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Global governance for pandemic prevention and the wildlife trade

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Although ideas about preventive actions for pandemics have been advanced during the COVID-19 crisis, there has been little consideration for how they can be operationalised through governance structures within the context of the wildlife trade for human consumption. To date, pandemic governance has mostly focused on outbreak surveillance, containment, and response rather than on avoiding zoonotic spillovers in the first place. However, given the acceleration of globalisation, a paradigm shift towards prevention of zoonotic spillovers is warranted as containment of outbreaks becomes unfeasible. Here, we consider the current institutional landscape for pandemic prevention in light of ongoing negotiations of a so-called pandemic treaty and how prevention of zoonotic spillovers from the wildlife trade for human consumption could be incorporated. We argue that such an institutional arrangement should be explicit about zoonotic spillover prevention and focus on improving coordination across four policy domains, namely public health, biodiversity conservation, food security, and trade. We posit that this pandemic treaty should include four interacting goals in relation to prevention of zoonotic spillovers from the wildlife trade for human consumption: risk understanding, risk assessment, risk reduction, and enabling funding. Despite the need to keep political attention on addressing the current pandemic, society cannot afford to miss the opportunity of the current crisis to encourage institution building for preventing future pandemics.

Introduction

A paradigm shift for pandemic governance is required in the context of wildlife trade for human consumption (panel). International and domestic regulatory frameworks for addressing pandemics have focused more on outbreak detection, containment, and response (known as downstream prevention) than on prevention of zoonotic spillovers (known as upstream, deep prevention, or prevention at source; figure 1, panel).[2,6] However, increased human mobility through transport infrastructure, larger population centres, and expanding wildlife markets with complex supply chains (panel) reduce the feasibility of containment even when early detection occurs.[7] Thus, the risk of another pandemic, should an outbreak emerge, remains latent.[8] With signals of support from the international community for negotiating a so-called pandemic treaty,[9,10] in this Personal View we argue that such an international institutional arrangement should be explicit about prevention of zoonoses emerging from the wildlife trade for human consumption.

Despite international cooperation efforts, crucial governance gaps for addressing pandemics persist. Countries have typically developed institutional arrangements to advance specific collective action goals, causing a silo problem whereby system-wide interactions among interdependent sectors are seldom considered.[11] The origin of some pandemics reveals problems of sectoral isolation of public health, biodiversity conservation, food security, and trade within a global governance context. As an approach to break down some of those silos, One Health emerged as a policy paradigm for addressing public and environmental health that explicitly recognises the need to work across sectors.[12] Specifically, the wildlife trade for human consumption, both domestic and international (including markets and associated supply chains), is a driver of zoonoses, which can lead to pandemics.[13] As a consequence, calls for changes to the wildlife trade have been made during pandemic events,[14] such as severe acute respiratory syndrome and COVID-19, even though the exact spillover origin of COVID-19 remains debated.[15,16] Many ideas have been advanced about what should be done to prevent future pandemics[17,18] but with less consideration

Panel: Definition of key terms

Governance
The formal and informal rules, structures, and mechanisms whereby society makes decisions, enforces them, and allocates resources towards the attainment of collective action goals[1]

Pandemic prevention
Prevention of pandemics can be considered as interventions at various stages, from disease emergence, through to transmission, to spread; interventions focused on preventing zoonotic spillovers in the first place are known as deep, at source, or upstream prevention[2]

Wildlife
Animals that have not been domesticated, involving both wild-caught and farm-raised[3]

Wildlife market
Places where economic exchange for wildlife specimens occurs, which may or not include live individuals for slaughtering on premises and other types of food[4]

Zoonotic spillover
The transmission of pathogens from a vertebrate reservoir host to humans, which may or may not include human-to-human transmission thereafter[5]

Wildlife trade
Domestic and international economic exchange of wildlife whose purpose includes consumption by humans, comprising full supply chains, from harvest (which may or may not entail killing) to point of sale to consumers, including markets and restaurants[3]

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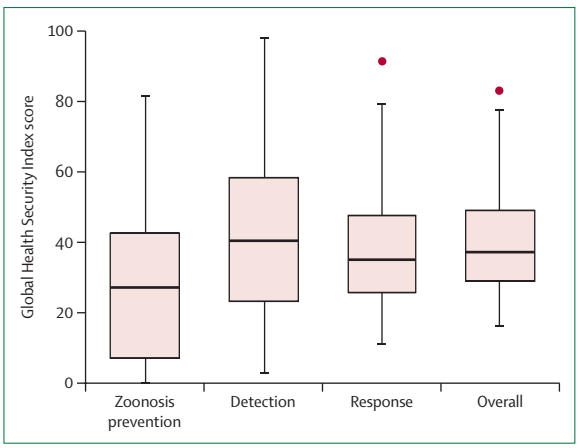

