT-SPI) that exist in the environmental context (such as the Intergovernmental Science-Policy Platform for Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)), but it needs to go a step further than these by allowing for policy recommendations, OH guidelines, and external evaluation (3). As such, this permanent global One Health structure could provide policy-relevant scientific assessment of health emergencies arising from the human-animal-environment interface. It would also be responsible for developing OH capacity assessment methodology and overseeing external evaluations of OH pandemic preparedness and response capacity in member countries, including how prevention is being implemented using an integrated OH approach to health security planning. There should be integration of equity considerations in all operations, including substantive leadership representation from the Global South. The permanent global One Health structure would also develop a long-term strategic approach to reducing the risk of infectious disease outbreaks using an OH perspective. In carrying out these activities, the structure would work in close collaboration with relevant initiatives including the One Health High-Level Expert Panel (OHHLEP) and other global entities.

In the following discussion, we describe in greater detail the importance of a pandemic treaty that incorporates a OH approach in the following areas: 1) prevention; 2) monitoring and surveillance; 3) preparedness and response; and 4) economics and financing.

**Equity must be a central consideration in each of these four areas, encompassing all aspects of treaty design, implementation, and evaluation.** As COVID-19 starkly illustrates, pandemics deepen pre-existing health inequities (39), and these inequities in turn drive pandemic health outcomes (see Box 2) (3). Key equity considerations include: 1) the appropriate use, recognition, and protection of Indigenous knowledge, as Indigenous peoples have long recognized the interconnection of human, non-human, and ecosystem health; 2) the substantive, equitable inclusion of Indigenous peoples, women, LGBTQ2SIA+, minority racial and ethnic groups, and other under-represented groups in treaty design and implementation; and 3) the use of health equity impact and gender-based analysis to identify and develop mitigation plans for potentially inequitable impacts of outbreaks, and of the treaty itself, on vulnerable populations.

## Box 2. Health Inequities in Pandemic Outcomes

Despite the early COVID-19 narrative of ‘we are all in this together’, it is now clear that, while the virus does not discriminate, inequitable social structures do. For example, the US age-adjusted COVID-19 associated hospitalization rates per 100,000 persons since the beginning of the pandemic are more than times higher for non-Hispanic Blacks and non-Hispanic American Indians or Alaska Natives than for non-Hispanic Whites (40). Unacceptable inequities also exist in global vaccine governance, considering that, during the vaccine roll-out, just over 45% of the world’s population had received at least one vaccine dose by September 2021, but only 2.5% were administered in low-income countries (41).



### 4.1 PREVENTION

Prevention is at the heart of public health and the OH approach. Whereas public health acts upon the social determinants of health and the primary prevention of disease (i.e. intervention before the pathological process is initiated or an infectious agent enters a host), a OH approach uses a similar strategy, but expands it to include risk factors at the human-animal-environment interface. Indeed, a clear link between certain key drivers of environmental degradation, such as illicit wildlife trafficking and harmful land-use changes, and the increased frequency of zoonotic disease outbreaks has been established (16,42). **To reduce the impact of these risk factors, a global pandemic treaty must strengthen the coherence between existing environmental treaties and the IHR and animal health regulations, to render existing legal regimes more effective (43).**

Food systems need to be a focal point for prevention. Climate change; increasing urbanisation; agricultural intensification and the associated use of antimicrobials and genetically modified organisms; the health impacts of pesticides, herbicides, and fertilizers; human global mobility; and human population growth are all examples of closely interlinked challenges facing modern food systems. There is broad consensus that a OH approach promoting animal and plant health enhances biosecurity in food production systems. This, in turn, protects human and animal health by reducing the spillover of infectious agents (9,16,44), as well as by limiting the animal and plant diseases that impact production systems and the availability of food products (45). The possibility that SARS-CoV-2 may have initially spilled over from wildlife to wildlife farms or wildlife markets,

where biosecurity measures are often rudimentary, and the knowledge that this has been the source of previous pandemics, highlights the need for an interdisciplinary OH approach also to biosecurity, based on increasing awareness and capacity among all actors along food value chains, from the producer to the consumer.

