
Global Health Crises: Monitoring and Reporting Progress towards Preparedness

13–14 March 2017

This meeting was co-organized by the Chatham House Centre on Global Health Security and the Graduate Institute Geneva Global Health Centre.



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Introduction

For the past two decades, the world has been subject to a steady stream of disease outbreaks and epidemics that have spread internationally and caused great concern because of their mortality, negative economic and humanitarian impact. After each one, panels and commissions were formed to review what worked and what did not in dealing with them, and new mechanisms were proposed and/or established to improve preparedness and response, including a revision of the International Health Regulations (IHR) in 2005 that committed all World Health Organization (WHO) member states to strengthen their capacities in public health surveillance and response. Likewise, assessments of capacity to prepare for and respond to catastrophic natural disasters, such as the Haiti earthquake in 2010 and the 2004 South Asia earthquake and tsunami, informed the development of the 2015–30 Sendai Framework for Disaster Risk Reduction, a revision of the 2005–15 Hyogo Framework for Action.

Following the West African Ebola outbreak of 2014–16, recommendations were made and measures put in place by WHO and other international stakeholders to help prevent future outbreaks from becoming widespread epidemics, and to ensure a more rapid and effective national, regional and global response if an outbreak with the potential for international spread occurs. Some of these proposals, including one from the UN Secretary General’s High-Level Panel on the Global Response to Health Crises, recommended monitoring and follow up to better protect the world from pandemics. The use of indicators would help track whether individual countries, international organizations and other stakeholders are becoming better prepared. Weaknesses in global governance received a great deal of attention, but in addition regional and sub-regional actors along with countries were called upon to ensure that public health systems are resilient and strong, for ‘the local community is on the front line of any outbreak’.¹

This is the summary of a meeting co-organized by the Chatham House Centre on Global Health Security and the Global Health Centre of the Graduate Institute of International and Development Studies, Geneva on 13–14 March 2017 titled ‘Global Health Crises: Monitoring and Reporting Progress towards Preparedness’. The objectives of the meeting were to identify the most appropriate national, regional and global health stakeholders to monitor national, regional and global contributions to preparedness, and to explore the types of indicators that would be most useful for monitoring and holding them accountable. The summary concludes with background information on existing monitoring activities that was provided to participants ahead of the meeting.

National perceptions of current monitoring and reporting efforts for preparedness

Over the course of the two days, participants heard perspectives on monitoring for preparedness for national, regional and global health crises from representatives of 12 Geneva-based country missions that covered a spectrum of regions and income levels. The discussions led to an understanding that countries perceive monitoring of preparedness as essential to holding national and global health stakeholders to account. They also led to a clear understanding that, to inform political action, indicator data must be presented in a manner that is easily understood by political leaders who have varying levels of health knowledge and may therefore underestimate the importance of preparedness for global health crises.

Several themes emerged from discussions with national representatives.

¹ United Nations (2016), *Protecting Humanity from Future Health Crises; Report of the High-level Panel on the Global Response to Health Crises*. New York: United Nations http://www.un.org/News/dh/infocus/HLP/2016-02-05_Final_Report_Global_Response_to_Health_Crises.pdf (accessed 7 Mar. 2017).

- **No new indicators.** There was a plea from the countries not to add any additional indicators or reporting tools, as they are already very over-stretched in reporting to existing monitoring frameworks.
- **Synthesize indicators.** The countries requested that the various existing frameworks be reviewed to find ways to synthesize or consolidate common indicators that appear in multiple frameworks.
- **The national level is not the whole picture.** In many countries, state and local governments have a large degree of autonomy and therefore the national government is often not the best example of real resilience and preparedness. Monitoring needs to be expanded to include local-level information.
- **Lack of financing.** The fact that the Joint External Evaluations are not linked to funding is a frustration, as there is often no practical next step to follow their completion and actual capacity strengthening.

