

Project: One Health for the Future

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One Health for the Future: Three Pathways Against Tomorrow's Crises

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With the support of



Table of Contents

| | |
|-----------------------------------------------|----|
| Introduction | 2 |
| The origins of One Health and key definitions | 4 |
| Scenario 1: Zoonoses | 7 |
| Scenario 2: Antimicrobial Resistance | 12 |
| Scenario 3: Food safety & security threats | 16 |
| Concluding remarks | 19 |
| Contributors | 21 |
| Endnotes | 22 |

Introduction

With the outbreak of the Covid-19 pandemic, the past two and a half years have highlighted more than ever the need for a holistic policy approach when tackling phenomena such as zoonotic diseases (infectious diseases jumping from animals to humans). At the same time the way humanity is interacting with its environment needs to radically change to preserve not only our own but also our ecosystem's health. If the *status quo* remains, future crises seem unavoidable. Indeed, humanity is confronted with pressing challenges such as zoonotic diseases, antimicrobial resistance (AMR), and food safety and security threats (see definitions in Box 1, p. 6). These challenges are directly and indirectly linked to the way we treat our ecosystems, interact with non-human animals, organize our food systems and handle the use of antibiotics. The concept of One Health (see definition in Box 1, p. 6) is a much-needed paradigm shift as it explores the interlinkages between human health, animal health, and the health of the ecosystems we inhabit, and has the potential to support solutions

to overcome the above-mentioned challenges.

While international organizations and their Member States are increasingly aligning and integrating One Health as a concept into their action plans, we at foraus believed that it was crucial to go one step further by looking into the future and thinking about the One Health approach of tomorrow in an open and inclusive process, outside of usual thinking patterns and existing multilateral processes. This *project brief* summarizes the main results and ideas crowdsourced through this participatory process involving interested citizens and experts from the field. It presents policy pathways that should be further explored.

Project methodology

With our project *One Health for the Future*, we have explored the phenomena of zoonoses, antimicrobial resistance (AMR), and food safety and security threats, 3 phenomena that One Health aims at preventing and addressing. Around 60 interested citizens and experts from the field joined from around the globe both online and physically at the Geneva Health Forum (GHF) in May 2022 and reflected upon scenarios that should be avoided in the future and measures needed to counter them.

From a methodological perspective, this multi-stage process consisted of (1) a visioning workshop during which participants developed dystopian scenarios taking place in 2050 around the above-stated phenomena, and (2) a scenario stress-testing workshop during which we developed One Health action plans with recommendations for necessary policy steps to be taken at national and international levels. During the entire process foraus' policy crowdsourcing methodology and online platform Policy Kitchen was used.

In the following *project brief*, the key concepts are first introduced, before presenting the 3 scenarios followed by a list of recommendations for action to avoid them from occurring in the first place. Given the depths of the thematics explored, this list of recommendations is of course not exhaustive and should be seen as initial points of reflection to be further explored and operationalized in regional and national settings. ●

The origins of One Health and key definitions

The foundations of One Health

Preceding approaches to One Health (in modern medicine) date back to the 19th century with renowned physicians such as Rudolf Virchow and William Osler linking human and veterinary medicine. Later on, public health veterinarians institutionalized this linkage into public health policy in the United States in the 1940s. Yet, it was in the 1970s that the term “One Medicine” and the fight against zoonotic diseases through common efforts by human and veterinary public health professionals gained further momentum. Finally, the approach has been complemented by an ecosystem health perspective bringing environmental factors into the equation as they appeared to be closely linked to animal and human health outcomes.

More concretely, One Health as a concept first appeared in 2004, when a coalition of global health experts laid its foundations with the so-called “Manhattan principles”, setting the agenda for 15 years of advocacy by several academic and non-profit organizations.¹ The “Manhattan principles” are 12 recommendations calling for

more collaboration between actors working on human, animal, and environmental health respectively. The end goal being more effective and forward-looking prevention and combat of epidemic/epizootic diseases and the maintenance of ecosystem integrity. Over the course of the past years, these principles were updated to include additional considerations on pathogen spillover, climate change, and antimicrobial resistance (called the “Berlin principles”).