The numerous reports of SARS-CoV-2 infecting companion animals, zoo animals, and wildlife are further examples of the failure to prevent spillover from humans to animals, once again demonstrating that pandemic prevention and response requires better coordination at the human-animal-environment interface. Since the spillover and spread of infectious agents are driven by specific key risk factors, these should be monitored such that disease emergence risk or vulnerability maps can be produced and interventions to reduce risk implemented accordingly. These risk factors might include, for example, weather conditions related to climate change; deforestation; changes in land use and distribution of animal populations; human and animal behaviour changes (possibly linked to climate change and encroachment into natural habitats); movement of animals and vectors; and food consumption behaviours. Such data could be combined with Indigenous knowledge and other situated expertise, including that contained at the community level, about the importance of these factors for the emergence, spillover, and spread of disease.

#### 4.2 MONITORING AND SURVEILLANCE

Monitoring and surveillance span the entire continuum of pandemic prevention, preparedness, response, and recovery. From a OH perspective, communication across animal, human, and environmental monitoring and surveillance systems is key. To ensure that prevention is effective, an integrated, multi-systems monitoring and surveillance system for infectious agents and their risk factors is paramount. Such systems should meet the attributes of robust surveillance systems (46) and encourage the integration of information and resources at all levels (47). **Integrated OH surveillance systems should include and connect data that identify risk factors for disease emergence in wildlife, companion animals, livestock, the environment (e.g., soil and water), and humans.** Beyond integration of surveillance data from multiple species and the environment to monitor EIDs or AMR (Box 3), there is also a need to develop a more globally integrated OH monitoring system and to ensure access to surveillance data through data sharing agreements between governments and others, including the private sector. The WHO Hub for Pandemic and Epidemic Intelligence that was launched on September 1, 2021 in Berlin represents the latest example of a collective and collaborative intelligence endeavour with a focus on reducing inequities and developing evidence-based solutions for better preparedness through open science, partnership, and solidarity. The planned collaborative efforts should lead to better data, superior analytics, and improved decision-making (48). The WHO, during the launch of the Hub, stated that the main limitation in surveillance systems currently is local surveillance capacity, which needs to be strengthened and, additionally, connected globally in an unbreakable, interlinked system (49).

##### Box 3. The Canadian Integrated Program for Antimicrobial Resistance Surveillance

The Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) represents an example of a successful OH surveillance system that integrates data from the human, animal, and environmental sectors. CIPARS monitors trends in antimicrobial use and antimicrobial resistance in selected bacterial organisms from human, animal, and food sources across Canada. It is based on several representative and methodologically unified surveillance components, which can be linked to examine the relationship between the antimicrobials used in food animals and humans and the associated health impacts. This information supports the creation of evidence-based policies to control antimicrobial use in hospital, community, and agricultural settings, as well as the identification of appropriate measures to contain the emergence and spread of resistant bacteria between animals, food, and people in Canada (50).

**A preventive approach to surveillance should also include OH risk assessment focused on monitoring the presence and distribution of infectious agents in several species and the environment to predict and prevent their spillover across species** (43). Such risk assessments could be conducted by OH expert networks, such as the WHO Hub for Pandemic and Epidemic Intelligence, and could be connected to the permanent global One Health structure that has been described above. The environment must be a key element in surveillance, because several infectious agents can survive and evolve outside of their natural hosts. Thus, monitoring their presence in key locations (for example water) can be a tool to monitor the distribution of the infection in animal species, including humans (51). An integrated surveillance system would also enable the early detection of new pathogen reservoirs after a pandemic (“reverse spillover”). Advancements in artificial intelligence (AI) tools and increasingly powerful computers capable of handling large amounts of data from a range of sources should also be used to improve our ability to detect unusual events more quickly. There is evidence that using a OH approach to diversify data sources can improve the ability of surveillance systems to appropriately and accurately rank threats by more comprehensively and extensively accounting for environmental, animal, and socio-demographic factors (52). In addition, social media data have been used to detect health emergencies and are increasingly being considered as additional sources for event-based surveillance in early warning systems (53).