Figure 1: **Global Health Security Index scores for three categories of indicators: zoonosis prevention, outbreak detection, and outbreak and pandemic response**
Scores range from 0 to 100, with the highest being the most adequate capacity and the lowest the least adequate; assessment includes 195 WHO member states.

given to the governance mechanisms required to operationalise such a goal, let alone within the specific context of the wildlife trade for human consumption.[19]

As the drivers and negative effects of the wildlife trade and potential zoonoses emerging from it can extend beyond single countries, addressing these requires governance mechanisms that are international and multisectoral. For instance, the wildlife trade for human consumption, driven by domestic and international demand, can lead to population declines of species,[20] even to extinction,[21] whereas zoonotic spillovers can lead to pandemics.[22] Within this context, we argue that global health governance, global biodiversity governance, global food governance, and global trade governance should be more effectively coordinated if pandemics are to be prevented (figure 2). Here, we consider the current landscape of institutional arrangements and mechanisms for pandemic prevention in light of calls to potentially negotiate a so-called pandemic treaty,[9,10] and propose institutional design principles that could play a central role in fostering coordination across those four policy domains through specific goals for preventing zoonotic spillovers from the wildlife trade for human consumption.

We chose to focus on the wildlife trade for human consumption as it is a plausible cause of the COVID-19 pandemic[16] and other zoonotic outbreaks over the past couple of decades, such as severe acute respiratory syndrome.[13] Consequently, we exclude here other zoonotic drivers of pandemics that are also important,[23] such as land-use change, domestic animal production, and the wildlife trade for purposes other than for human consumption (eg, pet trade or traditional medicine). Although our insights of institutional design could also be applied to these other drivers of pandemics, they would need to be tailored and, hence, considered in their own right due to variation in their biological and socioeconomic mechanisms as well as institutional frameworks. The exclusion of other zoonotic drivers in this Personal View reflects an analytical approach rather than empirical reality, as some of those can interact with the wildlife trade for human consumption.

Conceptualising zoonotic disease emergence from the wildlife trade as a collective action problem

Public health is a public good, wildlife is a common-pool resource in most parts of the world, and zoonoses are a negative externality that can stem from the wildlife trade for human consumption, compromising public health and, in turn, economic activity. One challenge arising from the causal linkage between wildlife trade and zoonoses is the disconnect in how incentives are structured, because the wildlife trade is a collective action problem in its own right but can generate a problem that spills well beyond resource users. In turn, zoonotic diseases can be conceptualised as a negative externality in economic terms, which requires institutional responses to be corrected. What makes this problem of collective action different is that environmental or collective action problems usually stem precisely from the cumulative effects of the individual choices of many actors, as is the case with marine debris and climate change. Conversely, pandemics of zoonotic origin are not the result of cumulative effects per se but rather can be conceptualised as punctuated effects enabled by wildlife trade driving health risk transfer. Furthermore, in the case of pandemics driven by zoonoses emerging from the wildlife trade, it is a problem that can spread internationally but that originates in the individual choices of a small subset of people or actors in some particular regions of the world. Although zoonoses pose an imminent risk to individuals along the supply chain, their likelihood of emerging from the wildlife trade is usually low (but can be catastrophic) and as a result individual risk perception might not be enough to induce behaviour change.[24] Uncertainty plays a key role, since it is usually not certain when wildlife trade will result in a pandemic event should a zoonotic outbreak occur.[25] Many such outbreaks might remain localised and contained although others might not, thus becoming a pandemic.[26]

Global governance of public health, biodiversity conservation, food security, and trade

Global health governance, global biodiversity governance, global food governance, and global trade governance present similarities in their practice and scholarship insofar as each of them focuses on their role in addressing collective action problems that countries cannot solve unilaterally.[27–30] The systems of governance across these four policy domains have emerged since, at least, the early 1900s and became cemented with the creation of the UN after World War 2. At the heart of these four governance systems are institutional arrangements dominated by

the nation-state, whereby countries typically enter international institutional arrangements, such as agreements, treaties, and conventions. The core institutional arrangements for each issue area (within the context of pandemic prevention focused on the wildlife trade for human consumption) include: WHO and World Organisation for Animal Health (WOAH) in the case of public health; the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Migratory Species of Wild Animals, and the Convention on Biological Diversity in the case of biodiversity conservation; the Food and Agriculture Organization of the United Nations (FAO) in the case of food security; and the World Trade Organization in the case of international trade. Furthermore, additional topical and regional international institutional arrangements exist in all four policy domains. Over time, actors beyond the nation-state (eg, non-state actors and subnational governments) have become more actively engaged across all four governance systems.