International collaboration

Although cooperation had been ongoing beforehand on various common working streams, the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Organization for Animal Health (OIE) formally laid down their collaboration through the release of the FAO/OIE/WHO Tripartite Concept Note in 2010. In the wake of the Covid-19 outbreak, One Health gained further momentum with the creation of the One Health High-Level Expert Panel (OHHLEP) in 2020 when the United Nations Environment Program (UNEP) joined the multilateral alliance.²

Box 1**One Health**

The most recent definition of One Health has been elaborated by the One Health High-Level Expert Panel (OHHLEP) as “an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilizes multiple sectors, disciplines, and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems while addressing the collective need for clean water, energy, and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.”³

Zoonoses

A zoonosis is an infectious disease that is transmitted from non-human animals to humans. Zoonotic pathogens can be of bacterial, viral, or parasitic nature, or may also involve unconventional agents. Their transmission to humans occurs through direct contact or through food, water, or the environment. Zoonoses represent a major public health challenge worldwide due to

our close interactions with animals in agriculture, as companions, and in the natural environment. Indeed, WHO estimates that most known human infectious diseases and about 75% of newly emerging infections originate from animals.⁴

AMR

Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi, and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness, and death. As a result of drug resistance, antibiotics and other antimicrobial medicines become ineffective and infections become increasingly difficult or impossible to treat.⁵

Food safety and security threats

Food safety and security touches upon the relationship between agri-food systems and the impact they have on the environment as well as human health. Increased demand for food has already strained natural resources resulting in soil erosion, loss of biodiverse landscapes, and pollution of the environment all around the world presenting new challenges in food safety and sustainable food production. ●

Scenario 1: Zoonoses

Uncontrolled habitat fragmentation and industrial livestock production caused Covid-49 pandemic

It's 2050 and the world is still suffering from the consequences of Covid-49, linked to a novel zoonotic disease outbreak transmitted from cows to humans. As a consequence, humanity is facing a 10 times higher death toll than the one caused by Covid-19 back in the 2020s. Scientifics and policy-makers identified environmental destruction in past decades as the main cause.

There is barely any natural forest left. Emblematic ecosystems such as the Amazon have been destroyed. Urbanization and the development of mega-cities have largely impacted wildlife and ecosystems with more than 90% of the world population living in urban areas in 2050, surpassing the UN's prediction of a 68% urbanization rate made back in 2018. Wildlife is a word merely experienced through history books. Practices such as uncontrolled waste disposal as well as mismanagement of wastewater serve as a fertile ground for zoonoses such as one linked to the Covid-35 outbreak, which occurred in the

suburbs of Philadelphia back in 2035. Inhabitants of this planet are now used to eating processed food, mainly generated in laboratories.

To keep pace and remain competitive, the livestock industry had to increasingly scale and industrialize its practices since the early 2000s, including urban livestock farms. Until recently, the industry was doing fairly well with companies based in Patagonia making double-digit profits selling low-quality meat on global markets. Yet, it is exactly in this region where the latest major pandemic we are now facing might have started according to recent scientific findings, as the deaths of thousands of cows were observed, infecting human populations living nearby at a pace never seen before.

Humanity has shown to be ill-equipped in the past, as policy measures that were taken under Covid-19 and Covid-35 only lasted for a few years before being abandoned due to a lack of interest among governments and the general public. Let's hope we finally learn our lesson this time!

Actions to counter future crisis related to zoonotic outbreaks

In total 4 major areas for action were proposed to prevent this scenario from materializing: (1) improved surveillance of livestock farming and wildlife, (2) measures aimed at conserving and restoring natural habitat, (3) incentivizing sustainable food consumption and (4) supporting the transition towards a circular economy worldwide. While implementation is foreseen at the national level, multilateral efforts should be undertaken and binding multilateral treaties define obligations and targets for the global state community. The key recommendations made for each action path are detailed below.