#### 4.3 PREPAREDNESS AND RESPONSE

A key to successful OH preparedness includes the establishment of sustainable OH communication channels across sectors at all levels, from local communities to central governments. To facilitate communication and exchange, a sustainable and horizontal (non-siloed) OH governance infrastructure is required. Importantly, this must integrate the medical, public health, veterinary, agronomy, social sciences, and environmental disciplines and sectors, and it must include both public and private representatives. This may take the institutional form of a OH platform or other MCMs that create standing relationships and facilitate collaboration, coordination, and communication across all relevant sectors at the human-animal-environment interface, including private actors involved in OH initiatives. Just as the IHR promoted national focal points (NFPs) as a novel element of global infectious disease governance, **a pandemic treaty should promote the establishment of multisectoral OH coordination mechanisms among signatory countries to improve pandemic preparedness, including with respect to human and animal health systems strengthening**. Additionally, the treaty should offer regular tabletop exercises to assess OH governance capacities, led by the permanent global One Health structure, similar to how the IHR assess core capacity through the JEE and peer-review.

Although the public health sector has experienced something of a revival due to the COVID-19 pandemic, this primarily relates to human health. In many LMICs, veterinary health services are often limited or non-existent and, when present, they are understaffed and underfunded (54). The same is true for plant and environmental health services, which are all too often entirely absent (55). Pandemic preparedness and early response require well-functioning, integrated systems for human, animal, and environmental health. This need has been highlighted during the COVID-19 pandemic, as insufficiently integrated response systems have delayed detection and preventive measures in animal species (such as mink). Systems integration entails sharing resources, including personnel, equipment, medicines, and interventions, as well as information on disease patterns and incidence. While SARS-CoV2 circulates mostly among humans, it is easy to understand that, in the presence of a zoonotic pathogen that can simultaneously spread and cause high mortality among humans and animals, well-coordinated and integrated responses applying the OH approach are of paramount importance. Also important is the development of global medical stockpiles, which would facilitate response to human emergencies, as well as those affecting animals (from insects to



whales) and plants, including human food crops. This process should build on resilient, 'just-in-case' as opposed to 'just-in-time', procurement systems and it should encourage public-private systems-building partnerships (e.g., OH product development partnerships).

#### 4.4 ECONOMICS AND FINANCING

Global funding to promote OH and prevent the spillover of infectious agents across species is currently inadequate. This is widely acknowledged, including in a recent G20 Communiqué that calls for new investments to build OH resilience, noting that “political commitment towards higher and more sustainable investment is needed in order to best tackle the risks emerging at the human-animal-environment interface” (56). The importance of adequate financing is also recognized by several EU member states, with the Pan-European Commission on Health and Sustainable Development agreeing that it is “necessary to establish mechanisms to raise funds for global public goods [for health] and to hold countries to account for their contributions to them” (57). The G20 High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response is calling for at least US \$75 billion-worth of investment for international public funding to address the gaps in pandemic prevention and preparedness (58).

In this context, a major concern about infectious disease governance through the IHR has been **the lack of global solidarity and inequitable allocation of resources**, with states neglecting IHR obligations of international assistance and cooperation, and reverting to isolationist policies, geopolitical competition, and global neglect (22). Moreover, in many treaties, even where international assistance and cooperation mechanisms are specified (e.g., in the IHR and the Paris Agreement), these financing and aid mechanisms are: 1) not legally binding, leading to inadequate commitments of funds (as seen in the failing effort to redress global inequities in access to vaccines and essential medicines through the COVAX initiative (59)); 2) reactive, focusing on pandemic response once a PHEIC has been declared, rather than providing robust support for the implementation of prevention and preparedness measures that would prevent a pandemic from occurring; and 3) disease-specific, focused on responding to single PHEICs rather than integrated approaches to the interdependent global health challenges at the animal-human-environment interface. Therefore, establishing clear financial and technical support mechanisms will be important aspects of a global pandemic treaty regime, ideally linking funding commitments to regular assessment of the measures implemented by states. **This should include fully embedding OH in the funding architecture for pandemic prevention, preparedness, and response, which implies, for example, financing the establishment of national OH platforms and initiatives, as well as the operational costs of the permanent global One Health structure.** The funding architecture should contain a redistributive element, with HICs providing most of the seed capital. In addition, innovative funding solutions should be pursued, such as collective issuance of OH pandemic preparedness bonds (expanding current World Bank programming in the area).