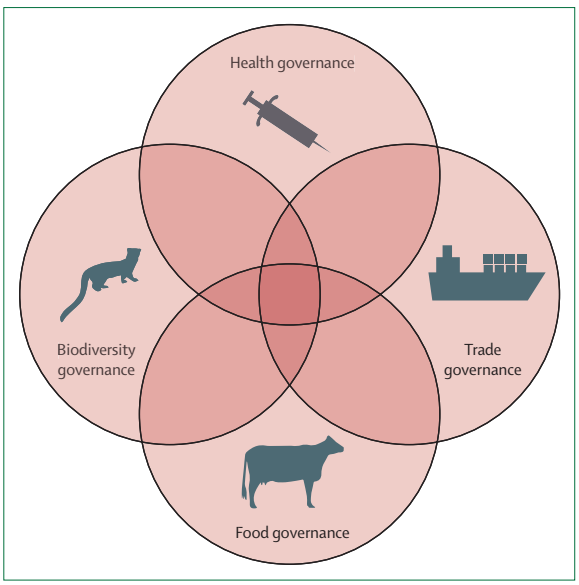

Figure 2: **The governance response to prevent pandemics caused by the wildlife trade lies at the intersection of four governance systems**

Evidence of silos in the current institutional landscape for pandemic prevention

The creation of separate silos for the global governance for public health, biodiversity conservation, food security, and trade has resulted in gaps regarding zoonosis prevention emerging from the wildlife trade. The gaps are evident from the absence of international institutional arrangements that straddle both human health and biodiversity conservation in their mandate;[31] public health prescriptions (ie, International Health Regulations) under WHO that are exclusively focused on the containment of zoonotic outbreaks, not on prevention at source;[32] no interinstitutional arrangements between CITES and WHO;[33] and limited mandate of CITES at the outset of the COVID-19 pandemic meaning that zoonoses were not only not considered but explicitly deferred to other institutions that belong to public health (ie, WOAH) and food security (ie, FAO).[34] However, the WOAH is primarily focused on livestock health (ie, Terrestrial Animal Health Code) with less consideration for wildlife health, the FAO's voluntary prescriptions for food hygiene (ie, Codex Alimentarius) do not explicitly consider the wildlife trade, and the World Trade Organization's Agreement on the Application of Sanitary and Phytosanitary Measures is underpinned by WOAH's and FAO's already mentioned prescriptions, rendering it of little use in reducing the risk of zoonoses driven by the wildlife trade.

Looking ahead for pandemic prevention

The road to an international institutional arrangement for pandemics

Despite some international institutional arrangements being in place to address pandemics (including downstream and upstream prevention through various mechanisms, such as the International Health Regulations[35] and the Quadripartite Partnership on One Health[36]), a new coordinating institutional arrangement, the so-called pandemic treaty, is under consideration by the international community but is not without challenges. Although negotiating new international institutional arrangements can be costly and lengthy,[37] there is also precedent for relatively rapid negotiations.[38] Furthermore, the potential negative consequences of another pandemic are probably too great to abandon the possibility of developing a new institutional arrangement. Like other policy domains with systems of multiple institutions, such as climate change and refugees,[39,40] a new pandemic instrument could become the core institutional arrangement of the pandemic governance system. A pandemic treaty was first proposed by the Government of Chile in April, 2020, and, after over a year of consideration at various policy forums (figure 3, appendix pp 2–4), garnered support from 61 countries, the European Council, and WHO (figure 4, appendix pp 5–7). This initiative was subsequently endorsed by the World Health Assembly at a special session held between Nov 29 and Dec 1, 2021, through a consensus decision among WHO's 194 member states, whereby a global process was launched to draft and negotiate a convention, agreement, or other instrument on pandemic prevention, preparedness, and response under the WHO aegis, referred to as a pandemic treaty.[42] The negotiation and drafting process for this pandemic treaty has now officially been launched and is underway with the leadership and purview of the Intergovernmental Negotiating Body, with a target for final consideration by the World Health Assembly in May, 2024 (figure 3).[43] The drafting and negotiation process has not started without challenges, as tensions between globalism and state-centrism have emerged whereby an international instrument for pandemics is perceived as a much-needed

