

# Imagining the future of pandemics and epidemics

A 2022 perspective



World Health  
Organization

# Imagining the future of pandemics and epidemics

A 2022 perspective

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# Foreword



**Dr Tedros Adhanom Ghebreyesus**  
Director-General  
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## This is a historical moment

The COVID-19 pandemic is one of the biggest challenges we have faced in the 21st century. It has been a painful reminder that no one is safe until everyone is safe. COVID-19 has demonstrated in stark terms that a pandemic is a complex phenomenon fuelled by a multitude of diverse, interconnected factors and revealed deeply rooted structural weaknesses and insufficiencies in our health, socioeconomic, environmental and political systems.

Hindsight - critical reviews of past infectious threats - helped us react better, but the current pandemic taught us that this is not enough. To better manage the ongoing pandemic and to be better prepared for other infectious threats in the future, a forward-looking, coordinated and collaborative approach across all levels of planning and response is vital.

## This is an opportunity

Being better prepared for the next infectious threat requires a mindset shift and the adoption of approaches different to what we are used to. Foresight can support the transition from emergency response to proactive infectious threat planning and management.

Leveraging futures thinking and foresight methodologies, practical applications and tools in the context of epidemic and pandemic threats, can help us identify trends, key factors, and emerging issues, negotiate uncertainties, and articulate scenarios and strategic visions.

Foresight can also help us design robust policies and strategies today which will help the global community be better prepared for tomorrow.

By engaging with a wide range of traditional and non-traditional actors and stakeholders, foresight can provide us with the opportunity to shake our habitual beliefs and shape new, inclusive narratives that allow us to imagine the future in different ways.

## This is a snapshot of the future

This report is an attempt to collectively explore what the future of infectious threats might look like. We set a short time horizon (three to five years) to encourage immediate action. Inspired by the COVID-19 pandemic, the scenarios illustrated in the following pages are not a prediction of the future. Instead, they are an invitation to imagine the different directions that the current and future pandemics might take and to expand the range of plausible futures.

They are also an opportunity to identify possible risks and solutions, discuss implications and propose actions aimed at preventing the occurrence or mitigating the impact of current and future infectious threats.

## This is a way forward

Through a series of conversations with stakeholders, a way forward has been highlighted. One of the strengths of foresight is its approach, bringing traditional collaborators and new actors around the table to collectively build the future of pandemic preparedness and to take actions together. Three key principles repeatedly emerged during our discussions and should be seen as the basis of any future pandemic preparedness: trust, solidarity and equity, and sustainable development.

Improved pandemic preparedness will also require more effective communication between governments, scientists, public health authorities, health care communities, the private sector, media and citizens. It will require a solid basis for a much-needed restoration of trust between individuals and collectives, and it will mean that, in the future, nations share more information, data, knowledge, expertise and resources.

Success in being better prepared for the next pandemic and epidemic threats will mean being ready to ensure access to the benefits of health technology and scientific innovation for those most in need. It will mean that medical supplies including vaccines, diagnostics, antivirals, oxygen and other essentials are distributed fairly, and that environmental goals and strategies are aligned with planetary and human health.

Overall, advancing pandemic preparedness will require a universal acceptance of pandemics as global human experiences that affect people, communities and nations in different ways. Paired with bespoke and flexible approaches, adaptable tools, platforms, and infrastructure,

and underpinned by a spirit of collaboration, trust and solidarity, preparedness means we will be able to protect people, communities, economies and the environment against future infectious threats.

This report does not aim to be an exhaustive list of practical actions. It reflects the conversations we had with representatives from diverse fields, geographical locations and demographic contexts.

Foresight is a new attitude and the way forward, in-between, but also during emergencies. Taking the time to reflect on the current situation, what has led to it and how it might evolve in the future, should not be seen as a nice-to-have. On the contrary, I truly believe that these exercises will enable us to save lives, time and valuable resources in the future, and to be better prepared to tackle future infectious threats.

I am very happy that we took the time collectively, during this pandemic, to step back and to reflect, and I would like to warmly thank everyone who has contributed to the discussions.