1. Improved surveillance of livestock farming and wildlife

Wildlife

- Strengthen existing wildlife monitoring systems such as the *International Cooperation for Animal Research Using Space* by integrating analytical criteria related to wildlife habitat evolution induced by climate change as well as to human-caused habitat

destruction.⁶

- Make progress towards the development of an integrated and globally used environment-wildlife-livestock-human surveillance-response system, drawing on existing recommendations developed by OIE as well as global and regional experiences and initiatives such as the *Joint FAO–OIE–WHO Global Early Warning System for health threats and emerging risks at the human–animal–ecosystems interface*, the *European Observatory of Wildlife* or the *SEGA One Health Network* in the Indian Ocean islands.⁷

Livestock farming

- Develop global standards for livestock farming monitoring, including diagnosis and surveillance and early-response capacity at the national level in case of an outbreak. These practices should also help to mitigate risks by identifying facilities at risk of becoming the epicenter of zoonotic outbreaks and provide a global information platform on areas and facilities at risk.
- Explore taxation at the national level of facilities with practices identified as ‘risky’ in terms of zoonosis outbreak potential based on scientific criteria (e.g. density of livestock farms in terms of the number of animals, nature, and nutritional value of animal feed used).

2. Habitat conservation and restoration

Reverse biodiversity loss induced by habitat destruction by:

- Building on existing information systems and databases measuring the conservation status of habitats (e.g. *European Nature Information System*⁸) and exploring the development of a global index using a visual “traffic light” color code describing the state of habitat conservation at national and subnational levels based on multiple indicators and including, for instance, the percentage of land usage. Following the introduction of this index system globally, states should explore the possibility to link mandatory measures to reverse biodiversity loss at the national level in linkage with the conservation status indicated by the index.

- Launching awareness-raising campaigns on the importance of biodiversity and ecosystems for our everyday life and the multiple services they provide (e.g. linked to food, water, timber, air purification, soil formation, and pollination).
- Promote traditional knowledge systems on how to protect ecosystems in parallel to other habitat conservation and restoration measures.

Fight deforestation through:

- The support of reforestation efforts worldwide and the establishment of further legal limitations to deforestation caused by the expansion of urban settings and agricultural activities. This should be achieved through the increase of the number and size of protected areas at the national level and subnational levels and by supporting alternative solutions such as vertical farming in urban settings.
- The fight against illegal logging by setting mandatory due diligence rules for all operators and traders who place, make available or export products linked to deforestation (notably palm oil, beef, timber, coffee, cocoa, and soy), such as the legislative measures which are currently being discussed as part of the new EU's anti-deforestation Regulation, which is likely to be approved in fall 2022.⁹
- Support international efforts to fight illegal logging conducted by the INTERPOL through its forestry crime activities in collaboration with the World Customs Organization (WCO).

3. Incentivizing sustainable good consumption

- Defining label systems for “sustainable” goods (notably taking into account negative environmental externalities linked to their production and transportation) in order to:
 - > Create subsidizing schemes for sustainable producers (supply side) and tax reduction for their products (consumer side);
 - > Explore the possibility of banning or imposing tariffs on imported goods which are below a certain threshold of “sustainability”. Alternatively, carbon adjustment mechanisms such as the one currently being discussed

within the European Union, could be considered for implementation at the global level.¹⁰

- Mainstream the consumption of safe, quality food and support food diversity at large by:
 - > Restraining the consumption of unhealthy processed food in publicly-funded spaces, encouraging healthy food practices;
 - > Conducting large scale educational campaigns in primary and secondary schools as well as more generally addressed towards the larger public about the importance of healthy diets in collaboration with local communities;
 - > Ensuring strict control lobbying activities of the food processing industry and establishing severe fining systems in case of abuse.

4. Supporting the transition towards a circular economy through a global plan including:

- Science-based awareness raising campaigns demonstrating the costs of further destroying and polluting the environment and quantifying the benefits for human and animal health and the economic advantages of more sustainable economic practices and ecosystem restoration.
- Reinforce existing taxation and incentivization systems for polluting and habitat destructive activities.
- Establishing annual goals at the national level for reduction of waste production and CO₂-equivalent emissions for private and public sector activities. ●

Scenario 2: Antimicrobial Resistance

Mortality rate is at an all-time high as a consequence of antimicrobial resistance

In 2050, we reached an all-time high due to antimicrobial resistance (AMR). We could have seen this coming. Since the mid-1950s, humanity has been using stronger and higher quantities of antibiotics, antivirals, antifungals, and antiparasitics, which created the conditions for the current AMR crisis the world is facing since 2049. Vice versa, to counter the emergence of AMR, healthcare systems were forced to increase their usage of antibiotic treatments, which has worsened the situation.