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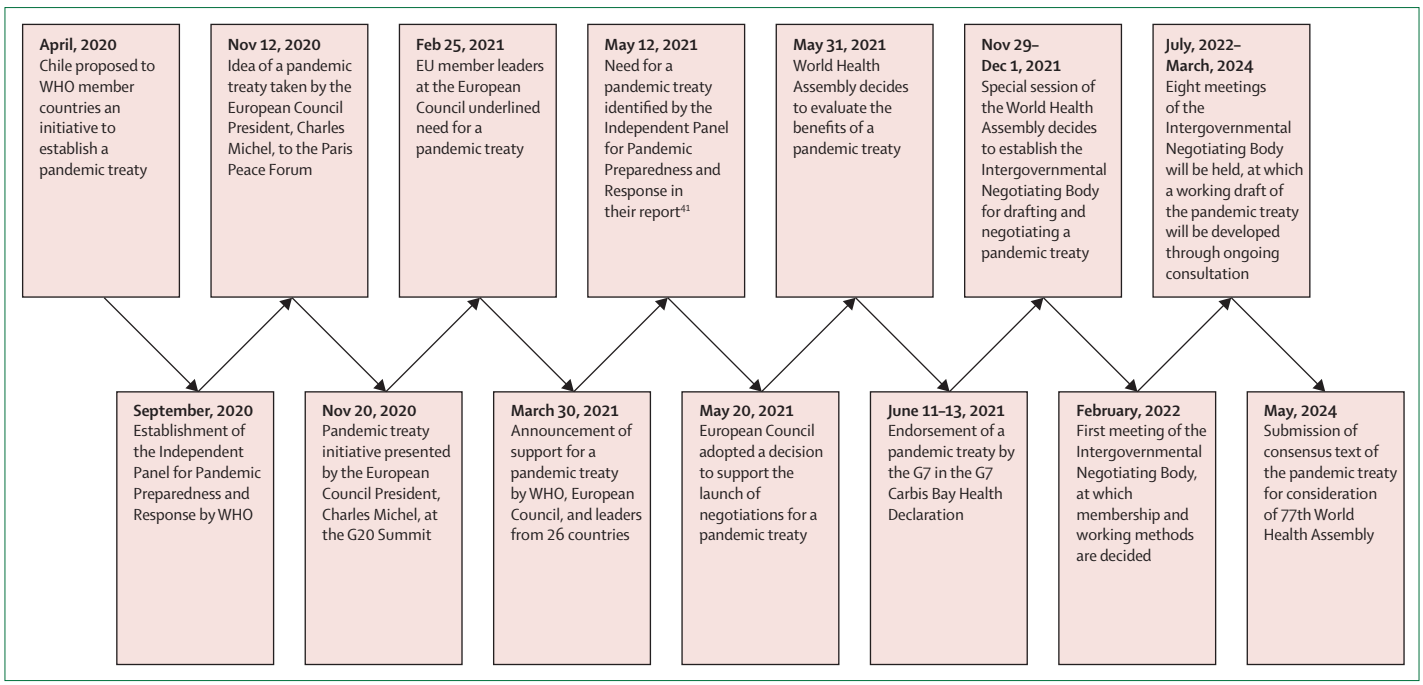

Figure 3: **Timeline of key events through which a so-called pandemic treaty has been proposed, promoted, and negotiated at international policy forums**

solution but also as potentially undermining national sovereignty.[44–46] Notably, the Global North and Global South divide has also emerged, as high-income countries continue to push for inclusion of comprehensive surveillance, reporting, and pathogen sharing by low-income and middle-income countries but with little commitment to equity in the sharing of tools and resources.[47] Additionally, the Russian invasion of Ukraine could reshape the geopolitical landscape as Russia grows isolated from the west due to ongoing sanctions, including a WHO resolution that could strip Russia of membership rights, and recalcitrance from Russia as it considers withdrawing itself from WHO.[48,49]

Several options are being considered under the aegis of WHO as the negotiations are underway.[50] To assist with the Intergovernmental Negotiating Body's decision, the WHO Secretariat prepared an information paper outlining the three main types of possible outcomes from an institutional arrangement perspective: the World Health Assembly can adopt conventions or agreements as per WHO's Article 19, similar to the Framework Convention on Tobacco Control; the World Health Assembly can adopt regulations as per WHO's Article 21, similar to the International Health Regulations; and the World Health Assembly can make recommendations as per WHO's Article 23, similar to the Pandemic Influenza Preparedness Framework. Although the first two instrument types would be legally binding, the third one would not. The selection of one instrument type is not necessarily exclusive of others, which means that more than one instrument can be developed, invoking more than one WHO article. Likewise, there is an option for more than one institutional arrangement being developed under a single WHO article. For instance, if following the framework convention type as per Article 19, its mandate could provide for developing additional protocols with more strict and targeted prescriptions and, in turn, a protocol specifically focused on prevention of zoonosis emergence could be negotiated once the framework convention enters into force. This protocol for pandemic prevention could potentially address all drivers of zoonosis emergence, although our focus here is only on design principles as it pertains to the wildlife trade for human consumption.