Another important aspect of OH funding is the involvement of the private sector, which could contribute directly by investing in established OH funding mechanisms or indirectly by: 1) investing in OH knowledge exchange and training, thus supporting the development of academic infrastructure; 2) building OH infrastructure and capacity in affected communities, such as by supporting the establishment of OH reference centres for prevention, surveillance, and diagnosis and/or treatment; 3) participating in public-private partnerships related to OH product development and on-the-ground implementation, including vaccine development, testing capacity, and the study of risk factors to enable targeted prevention; and 4) advancing solidarity by, for example, sharing much-needed intellectual property for diagnostic tools and vaccine development. Finally, and in addition to the financial contributions already mentioned, it is essential that the private sector actively participates in ongoing and forthcoming multisectoral coordination at both national and international

levels. The road to successful prevention and preparedness for, and response to, emerging threats requires that the private sector embed OH approaches in their respective business models in the years to come.

## 5. UNIVERSAL METRICS FOR EVALUATING OH IMPLEMENTATION AND SUCCESS

The intersectoral, inter-/trans-disciplinary and multi-level nature of the OH approach can make it appear complex and difficult to assess, and implementation and evaluation challenges have been presented as barriers to operationalizing OH.

The Berlin Principles for OH (Box 4) are an important reference point for evaluation, as they offer recommendations for ten actions at the national and supranational levels of decision-making that would strengthen OH implementation (19). OH evaluation could begin by comparing the manner in which these ten principles are being implemented across a range of countries, as a basis to evaluate their OH capacities for better pandemic prevention and preparedness.

As we endure the COVID-19 pandemic and as the international community reaches consensus about the need for more efficient implementation of OH measures, it is essential to have tools that ensure that OH investments are properly evaluated and adjusted as needed. **This is why the permanent global One Health structure should adopt an inter-/trans-disciplinary OH evaluation framework and methodology that can be applied through an external review process.**

OH strategies can strengthen the protection and promotion of health ecosystems; enhance improvements to plant, animal, and human health and welfare; and contribute to more effective disease control and biosecurity, as well as to better data sharing and preparedness. As such, measuring success means addressing the contributions of OH to the wider range of social well-being and sustainability, as well as with respect to key ecological and economic dimensions, all soundly grounded in a transformative approach to governance and policy development. This requires the combination of both qualitative and quantitative metrics and their integration into existing monitoring and evaluation systems, with respect to which many of the metrics used in ecology, ecosystem management, human and animal health fields, and economics can provide valuable input. For example, the Sustainable Development Goal (SDG) evaluation systems incorporate some OH-relevant metrics, including with respect to SDG 13 (“Climate Change”) and SDG 15 (“Life on Land”). However, there are no SDGs or indicators that integrate OH sectoral synergies or ways to measure such progress. As such, OH evaluation could also integrate OH specific deliverables within relevant SDG targets, requiring countries to integrate these into existing monitoring systems and to report the impact of the multi-/interdisciplinary and multi-/intersectoral approach. It has also been proposed that the World Bank set lending and performance targets for pandemic prevention and preparedness, and that the International Monetary Fund include pandemic preparedness assessment in its existing Member States consultations, both of which are potentially relevant measures for a monitoring and preparedness framework under a prospective pandemic treaty (60).

#### Box 4. The Berlin Principles on OH

- 1) Recognize and take action to retain the essential health links between humans, wildlife, domesticated animals and plants, and all nature; and ensure the conservation and protection of biodiversity which, interwoven with intact and functional ecosystems, provides the critical foundational infrastructure of life, health, and well-being on our planet.
- 2) Take action to develop strong institutions that integrate understanding of human and animal health with the health of the environment and invest in the translation of robust science-based knowledge into policy and practice.
- 3) Take action to combat the current climate crisis, which is creating new severe threats to human, animal, and environmental health, and exacerbating existing challenges.
- 4) Recognize that decisions regarding the use of land, air, sea, and freshwater directly impact health and well-being of humans, animals, and ecosystems and that alterations in ecosystems paired with decreased resilience generate shifts in communicable and non-communicable disease emergence, exacerbation and spread; and take action to eliminate or mitigate these impacts.
- 5) Devise adaptive, holistic, and forward-looking approaches to the detection, prevention, monitoring, control, and mitigation of emerging/resurging diseases and exacerbating communicable and non-communicable diseases, that incorporate the complex interconnections among species, ecosystems, and human society, while accounting fully for harmful economic drivers, and perverse subsidies.
- 6) Take action to meaningfully integrate biodiversity conservation perspectives and human health and well-being when developing solutions for communicable and non-communicable disease threats.
- 7) Increase cross-sectoral investment in the global human, livestock, wildlife, plant, and ecosystem health infrastructure and international funding mechanisms for the protection of ecosystems, commensurate with the serious nature of emerging/resurging and exacerbating communicable and non-communicable disease threats to life on our planet.
- 8) Enhance capacity for cross-sectoral and transdisciplinary health surveillance and clear, timely information-sharing to improve coordination of responses among governments and non-governmental organizations, health, academia and other institutions, the private sector and other stakeholders.
- 9) Form participatory, collaborative relationships among governments, NGOs, Indigenous Peoples, and local communities while strengthening the public sector to meet the challenges of global health and biodiversity conservation.
- 10) Invest in educating and raising awareness for global citizenship and holistic planetary health approaches among children and adults in schools, communities, and universities while also influencing policy processes to increase recognition that human health ultimately depends on ecosystem integrity and a healthy planet.