Gaps and recommendations

Over the course of the meeting, it became clear that there are several gaps in global efforts for monitoring and reporting on progress towards preparedness for global health crises. These are listed below, with recommendations based on the discussions. Some areas identified were not covered in detail by participants and require further research and understanding for the formulation of relevant monitoring efforts.

Tracking subnational preparedness

While many indicators are being tracked to monitor progress towards preparedness for global health crises, participants made the important observation that the measurement of progress for preparedness at present is concentrated at the national level. They noted that monitoring the capacities of local, community-based actors and the private sector is also important as often these are the first responders, and they concluded that there is a need for indicators and monitoring of preparedness at the sub-national level.

Recommendation 1: The gap in monitoring for preparedness at the sub-national level should be filled, and as a start research is needed into the aspects of sub-national level response that would benefit most from monitoring and accountability tracking.

Tracking global financing

Governments, development agencies and financial institutions have pledged financial support to help less developed countries build capacity to detect and respond to global health crises. For example, the World Bank has sought funding to assist at least 25 countries, and the G7 at their summit in 2015 committed to supporting 76 low- and middle-income countries in funding their preparedness plans.² As more countries complete the Joint External Evaluation, there will be additional details on what each country needs technically and financially in order to strengthen preparedness for global health crises.

² World Bank (2016), 'International Development Association (IDA) 18: special theme - governance and institutions', Washington, DC: World Bank, <http://documents.worldbank.org/curated/en/368341467989536274/International-Development-Association-IDA-18-special-theme-governance-and-institutions> (accessed 7 Mar. 2017)

In 2015 WHO established a Contingency Fund for Emergencies to enable an immediate release of funds at the beginning of a health or humanitarian emergency.³ This is expected to fund response activities for three months until funds from other financing mechanisms begin to flow. Another newly established initiative is the Pandemic Emergency Financing Facility (PEF) created by the World Bank Group in conjunction with WHO (see Appendix 2). The PEF seeks to provide financing within three months of the activation of a designated trigger point.⁴

If all these pledges, contributions and financing activities were monitored, accountability might be better assured. Some international and bilateral aid flows are tracked by the Organisation for Economic Co-operation and Development (OECD), but its categories are not broken down in a way to show what funds are going to preparedness. Additionally, some of the funding for preparedness is not considered as OECD Development Assistance Committee⁵ funding, and therefore does not become a part of the organization's tracking data.

The WHO Strategic Partnership Portal also tracks information on financial support for preparedness, but some participants commented that it is difficult to use and does not offer data that is adequately disaggregated to enable understanding of country-level investments and financing sources.

Recommendation 2: Because no mechanism exists to completely track whether enough funding is available to accomplish preparedness at the global and national levels, or to show initial commitments, delivery on those commitments and outputs accomplished, monitoring of the following is required.

- Funding needed for national and sub-national preparedness actions.
- Amount countries themselves are spending on preparedness actions.
- Funding required and spent by WHO, the World Organization for Animal Health (OIE) and other relevant intergovernmental organizations for their global and safety-net actions.
- Amount donor countries, development agencies and international/regional development banks are providing for preparedness actions.
- Amount being spent on research and development for new technologies that could enhance preparedness (e.g., drugs, diagnostics, vaccines or non-pharmaceutical interventions).
- Economic modelling to demonstrate the cost of inaction compared to the cost of preparedness.

Tracking trade and travel restrictions

Governments and private companies contributed to the negative impact of the Ebola pandemic by imposing trade and travel restrictions that went beyond those recommended by WHO on scientific or public health grounds. In some instances these were the result of employee concerns and limitations of insurance coverage. The IHR are not directly binding on the private sector, and there are no mechanisms to ensure private sector compliance with IHR principles.

Recommendation 3: Monitoring of outbreak-related trade and travel restrictions is necessary to understand better the nature of the problem as well as its root causes and ways to address them. The following should be monitored.