Importantly, the Intergovernmental Negotiating Body decided at its second meeting (held in July, 2022) that the pandemic instrument should be legally binding and developed under WHO's Article 19.[51] This architecture would potentially allow for a framework convention with attention to a wide range of issues through a more detailed focus on substantive areas requiring specific negotiations, such as prevention and response.[52,53] Subsequently, a conceptual zero draft of the pandemic treaty was released in November, 2022, by the Bureau of the Intergovernmental Negotiating Body,[54] which includes an article focused on One Health and the importance of prevention of health threats at the interface of the environment, animals, and humans, such as the wildlife trade. Although this conceptual zero draft's article recognises the need to work across sectors, it does not include the institutional design we propose here.

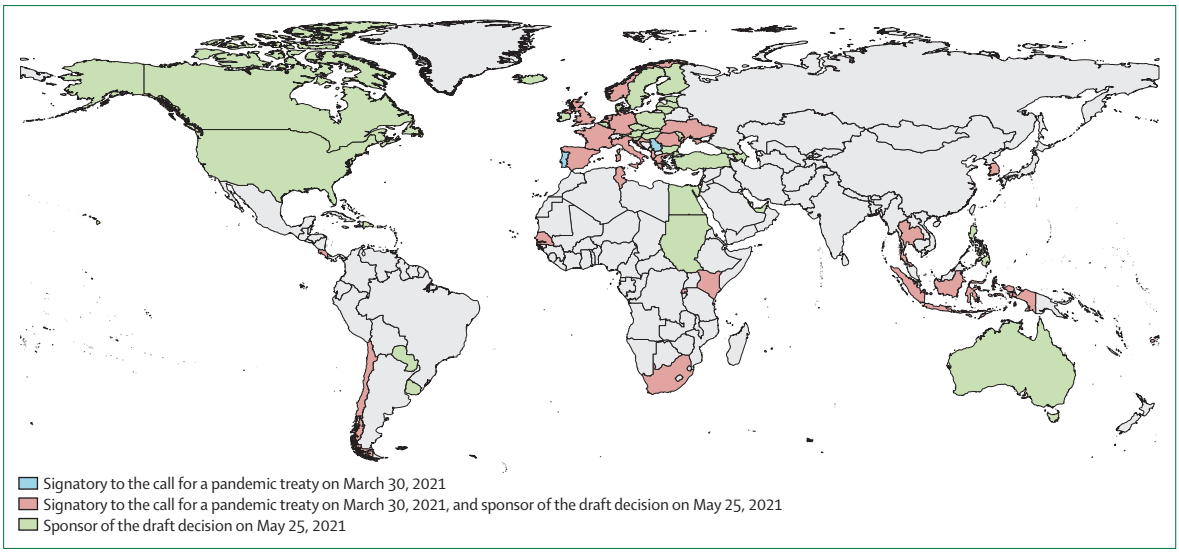

Figure 4: **World map displaying the 61 countries that signalled support for the negotiation of a pandemic treaty**
Support was signalled from two public statements on March 30, 2021, and May 25, 2021 (appendix pp 5–7).

Institutional design principles for zoonotic spillover prevention with a focus on the wildlife trade for human consumption

With this background of potential avenues for the development of an international institutional arrangement for the prevention of zoonotic spillovers, we do not necessarily advocate for one outcome over another one. Instead, we present design principles that any given institutional arrangement on pandemics should include for upstream prevention within the context of the wildlife trade for human consumption. These principles are codified in four goals (figure 5), interweaving governance mechanisms already in place or in progress that could enable operationalisation.[55]

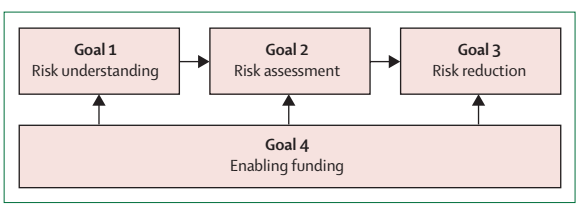

Figure 5: **Proposed structure of goals for designing the international institutional arrangement for pandemic prevention, including how goals relate to one another**

Goal 1: risk understanding

Improving knowledge of risk of zoonoses emerging from the wildlife trade, and how to manage them, is pivotal for pandemic prevention. Despite the understanding of the wildlife trade as a driver of emerging zoonoses,[13] uncertainty remains regarding more specific attributes of such a process, both biophysical (eg, pathogen pressure) and sociocultural (eg, exposure through human behaviour), that could inform prevention strategies at domestic and international levels.[56,57] Research should be conducted to reduce the uncertainty about the relative risk of zoonotic spillover events potentially resulting in pandemics from domestic compared with international wildlife trade.[58] Within this context, a policy-relevant science platform has already been proposed by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.[6] This platform should be tasked with, among other things, four primary objectives: improve knowledge on specific risks of zoonoses emerging from the wildlife trade for human consumption both from a biological and sociocultural perspective; develop a framework (including indicators) for risk evaluation and monitoring; conduct impact evaluation of interventions for risk reduction; and reach consensus on risk perception and acceptance.