## 6. CONCLUSION

The current pandemic treaty discussions provide an opportunity to reflect on the role that OH principles must play in predicting, preventing, and preparing for future pandemics, by working proactively to support prevention, preparedness, and response activities at the human-animal-environment interface. This brief has outlined key dimensions of the OH approach, the limited integration of OH principles into existing international treaties, and avenues for future integration into a pandemic treaty. We highlighted that existing legal instruments, such as the IHR, do not adequately address the centrality of OH for global health security; hence, there is a need for an integrated OH approach to the prevention and management of emerging infection outbreak risks. **The OH approach will bring a novel and necessary dimension to the treaty, addressing aspects of effective pandemic prevention and preparedness at the human-animal-environment interface that are not sufficiently accounted for by existing international agreements and governance systems** (16). Legal regimes linked to the work of the World Health Organization (WHO) and its OH partners – the Food and Agricultural Organization (FAO), the World Organisation for Animal Health (OIE), and the United Nations Environment Programme (UNEP) – on biodiversity, land use, and wildlife trade are important in a pandemic context, but are not at present explicitly connected to the global governance of human health. A pandemic treaty would provide the necessary formal linkages between the treaties to which all or most WHO Member States are already parties, making for an approach that is more efficient and coherent than amending existing treaties and regulations to accommodate pandemic prevention and preparedness (60). **A pandemic treaty should develop a clear set of principles for pandemic prevention and preparedness that build on the OH approach.** We also note that equity and solidarity considerations should be central to the treaty design, so that it facilitates universal access to human and animal health diagnostics, treatments, and vaccines. In the context of building global resilience for pandemics, there should be a collective effort to mobilize additional resources through OH-specific financing commitments. The inclusion of OH in a pandemic treaty will help ensure much-needed inter-/trans-disciplinary and multi-/intersectoral collaboration, but will require strong commitments to knowledge creation, as well as to OH operationalization, evaluation, and monitoring. To ensure that these ambitious goals are met, a pandemic treaty should **create or facilitate the creation of a permanent global One Health structure to provide strategic guidance on OH implementation, in close collaboration with other initiatives such as the OHHLEP. It should also ensure that OH is fully embedded in the funding architecture for pandemic prevention, preparedness, and response.**

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## APPENDIX

**Quotation Keywords:** "One Health" OR "EcoHealth" OR "Eco Health" OR "veterinary public health" OR "planetary health" OR "geohealth" OR "One world, one medicine" OR "human animal environment interface" OR "integrated approach" OR "multi-disciplinary" OR "multidisciplinary" OR "One medicine" OR "global health" OR "multisectoral" OR "multi-sectoral" OR collaboration OR "environmental health" OR "Low and Middle Income Countries" OR "High Income Countries"