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# Executive Summary

### The aim

In 2021, WHO embarked on its first foresight initiative to explore the future of pandemics and epidemics. Foresight is different from a prediction or forecasting of the future. It presents a new approach for better preparedness. It is forward looking, action-oriented and fosters collective ownership of the future.

This initiative aims to achieve a two-fold goal. Firstly, to ensure that we are collectively better prepared to tackle future epidemics and pandemics by bringing key players together. Secondly, to support informed decision-making for leaders on the transition from emergency response to future preparedness.

### The method

Central to the foresight initiative is the development of scenarios. Scenarios are hypothetical, yet plausible, illustrations of the future. They are an invitation to conversations; a way of “thinking the unthinkable”.<sup>1</sup> They are a tool for framing imagination, aiding decision-making, identifying recommendations, testing, and refining strategy and policy options.

For scenario building, the morphological approach was chosen by the foresight professionals.<sup>2</sup>



**“We have our future in our hands. Choices we make over the coming months and years will determine the future.”**

Dr Michael J. Ryan, Executive Director  
WHO Health Emergencies Programme

The approach is a well-established, systematic and thorough method, frequently used in the business world and increasingly by governments. The approach offers a structured, transparent, process-driven and software-enabled way to build scenarios.

The first step involved identifying the key components of the system of change through consultations with the Strategic Advisory Group on Infectious Hazards (STAG-IH)<sup>3</sup> and the WHO Foresight Task Team. From these consultations, critical determinants of pandemic and other infectious threats were identified and split into three categories:

1. Pathogen and host characteristics
2. Public health and social measures
3. Contextual factors

The second step was to agree on a time horizon within which to explore the future. For this exercise, it was set in the next three to five years to inspire immediately actionable recommendations. The time horizon determines what trends and key factors should be considered for exploration. Further, the use of the social, technological economic, environmental, political (STEEP) framework ensured a comprehensive approach and led us to identify 25 high-impact trends that will shape the future.

Analysis of the key components of the system and a review of the trends resulted in an initial set of key factors across the three categories. The key factors were validated and refined in two workshops involving subject matter experts and stakeholders from organizations and institutions representing a variety of fields and sectors.

The final selection of key factors provided the baseline structure for the development of the morphological box.

The morphological box comprises key factors and associated projections and helps produce consistent combinations of projections. Through this process, four alternative, consistent, and plausible pathways into the future (that is, scenarios) were selected for further development.

The scenarios and their associated implications were discussed in two public roundtable discussions. The roundtables had several aims including highlighting the role of different stakeholders in each of the four future worlds, identifying recommendations and actions for the future, as well as discussing the crucial role of leadership. The members of the panel included influential personalities from the public and private sectors, including youth and faith leaders, policy consultants, trade union representatives, anthropologists, academics, public health experts, biotech experts, health care services providers and representatives of the United Nations.

### The outcome

Three pillars were established as fundamental, overarching, guiding principles for the overall effort of strengthening future pandemic preparedness:

1. Trust
2. Solidarity and equity
3. Sustainable development

They are accompanied by five themes, or areas of focus, which are key in formulating an all-encompassing approach when managing and responding to the complexity of infectious threats. In summary, the key messages under the five themes are:

### 1. Science, policy and environment

A sound scientific evidence base must be developed and communicated, informing

transparent knowledge translation across policy and practice with a goal to master decent management of uncertainty. WHO should lead the development of a research agenda, with increased attention to science for equity. The independence of research and academic institutions must be protected and international research collaboration should be further encouraged, emphasizing diversity and in-country research capacity development. Research funders have an important role to play in realizing these goals.

Scientific evidence must inform decision-making. A multidisciplinary scientific advisory group of experts should be set up to inform decision-makers, and policies need to be translated into context specific actions. Meta-analyses of scientific information related to evolving emerging infectious threats should be widely available and easily accessible to everyone. Human-centred scientific disciplines must be funded and leveraged.