Operationally, mechanisms might already be in progress to advance this goal. WHO and the Convention on Biological Diversity developed a Joint Work Programme on Biodiversity and Health in 2012 and subsequently a Memorandum of Cooperation in 2015, which established the Interagency Liaison Group on Biodiversity and Health in 2017 with ten additional members, including other sectors such as food governance (ie, FAO).[59] This group aims at, among other things, addressing trade-offs, and fostering synergies, between public health and biodiversity conservation goals through a cross-sectoral approach. This group has focused on four themes: capacity building; developing databases, metrics, and indicators; implementing research, case studies, and exchange of best practices; and communication, awareness-raising, and advocacy. Building and expanding on the Interagency Liaison Group on Biodiversity and Health, a new Expert Working Group on Biodiversity, Climate, One Health and Nature-based Solutions was formed by WHO, the International Union for the Conservation of Nature, and the Friends of Ecosystem-based Adaptation network in April, 2021.[60]

For more on the **Wildlife Trade Portal** see http://www.wildlifetradeportal.org

Independent of the previous mechanisms, a new One Health High-Level Expert Panel was formed by WHO, WOAH, FAO, and the UN Environment Programme in May, 2021, to advance policy-relevant science, focusing on the drivers of zoonotic disease emergence.[61] Still in the making, the Convention on the Conservation of Migratory Species of Wild Animals Scientific Council agreed in July, 2021, to create an expert working group on migratory species and public health, including zoonoses linked to the wildlife trade.[62] These initiatives combined could potentially be used as a starting point to launch the policy-relevant science platform for pandemic prevention, which could be similar to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the Intergovernmental Panel on Climate Change.

Goal 2: risk assessment

Reducing the risk of emerging zoonoses from the wildlife trade, including from markets and associated supply chains, will require baseline data of current risk levels in each member country, as well as longitudinal data. To that end, we propose that the resulting international institutional arrangement should consider a combined system of self-reporting from parties and third-party audits focusing on two matters: characterisation of the entire supply chains and networks of the wildlife trade from a biophysical, legal, and sociocultural standpoint; and characterisation of the corresponding regulatory frameworks and funding available for their implementation. The characterisation of supply chains and trade networks should consider the entire process, from harvest or capture to point of sale to the end consumer, accounting for both legal and illegal trade, including key variables—eg, the stage at which killing takes place, shipping conditions, market size, traded taxa, animal density and interspecies mixing (both wild and domestic), and supply chain length and breadth.[63] This self-reporting and third-party audit process could be devised by the policy-relevant science platform for pandemic prevention on the basis of the most up to date knowledge of risk of emerging zoonoses from the wildlife trade for human consumption. As knowledge will accumulate over time, we suggest an adaptive framework, so that periodic reporting can be adjusted according to the best available evidence. The baseline information on the characteristics of the wildlife trade in each country would allow a risk assessment using the best available evidence on risk according to the policy-relevant science platform for pandemic prevention. Explicit assessment of current risks could be conducted and reported through the use, emulation, or expansion of already existing governance mechanisms. For instance, risks stemming from the wildlife trade for human consumption could be assessed using the Global Health Security Index through the inclusion of more specific metrics with input from the policy-relevant science platform for pandemic prevention, including data on legal (eg, CITES reporting) and illegal wildlife trade (eg, Wildlife Trade Portal). With this framework, 195 countries, corresponding to the parties of WHO's International Health Regulations, were quantitatively assessed for the first time in 2019. The index attempts to evaluate the baseline of where countries are at in relation to pandemic prevention, detection, and response, including risk factors, so that gaps can be identified and progress tracked over time. This index, however, is not without pitfalls, as analyses have already identified the need for a more holistic set of indicators beyond technical capacities.[64–66] This recommendation should be included for risk assessment within the context of the wildlife trade for human consumption. Likewise, risk assessment could be done by adopting the Joint Risk Assessment Operation Tool prepared by WHO, FAO, and WOAH. This tool provides the blueprint to set up domestic governance structures to assess zoonotic risk across sectors.[67] In turn, the characterisation, including reporting, of regulatory frameworks and funding available for pandemic prevention in relation to the wildlife trade for human consumption could be devised on the basis of the WHO Joint External Evaluation Tool.[68] This framework was initially developed to support the implementation of WHO's International Health Regulations in 2016, with a focus on appraising parties' capacity for surveillance, containment, and mitigation.