Low-resource settings such as Australia or Switzerland have been impacted much more heavily compared to high-resource settings. Indeed, in countries that have higher medical standards and better levels of biosecurity, relatively fewer people died. At the same time, the lack of availability of effective antibiotics in some places is limiting their chances for development. Related social injustice and disparities in health coverage have increased significantly and pose a risk of unrest.

As the risk of AMR has never been addressed adequately, common infections such as urinary tract infections, which used to be treated by ciprofloxacin, a commonly used antibiotic, could not be treated anymore. Global life expectancy has drastically fallen to 50 years in 2050 while it was at 105 years globally in 2045. This is also explained by the fact that due to the absence of effective antibiotics, medical procedures became riskier over the past years which led to fewer people receiving the medical treatments they needed.

Actions to counter future AMR-related crises

In total 4 major areas for action were proposed to prevent this scenario from materializing: (1) improving health literacy; (2) enhanced access to quality medicines; (3) the creation of an AMR-usage monitoring system across sectors and countries; and (4) more transparency and sustainable practices on the use of antimicrobials in food productions. While implementation is foreseen at the national level, existing multilateral efforts should be supported and new initiatives should be launched to implement the below-described measures. The key recommendations made for each action path are detailed below.

1. Improve health literacy

In order to prevent misuse of medicines, access to adequate health information should be ensured and health literacy improved in Low and Middle-Income Countries (LMICs) in collaboration with different parties (patient advocacy groups, healthcare professionals, pharmacists). This should be done by implementing a set of different measures:

- The organization of information campaigns (notably through schools and on social media channels). The campaigns could use useful insights from the *Health literacy toolkit for low-and middle-income countries* developed by the World Health Organization's Regional Office for South-East Asia.¹¹
- Recognize that the use of antimicrobials in animals for growth promotion, infection prevention, and treatment is amongst the

main contributors to the development of AMR and that the environment constitutes a reservoir of microbes from which the genes associated with AMR originate. Base national actions on the *Antimicrobial resistance and the United Nations Sustainable Development Cooperation Framework* developed by WHO, FAO, OIE, and UNEP.¹²

- Improving water sanitation and hygiene (WASH) as well as related infection prevention in LMICs based on existing multilateral technical guidelines for national governments.¹³
- Establishing knowledge-sharing platforms on veterinary public health to support efforts against AMR and zoonotic spillover between livestock and humans.

2. Take decisive action regarding access to and use of quality medicines by:

- Ensuring equitable access to effective and efficient antimicrobials to avoid excessive reliance on first-line antibiotics in low-resource settings and fight the circulation of counterfeit drugs;
- Investing in vaccines and diagnostic tests to reduce misuse of antibiotics for diseases with non-specific symptoms;
- Ensuring adequate financing mechanisms for alternative medicine to limit the use of antibiotics.

3. Fight AMR through surveillance and global standards on the use of antimicrobial agents by:

- Supporting WHO's Global Antimicrobial Resistance and Use Surveillance System (GLASS) as well as AMR regional networks
- Following OIE and WHO standards and guidelines on AMR and the use of antimicrobials.¹⁴

4. Act on food production practices

Provided that the use of antimicrobials in food production is largely contributing to the rise of AMR threats, sectors linked to its use should be forced to be more transparent regarding the use of antimicrobials, and more sustainable practices be encouraged by:

- Providing information on antibiotic use for meat production through a front-of-package antibiotic usage score and the organization of awareness raising campaigns.

- The development of a framework of good practices for sustainable food production tailored to local settings and based on existing materials developed in the context of the *Global Action Plan on AMR* (e.g. through awareness campaigns, education & training for farmers & (para-)veterinarians to use antimicrobials prudently).¹⁵ ●

Scenario 3: Food safety & security threats

Norovirus causes major nutriment drop

2050, leafy greens were banned first by the FDA in the US and later by other food agencies around the world after millions of people got infected with a highly mutated variant of Norovirus, provoking a global pandemic causing many deaths and leading to massive economic losses. Leafy greens such as spinach, kale, collard greens, cabbage, and beet greens, played a major nutritive role in ensuring population health before the crisis (e.g. lowering the risk of heart diseases or decreasing inflammation in people's bodies).