A global environment that facilitates preparedness and response to infectious threats must be created. Policy and international frameworks for future pandemic and epidemic preparedness must be solidified. There is a need to create common regulatory pathways to ensure equitable resource distribution. WHO and partners must plan for the impact of different and combined causes of migration including climate, conflicts, natural disasters, infectious threats and associated restrictions to ensure future pandemic and epidemic preparedness. Finally, a One Health approach needs to be strengthened given that the health of people is closely linked to the health of animals and our shared environment.



**“It is healthy for the World Health Organization to be listening to diverse views and opinions.”**

Dr Jaouad Mahjour, Assistant Director-General, WHO Health Emergency Preparedness

<sup>1</sup> As described by futurist, military strategist and systems theorist Herman Kahn.

<sup>2</sup> WHO engaged Arup for this exercise. [www.arup.com](http://www.arup.com)

<sup>3</sup> STAG-IH provides independent advice and analysis to WHO Health Emergencies Programme on the infectious hazards that may pose a potential threat to global health security. See <https://www.who.int/groups/strategic-and-technical-advisory-group-for-infectious-hazards>

## 2. People, communication and education

Infectious threats are global human experiences that start and end in communities. Engagement for preparedness includes fostering trust and actively engaging communities to protect the health and well-being of their members. Foresight underscores the need to recognize, respect and learn from knowledge held across cultural, religious, generational and other groups. Engaging with the health care workforce to provide accurate health communication and involving the youth is of particular importance. In addition, the private sector has an importation role to play, a role that must be recognized and mobilized.

The impact of public health and social measures on mental health needs to be assessed and monitored. There is a need to raise public awareness of mental health, as well as to develop community-based mental health initiatives and societal mechanisms. Highlighting the importance of education as a tool to inform safe behaviours and actions is key. Health authorities need to invest in modern communication channels and tools for health information dissemination, as well as to master infodemic management. The global development community should work towards solutions that address digital inequity and improve digital literacy.

## 3. Economy, infrastructure and systems

Strengthened and resilient systems are necessary to respond to shocks, both known and unknown,

Investment must be made in primary health care and in achieving Universal Health Coverage, including a sustainable health workforce. Infection prevention and control should be systematically implemented across all health care settings. Global health partners should set up a global health protection fund to support countries with limited capacities. For supply chain and logistical aspects of pandemic preparedness and response, a systems thinking and all-hazard approach must be applied to manage associated risks and benefits. Technology, including artificial intelligence (AI) and machine learning (ML), must be harnessed and applied to supply chain networks. Local production capacities should be strengthened, including empowering local communities to contribute, for example, through production of high-quality personal protective equipment (PPE).

## 4. Technology and innovation

Technology and innovation play a key role in realizing ambitions regarding future preparedness. Advancements in genomic science and nanobiotechnology must be leveraged to achieve pan-viral prevention. The application of emerging technologies to data gathering, conversion, integration, analysis and projection will increase access to medical countermeasures, essential life supplies and health information. Widespread sharing of benefits stemming from health care innovation is key. Biosafety must be strengthened and the benefits of biobanks and biodepositories in investigating novel pathogens must be leveraged

## 5. Leadership and collaboration

There is a pressing need to champion equity, foster trust, and to uphold transparency and accountability in the highest levels of decision-making. Data, knowledge and solution sharing are crucial to ensuring global solidarity. At the same time, they require an environment of global multilateral collaboration that promotes collective action and adaptive approaches. Multinational organizations must be empowered and encouraged to collaborate with agencies from a variety of sectors. Successful interventions should be identified, analysed and documented to update pandemic preparedness guidance. In addition, public-private partnerships with new stakeholders outside of the health sector should be explored.

## The next steps

The WHO foresight initiative is the beginning of a new way to build stronger preparedness for future infectious threats. The outcomes described in this report offer a base for future foresight exercises. Yet, they need to be strengthened with coordinated dialogue and actions. Continuing the conversation through exercises at local, regional and national levels, as well as through frequent testing of the key assumptions of each scenario in specific regions, are effective ways to better prepare for future pandemics and epidemics.