For more on the **Global Health Security Index** see http://www.ghsindex.org/

Goal 3: risk reduction

Prevention of pandemics driven by the wildlife trade ultimately hinges on reducing the risk of zoonotic disease emergence in the first place. Risk of zoonotic disease emergence can be present along the entire supply chain to various degrees, depending on context, from harvest or capture, through transport and distribution, to point of sale to the end consumer, and including slaughtering.[56,63] Within this context, we argue that prescriptions for pandemic prevention will likely require improved governance frameworks for legal wildlife trade[69] and strategies to reduce illegal wildlife trade, which is intrinsically unregulated, through sanctions and incentives.[70] These prescriptions could include, but not be limited to, a reduction in demand and supply, particularly of those taxa bearing high zoonotic risk (eg, rodents and primates),[71] and improved management of supply chains, including markets, through chains of custody, food safety standards, and considerations for interspecies mixing.[58,72,73] Importantly, specific decisions on bans of markets trading wild meat for human consumption, although suggested and even already implemented,[74] should be informed by the best available evidence from the policy-relevant science platform to ensure effectiveness and avoid unintended consequences.[75] After all, access to meat from wild animals is deeply intertwined with livelihoods and culture in some regions around the world.[76,77] Hence, developing substitutes to wild meat use (eg, by promoting locally acceptable alternative livelihoods) will

likely be necessary.[78] Risk reduction should not be approached as a single universal solution, but rather as an adaptive, context-dependent, evidence-informed systems approach with careful targeting, considering pandemics are not the result of cumulative effects but rather punctuated events. For instance, wildlife markets in large cities with highly interconnected transport infrastructure should receive special attention due to the high risk of zoonotic outbreaks becoming a pandemic.[7] A governance approach that considers the balance between multiple goals (ie, public health, biodiversity conservation, food security, and economic exchange), and between local context as well as global effects, will be paramount.

Some governance mechanisms that are already in place and others under development could serve as models to operationalise this goal, as well as to strengthen coordination and cooperation through existing institutional arrangements. Reducing public health risk stemming from the animal–human–environment interface, on the premise that zoonotic outbreaks can only be prevented and addressed through a multisectoral approach, is an objective of the Tripartite Partnership on One Health, launched in 2010 between WHO, FAO, and WOAH.[79,80] The UN Environment Programme joined this effort in March, 2022, so this initiative is now known as the Quadripartite Partnership on One Health, to contribute expertise on the environmental determinants of zoonoses and antimicrobial resistance.[36,61] Additionally, WOAH released a Wildlife Health Framework in March, 2021, reinforcing a One Health strategy.[81] One of its objectives entails improving WOAH members' capacities to manage the risk of pathogen emergence in wildlife and transmission at the human–animal–ecosystem interface while observing biodiversity conservation goals. Considering CITES does not include public health prescriptions as part of its mandate but some CITES-listed species are zoonotic vectors and subject to trade for human consumption,[82] a working group has been established to better understand what role this convention could play in pandemic prevention.[83] The outcomes of discussions and recommendations of that working group were considered at the 19th Conference of the Parties in Panama City (Panama) in November, 2022, and a decision was adopted accordingly.[84] Specific actions from such a decision include, among others, improved cross-sectoral coordination and establishment of a baseline of actions taken by parties to reduce the risk of zoonotic spillover associated with the wildlife trade. As not all wildlife trade requiring attention is international, the Post-2020 Global Biodiversity Framework adopted in December, 2022, known as the Kunming–Montreal Global Biodiversity Framework, could help address cross-sectoral integration domestically, as one of its considerations for implementation includes the interlinkages between health and biodiversity.[85] Strategies for risk reduction of zoonotic spillover devised by parties to the resulting international institutional arrangement for addressing pandemics could be incorporated and reported as part of the already existing National Action Plans for Health Security.[86] These documents are currently voluntary, multiyear planning processes that use a One Health approach and aim to, among other things, implement WHO's International Health Regulations and contribute to achieving the Sustainable Development Goals.[87]

Goal 4: enabling funding

Analyses have revealed the insufficiency, inadequacy, and fragility of current funding for addressing pandemics, warranting the development of new financial mechanisms.[41] Funding will be needed for advancing each of the three previously presented goals (ie, risk understanding, risk assessment, and risk reduction). Additionally, funding is required to support the development and implementation of governance structures for the accomplishment of such goals and to cover the overhead costs associated with managing the funds. Importantly, two key initiatives were created in early 2021 for analysing financing gaps and scoping potential means for addressing pandemics, namely the WHO Working Group on Sustainable Financing and the G20 High-Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response.[88] These two processes create opportunities to craft a funding strategy for the proposed international institutional arrangement for addressing pandemics with specific reference to prevention of zoonotic spillover from the wildlife trade for human consumption, as both incorporate forums with high-level political engagement that include national governments and international financing institutions.