³ World Health Organization (2017), 'About the Contingency Fund for Emergencies', Geneva: World Health Organization http://www.who.int/about/who_reform/emergency-capacities/contingency-fund/en/ (accessed 23 Mar. 2017).

⁴ World Bank (2017), 'Pandemic Emergency Facility: Frequently Asked Questions', Washington, DC: World Bank, <http://www.worldbank.org/en/topic/pandemics/brief/pandemic-emergency-facility-frequently-asked-questions> (accessed 24 Mar. 2017).

⁵ The Development Assistance Committee of the OECD creates global policies and guidelines for what is considered as foreign aid.

- Frequency of and reasons for establishing trade and travel restrictions, particularly those that clearly exceed WHO recommendations.
- Policies and processes that have been successfully used by countries and companies to minimize disruptions to trade and travel during global health crises.

Tracking research and development

A frequent conclusion of the post-Ebola reports was the importance of scaling up research and development (R&D) to ensure the availability of medical counter-measures such as vaccines, drugs and diagnostics to prepare for outbreaks and epidemics. In response, WHO has led the creation of the R&D Blueprint, a global strategy and preparedness plan that is aimed at facilitating the rapid activation of clinical research and development prior to and during outbreaks.⁶

The goal of the R&D Blueprint is to fast-track the development of diagnostic tests, vaccines and medicines that have successfully passed through Phase I, II and III clinical trials in animals as well as Phase I and II trials in humans so that they can be rapidly scaled up for clinical trial and use during large-scale crises. Activities under the blueprint include setting priorities for R&D by identifying gaps and priority pathogens, convening the scientific community to agree on data sharing and identifying acceptable clinical-trial designs that satisfy regulatory needs. WHO will seek to do so by ‘improving research coordination and fostering an enabling environment; accelerating research and development processes; and developing new norms and standards for product licensing tailored to the epidemic context’.⁷

The Coalition for Epidemic Preparedness Innovations will play an important role in realizing the R&D Blueprint specifically for vaccines, and it has committed funding to activities for which it has now begun the process of soliciting research proposals for consideration.

Recommendation 4: Participants noted that there are no monitoring mechanisms in place for the R&D Blueprint and associated initiatives, and recommended that the following be monitored.

- Progress in working with relevant agencies to streamline regulatory processes for clinical trials during outbreaks.
- Timeline from initial DNA/RNA sequencing of a novel pathogen to a licensed product.
- Product pipelines of vaccines, drugs and diagnostics for emerging infections.
- Accessibility and affordability of vaccines, drugs and diagnostics for preparedness stockpiles and/or during outbreaks.
- Amount of funding provided by public and private sectors for R&D, stockpiling and/or deployment during outbreaks.
- Manufacturing production capacities for vaccines, drugs and diagnostics during outbreaks.

Tracking knowledge and data sharing

Clear protocols for rapid sharing of epidemiological data, successful control strategies and biologic samples were recommended following the West Africa Ebola outbreak. There has been some progress in this area. A best-practice guideline for sharing of public health surveillance data has been developed and is currently being reviewed and submitted to a WHO consensus process. At the same time, it appears that data were more readily shared in the response to the Zika virus outbreak than in response to the MERS

⁶ World Health Organization (2016), ‘An R&D Blueprint for Action to Prevent Epidemics; Plan of Action’, Geneva: World Health Organization, http://www.who.int/csr/research-and-development/r_d_blueprint_plan_of_action.pdf?ua=1 (accessed 27 Mar. 2017).

⁷ Ibid.

Coronavirus outbreak. This was likely in part the result of the WHO director-general's declaration of a public health emergency of international concern (PHEIC), leading to rapid sharing of epidemiological data permitting timely development of evidence-based guidelines, and of convening of epidemiological researchers and private sector actors such as vaccine developers. In addition, the guidelines of the International Committee of Medical Journal Editors now clarify that data sharing pre-publication during public health emergencies will not prejudice later publication in member journals.