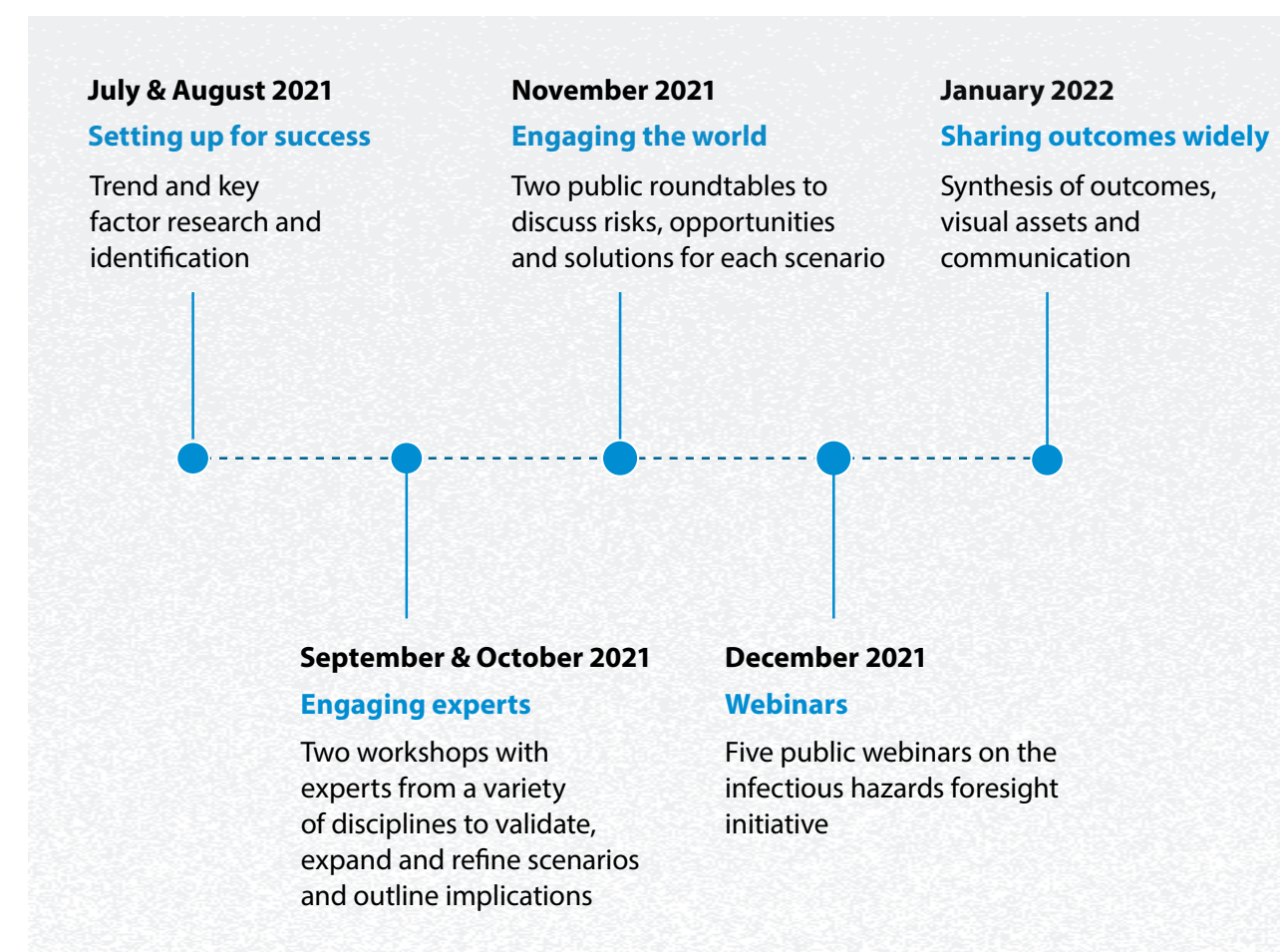


Fig.1 Project timeline

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