For more on the **WHO Working Group on Sustainable Financing** see https://apps.who.int/gb/wgsf/

We propose a two-pronged strategy for meeting the funding needs of pandemic prevention in line with the Working Group on Sustainable Financing, the High-Level Independent Panel, and the Independent Panel for Pandemic Preparedness and Response. Negotiations for an international institutional arrangement that accounts explicitly for prevention of zoonotic spillover from the wildlife trade for human consumption should include considerations for financing, leading to stipulations for the development of specific mechanisms enshrined in the final document. Governance functions and core programmatic activities, such as risk understanding (ie, Goal 1) and risk assessment (ie, Goal 2), could be financed through a mix of assessed and voluntary contributions from member countries. More specifically, assessed contributions should follow an incremental structure over time accounting for economic recovery of countries in the aftermath of the COVID-19 pandemic. In addition, a Global Pandemic Financing Facility, with contributions from select donor countries, could be established drawing on lessons from the Global Environmental Facility.[89] This could be used as a mechanism

to mobilise resources for the Global South, where countries generally have lower financial and technical capacity, in this case with a focus on risk reduction following structured decision making on the basis of risk assessments. In terms of concrete figures, it has been estimated that governments should commit to an increased international financing pool for addressing pandemics by US$5–15 billion annually, which spans prevention, preparedness, and response.[88,89] Although these figures are now available, much work remains to be done in terms of deciding allocation across those three areas of work. Importantly, these considerations supplement existing mechanisms, which should not be rolled back in light of additional contributions from the private sector, non-governmental organisations, and international financial institutions, such as the World Bank's Health Emergency Preparedness and Response Multi-Donor Fund and the Financial Intermediary Fund for Pandemic Prevention, Preparedness and Response.[90,91] This strategy would allow for a robust financing base with predictability, agility, adaptability, and leverage to attract additional funds.

Conclusion

If the role of governance includes supplying institutional arrangements in response to demand of societal problems, then pandemics reveal a probable institutional failure requiring a strong governance response. Public health, biodiversity conservation, food security, and trade are intertwined and their causal pathways for the emergence of zoonotic diseases spilling over into pandemics are more connected than ever due to increased exploitation of biodiversity, intensified interconnectivity of the world, and a larger human population. Pandemics require collective action not only across countries but also across sectors. Addressing this causal link is now paramount, but the acceleration of such a causal pathway has so far outpaced the development of institutional responses to address it.[89] With increased globalisation and urbanisation, containment of zoonotic outbreaks and prevention of spillovers into pandemics will likely become more difficult, hence the imperative for prevention at source to take centre stage in future strategies.[7,8] As a potential response to this issue, we have argued how an international institutional arrangement that addresses pandemics, accounting explicitly for the prevention of zoonotic spillovers from the wildlife trade for human consumption, could be built institutionally upon many mechanisms already in place or under development that foster accountability, transparency, coordination, and resource mobilisation. Importantly, a holistic and coordinated approach to zoonotic spillover prevention across all drivers is imperative. As institution building seems to be at the agenda formation and negotiation stages,[55] our recommendations for institutional design could also be applied and tailored to additional zoonotic drivers in the context of a potential WHO instrument for pandemic prevention, as well as to all zoonotic drivers within an international institutional arrangement negotiated outside the WHO framework.[52] For instance, the Convention on Biological Diversity's Subsidiary Body on Scientific, Technical, and Technological Advice is working on the issue of Biodiversity and Health, including (but not limited to) the prevention of zoonotic spillover from the wildlife trade. Indeed, the Subsidiary Body on Scientific, Technical, and Technological Advice discussed a possible Action Plan on Biodiversity and Health at its meeting in Geneva (Switzerland) in March, 2022.[92]

Despite the paradox between timing and urgency for treaty negotiations, there is a need to act while the effects of a pandemic are still tangible as they can stimulate institution building. Times of crises might not be perceived as most appropriate for institution building as all efforts are deployed in dealing with the current problems as they unfold. Conversely, although periods between crises could enable more political bandwidth for institution building, the sense of urgency to do so could wane as crises are overcome. Acknowledging this conundrum, we recommend the impetus given by the COVID-19 crisis is used catalytically to develop the macrostructure of an international system for pandemic prevention without necessarily developing all details in the immediate future.

Contributors

EG-C, ND, AP, and MW conceived and framed the initial idea. EG-C wrote the first draft, and all authors contributed equally to subsequent iterations, revisions, and the final manuscript.

Declaration of interests

We declare no competing interests.

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