**Asterisk Keywords:** zoono\* OR veterina\* OR LMIC\* OR HIC\* OR vector\* OR intersector\* OR interdisciplin\*

Treaty	How is OH mentioned?	Context in which it is mentioned
IHR (2005)	No direct references to One Health. However, the IHR contain some references to the Zoonotic, veterinary, vector, collaboration, global health, multidisciplinary and multisectoral search terms.	<p>The IHR deals with <b>vectors</b> and vector control within transportation vessels (p. 19), points of entry (p.18) and states (p. 50-51). What's of more interest is the fact that the IHR has implicit vector-surveillance systems built in in the form of Article 9 Section 2, which mandates that all state-parties must inform the WHO of vectors that may pose a health risk within 24 hours. In addition, it explicitly requires the presence of vector control personnel in points of entry (p. 42).</p> <p>In terms of <b>collaboration</b>, the IHR involves cooperation between states and WHO and other international organizations (pp. 13 &amp; 15).</p> <p>Finally, the IHR considers <b>multisectoral/multidisciplinary</b> teams to be integral to any national public health emergency response plan (p. 41) but does not actively promote establishment of MCMs.</p>
Sendai Framework	No direct references to One Health. There are two keywords in the Framework that are repeated more than a dozen times: "collaboration" and "multisectoral".	<p><b>Multisectoral:</b> This word is largely used in the context of disaster prevention (Article 27) and preparedness (Article 7). Specific sectors are not assigned responsibilities. Although there are numerous guidelines built around collaboration (Article 24 &amp; 27), they tend to be vague and all-encompassing. It appears that the majority of the specifics have been left to signatory states.</p> <p><b>Collaboration:</b> This term is used in the context of grassroots organizations (Article 24), private businesses (Article 7 &amp; 26) and international organizations (Article 28). In addition, there is a direct mention of collaboration with the IHR in Article 30. Interestingly, interstate cooperation does not seem to be encouraged, and the vast majority of such coordination occurs through the UN (Article 48c). Finally, Article 31f notes that it is important "strengthen and promote collaboration and capacity-building for the protection of productive assets, including <b>livestock, working animals, tools and seeds...</b>", which may be relevant to One Health.</p> <p>The <b>Bangkok Principles</b> promote the systematic integration of health into national and sub-national disaster risk reduction through multi-sectoral policy coordination and a whole-of-government approach</p>

<p><b>FCTC</b></p>	<p>No direct references to One Health.</p> <p>By far the most common keyword in the FCTC is “multisectoral” followed by “collaboration” and “global health”.</p>	<p><b>Multisectoral:</b></p> <p><b>Article 5.2(a)</b> of the World Health Organization Framework Convention on Tobacco Control (the WHO <b>FCTC</b>) requires each Party to the Convention to, “in accordance with its capabilities establish or reinforce and finance a national coordinating mechanism or focal points for tobacco control”</p> <p>Both <b>collaboration</b> (p. 12) and <b>global health</b> surveillance (p. 18) are also mentioned in the same context as tools through which to advance the FCTC’s goals.</p>
<p><b>CBD</b></p>	<p>No direct references to OH or above keywords.</p> <p>Two references to human health: One in the context of biological diversity as a critical element of health (p. 2); and a second warning of modified living organisms as a threat to human health (p. 6).</p>	<p>“[e]ach Contracting Party shall, as far as possible and as appropriate [...] Establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to <b>human health</b>.” (p. 6)</p>
<p><b>CBD Special Session on One Health</b></p>	<p>Direct references to OH. The other major keyword is “zoonoses”.</p>	<p>This discussion period does not make any adoptions or changes to the CBD, but it may be relevant as an indicator of the treaty’s future. Another good indicator of the CBD’s path is the “Guidance on Integrating Biodiversity Considerations into One Health Approaches” which was officially adopted by the CBD in 2018. To that end, the CBD is most certainly the most One Health progressive treaty among those listed.</p> <p>Otherwise, the discussion is not particularly revolutionary, as it discusses <b>One Health</b> and <b>Zoonoses</b> in the context of the Covid-19 pandemic.</p>
<p><b>CITES</b></p>	<p>No direct references to One Health.</p> <p>One mention of public health and veterinary terms, but in a context that indicates that CITES cannot overrule existing or future domestic and international measures or obligations. (p. 9)</p>	<p>“The provisions of the present Convention shall in no way affect the provisions of any domestic measures or the obligations of Parties deriving from any treaty, convention, or international agreement relating to other aspects of trade, taking, possession or transport of specimens which is in force or subsequently may enter into force for any Party including any measure pertaining to the Customs, <b>public health, veterinary</b> or plant quarantine fields.” (p.9)</p>
<p><b>Paris Agreement</b></p>	<p>No direct references to One Health or above keywords.</p> <p>One reference to “right to health”, which in itself could be interpreted as a health equity term. (p.1)</p>	<p>“The parties to this agreement [...] acknowledg[e] that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the <b>right to health</b>, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity...” (p. 1)</p>