After the crisis and the subsequent ban on leafy greens, food agencies around the world agreed on a series of draconian safety measures required to produce these vegetables that made it impossible for farmers to adopt at scale. These vegetables were deemed not profitable and the production was abandoned by almost the entire industry. A few specialized farmers were able to adapt to the new regulations and continued production, selling the rarity to a few wealthy consumers. While leafy greens were the main source of

vitamins for most humans before the crisis, things look different mid-century. Their disappearance from the supermarkets led to a massive spike in diet-related diseases linked to the low consumption of greens.

Now, several years after leafy greens put civilization on the brink of collapse and have been banned from supermarkets, they are about to come back to the shelves of grocery stores, not only highly exquisite gourmet institutions. An Israeli start-up that took long-forgotten old research papers on CRISPR as a starting point to improve gene-editing technology specialized in vegetables has successfully genetically modified a “super lettuce” that is resistant to all known traces of norovirus, making it suitable for human consumption again. No data is yet available on the impact of this CRISPR 2.0 super green on human health. While the start-up has already raised massive funds for huge marketing campaigns to lure consumers even before the sale starts, many countries are seeing thousands of students on the streets as the previous use of CRISPR technology had caused human deformities in several proven cases around the world just a decade earlier.

Actions to counter future food safety and security threats

In total 2 major areas for action were proposed to prevent this scenario from materializing: (1) ensuring transparent and inclusive processes during the establishment of food safety norms; and (2) the support of a global “crops and plant species diversification” strategy. The key recommendations made for each action path are detailed below.

1. Ensure the establishment of sound food safety standards and processes around surveillance of foodborne diseases by:
 - Forming transdisciplinary expert panels including experts and researchers from various fields (nutrition, biodiversity, public health, agri-food, veterinary science) representing academic institutions, public administrations and regulatory bodies, civil society organizations representing local communities and private

sector in the development of national and global agri-food safety norms such as those being developed by the Codex Alimentarius Commission.

- Ensure surveillance system tracking viruses causing foodborne illnesses such as Norovirus is in place at the national level and coordinate global response using existing international guidelines.¹⁶
2. Support the agricultural sector in the diversification of crops by:
- Conducting awareness-raising campaigns among farmers of importance to diversify productions in order to guarantee sustainable food systems.
 - Supporting local crop species productions (e.g. via subsidy schemes notably in LMICs) and existing global databases of plant and crop species with the goal to support crop diversification globally in the long-term. ●

Concluding remarks

Taking a One Health approach is unavoidable if we want to guarantee a sustainable and safe future. Yet, as the recommendations detailed in this *project brief* show, moving from theory to practical implementation is a complex undertaking. Indeed, it demands no less than a major shift in thinking as well as in the way we organize our lives, interact with the ecosystems that surround us, and traditionally manage public health.

More concretely, the tools needed are to a large extent related to awareness raising as well as the maintenance and development of sound databases and monitoring systems informing decision-makers and the scientific community about the status of our ecosystems and usage of antimicrobials. Increasing awareness amongst citizens and concerned parties about the costs and risks related to destructive behaviors and lifestyles is an important starting point for One Health to materialize in practice beyond expert communities. So-called “traffic light” systems are interesting tools to explore as they

are easily understandable and have the potential to ensure more transparency in addition to information campaigns. Monitoring systems, which enable risk assessments and inform policy-makers about the status quo and evolution of habitat destruction, the use of antimicrobials, and potential zoonotic outbreaks will also have a major influence on the state community's response to the threats portrayed in the 3 dystopian scenarios described in this *project brief*. Additionally, habitat destruction should be countered by protective measures and measures taken to steer consumers and producers away from destructive practices such as deforestation or industrial livestock farming. Finally, to tackle the challenges posed by AMR, health literacy and access to quality medicines should be promoted especially in LMICs.

For sure these measures come at a cost and political trade-offs will be necessary. Nevertheless, the 3 scenarios developed in this *project brief* highlight that One Health should be seen as an investment against future crises. The recommendations developed by participants of our participative process should be further explored as they have the potential to lead to better health outcomes and avoid major public health threats, which will also impact our economies and socioeconomic conditions for millions of people on the globe. ●

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Endnotes

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One Health for the Future

In this participatory project we explored the concept of One Health, societal challenges related to it and needed policy measures. This *project brief* is based on the crowdsourced ideas from citizens and experts from all over the world who participated in it.

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