<p><b>Codex Alimentarius</b></p>	<p>No current references to One Health*; numerous references to almost every other keyword on the list.</p>	<p>Due to the sheer quantity of keywords in the Codex, this section will simply give a brief overview of the Codex standards relevant to One Health.</p> <p><b>Animal Health Standards:</b> There are numerous standards in the Codex devoted to protecting the health quality of meat “from farm to fork”. These include standards on animal feed, street vending, fishing, meat processing, frog leg preparation, parasite control etc.</p> <p><b>Antimicrobial Resistance (AMR) Standards:</b> There are only two standards devoted to AMR in the codex, however they are arguably the most relevant ones in this overview. Please note that these standards will be updated very soon per Codex Commission discussions, and the update is set to be very One Health focused. The standard involves guidelines on the management of veterinary antibiotics, export and trade of antibiotics and ecological control of microorganisms (CXC 61-2005 p. 3).</p> <p><b>Pesticide Standards:</b> There are five standards on pesticides within the codex that work to regulate pesticide residues in a human (CXG 40-1993) and animal health (CXG 90-2017) context. The standards are not heavily concerned with the environment, but there is a short statement about how “[a]ll waste solvent should be stored safely and disposed of both safely and in an environmentally friendly manner..” in CXG 40-1993 page 2.</p>
<p><b>Codex Alimentarius Commission Annual Meetings 2013, 2015, 2016 and 2017</b></p>	<p>Multiple references to One Health and many other keywords such as “veterinary”.</p>	<p><b>2013:</b> The Director-General of the Food and Agriculture Organization of the United Nations, José Graziano da Silva states that the Codes should keep up with the holistic “One Health” approach (p. 6).</p> <p><b>2015:</b> One Health is presented as a possible framework to follow in combating antimicrobial resistance(AMR) (p.7).</p> <p><b>2016:</b> The WHO-FAO-OIE One Health tripartite is discussed in the context of AMR (pp. 18-20)</p> <p><b>2017:</b> “The United States of America expressed its appreciation of the tripartite One Health partnership among FAO, WHO and OIE to address AMR” (p. 17).</p>
<p><b>OIE/TAHC 28th ed.</b></p>	<p>One direct reference to One Health.</p> <p>Over 3000 collective references to the keywords “zoonotic” “vector” and “veterinary”</p> <p>Several dozen references to “veterinary public health” and “collaboration”</p> <p>Few references to “Environmental Health” and “multidisciplinary”</p> <p>It is important to note that there is a depth of potentially relevant information that could not be directly included in this</p>	<p><b>One Health:</b> The only reference to One Health can be found at the beginning of Chapter 6.2: “..the globalisation of the food supply demands a high level of engagement and collaboration between <i>Competent Authorities</i> responsible for animal health, food safety and public health, in line with the <b>One Health</b> approach”. In this case, “competent authority” refers to a government-appointed body responsible for implementing veterinary legislation and Terrestrial Code recommendations.</p> <p><b>Vector:</b> This keyword is generally used in the context of control and management. Chapter 1.5 examines ways to control arthropod vectors, particularly in the context of animal viruses such as African Horse Sickness (Article 1.7.1). Article 4.4.6 describes ways</p>

	<p>summary due to need for brevity.</p>	<p>in which a “protection zone” may be set up to isolate wildlife from nearby pathogens. Article 4.5.3 describes avian and mammalian vector control as an important portion of animal population management infrastructure. Article 7.10.4 recommends vector control as a critical part of every biosecurity programme.</p> <p><b>Zoonotic:</b> “Veterinary Authorities should use the standards in the Terrestrial Code to set up measures providing for early detection, internal reporting, notification, control or eradication of pathogenic agents, including <b>zoonotic</b> ones, in terrestrial animals (mammals, birds, reptiles and bees) and preventing their spread via international trade in animals and animal products, while avoiding unjustified sanitary barriers to trade.” (Introduction)</p> <p><b>Veterinary Public Health:</b> Chapter 6 in its entirety pertains to <b>veterinary public health</b> and relevant recommendations. This concept and its following definition is perhaps the most relevant One Health concept in the entire treaty: “<b>Veterinary public health</b> is a component of public health that focuses on the application of veterinary science and that includes all actions directly or indirectly linked with animals, their products and by-products, so long as they contribute to the protection and improvement of the physical, mental and social well-being of humans” (Article 6.1.1). Broadly, this chapter focuses on the control of vectors and zoonotic diseases; farm-to-fork food safety (Chapter 6.2), and AMR (Article 6.7.1).</p> <p><b>Collaboration:</b> Intragovernmental cooperation is heavily emphasized (Articles 8.5.1 &amp; 8.6.2). Collaboration between veterinary and health authorities is depicted as critical to success. State and Non-state organizations are also encouraged to cooperate (Article 1.4.3). Interstate cooperation is indicated to be a part of African Horse Sickness (Article 1.7.1) and bovine pleuropneumonia (Article 1.10.1) control.</p> <p><b>Environmental Health:</b> “Veterinary legislation should provide a basis for assuring the quality of veterinary medicines and biologicals and minimising the risk to human, animal and <b>environmental health</b> associated with their use” (Article 3.4.11).</p> <p><b>Multidisciplinary:</b> Mainly in reference to food safety: “Food safety is best assured by an integrated, <b>multidisciplinary</b> approach that considers the entire food chain” (Article 6.2.3) &amp; “Organisation and dissemination of information throughout the meat production chain involves <b>multidisciplinary</b> input” (Article 6.3.9).</p>
<p><b>United Nations Convention to Combat</b></p>	<p>No direct references to One Health.</p> <p>Five references to “multidisciplinary”</p> <p>Four references to “integrated approach”</p> <p>Four references to “collaboration”</p>	<p>The convention favours an <b>integrated approach</b> combining “effective action at all levels, supported by international cooperation and partnership arrangements” (Article 2). This is further expanded upon in article 4, which highlights the importance of “<b>cooperation</b> among affected country Parties in the</p>

<p><b>Desertification (1994)</b></p>	<p>Two references to “interdisciplinary”</p> <p>Overall, the convention has a very strong emphasis on collaboration at all levels, from domestic to international, and grassroots to government.</p> <p>There are three sections on financial resources: Article 20, Article 21, and Annex V Article 7. The latter is rather short and seems to act as more of a basic guide as opposed to a strong financial apparatus. The former two Articles describe a detailed, redistributive, collaborative financial framework intended to enhance drought protection primarily in Africa. This financial framework is largely led and controlled by the UNCCD Conference of the Parties. There is also mention of a “Global Mechanism” through which finance and technology transfer is intended to be enhanced, but the actual mechanism is not in the Convention.</p> <p>According to the UNCCD website, the Convention is legally binding, but we were unable to find any explicit enforcement mechanisms within the Convention.</p>	<p>fields of <b>environmental protection</b>”, in addition to addressing the “<b>biological</b>” aspects of desertification.</p> <p>There are several mentions of <b>biological diversity</b> in the Convention, one of which underlines the importance of “conservation and sustainable use of biodiversity in accordance with the provisions of the <b>Convention on Biological Diversity</b>” (Article 4).</p> <p>Article 12 states that <b>collaboration</b> should occur during technology transfer, information collection and dissemination as well as the sharing of financial resources.</p> <p>In addition to highlighting the importance of <b>multidisciplinary</b> research, Article 17 mentions the importance of “respond[ing] to well defined objectives [and addressing] the specific needs of local populations”. Article 17.c reinforces this statement by asserting that parties should “protect, integrate, enhance and validate traditional and local knowledge, know-how and practices” during the research and technology distribution process. Article 24 details the importance of <b>multidisciplinary</b> and geographically-diverse appointment of members to scientific committees.</p> <p>The convention calls for regular <b>cooperative, interdisciplinary</b> reviews of state actor capacities to combat desertification (Article 19). Article 19 also features a long section on public education and information dissemination, which is reminiscent of the knowledge sharing section in the policy brief.</p> <p>The remainder of the convention (Annex III Article 2; Annex IV Article 10; Annex V Article 5) outline intra-regional programs (e.g. Latin America and the Mediterranean) and interregional <b>cooperation</b> frameworks.</p>
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\* Only seemingly-relevant portions of the Codex were searched for this review. There may be references to One Health in portions of the Codex that have not been searched.



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