Participants noted that this progress alone does not yet ensure that knowledge will be rapidly and freely shared during outbreaks, and that there is a need for interoperability of data collection and storage platforms of both traditional (national) and non-traditional (e.g., foundations, private sector) sources.

Recommendation 5: As there are no systems in place to monitor knowledge and data sharing as part of the preparedness actions that would translate into sharing during outbreaks, it was recommended that the following indices be monitored.

- Time between data acquisition and data sharing, as feasible.
- Adherence to data sharing policies of research funders and medical journals by researchers.
- Impact of sharing of data on preparedness and public health responses.

Tracking linkages between animal and human health

Infectious agents frequently breach the species barrier from wildlife to humans and cause outbreaks, and though domestic animal surveillance is increasing in strength, comprehensive or systematic wildlife surveillance for unusual events is rare, and there is little ongoing, coordinated interaction between human and zoonotic experts. OIE is working with countries to conduct national assessments of capacity in veterinary public health, and it maintains a list of 116 reportable diseases and an inventory of infectious agents harboured by wildlife. Activities in surveillance such as the Participatory One Health Disease Detection pilot project (PODD) of the Skoll Global Threats Fund are at the same time working with countries to develop new tools for stronger animal surveillance.

Recommendation 6: Because of the importance of One Health, the intersection of animal, human and environmental health, as a major area of cross-sector collaboration in countries, it is recommended that the following One Health actions be monitored.

- The extent to which countries ensure collaboration in activities of their ministries of health and agriculture in the area of preparedness for health crises.
- Policies of funders to stimulate implementation of One Health principles for preparedness.
- Funding by countries and made available by donor governments, development agencies and international/regional development banks for One Health activities that lead to preparedness.

The way forward – MAP, a Chatham House and Graduate Institute Geneva work plan

Support and strengthen the ecosystem of monitoring preparedness for health crisis through facilitating dialogue and partnership with international and national stakeholders already undertaking or planning monitoring activities.

There is a broad ecosystem of stakeholders involved in monitoring preparedness for national and global health crises, and many of them were represented at the meeting. They, and others, are developing innovative means of identifying indicators and using them to monitor and drive accountability in some of the following areas where monitoring is considered crucial.

- National and sub-national preparedness and response capabilities and capacities.
- Donors and financing.
- Domestic animals and wildlife.
- International trade.
- The pharmaceutical industry.
- The travel industry.
- The food industry.
- Technical agencies.

Participants were clear in stating that this ecosystem should be encouraged, and that momentum and innovation should in no way be stifled by overly formal collaboration mechanisms. They cited the way in which the ecosystem for the global HIV/AIDS response was initially brought together informally, and has continued to successfully work together through regular meetings at annual conferences and elsewhere.

Activity 1

Chatham House and the Graduate Institute Geneva will work with partners on an annual gathering of members of the growing ecosystem for monitoring of preparedness for health crises that will permit exchange of information and innovations in monitoring in the areas listed above, and others that may be identified.

Additional partners would be welcome to join this facilitation effort and contribute to the agenda and cost of the annual informal ecosystem meetings.

Identify and help to fill gaps in preparedness monitoring.

The meeting highlighted that there is a complex existing system of indicators and monitoring efforts, new efforts being planned and ongoing gaps that remain unfilled. There is a need to ensure coherence and efficiency in global monitoring efforts, as well as to address any unmet needs.⁸

Activity 2

Chatham House and the Graduate Institute Geneva have created the Monitoring and Accountability of Preparedness for Global Health Crises (MAP) project that will focus on monitoring and reporting on aspects of the six areas outlined above, and, where appropriate, working with likeminded partners to ensure unfilled gaps are covered. The scope of MAP's analysis will include tracking trade and travel

⁸ A meeting on 18 April 2017 by the Harvard Global Health Institute (HGHI) and the US National Academy of Medicine (NAM) on the need to develop a monitoring framework on global health security and pandemic preparedness reached similar conclusions. The report of that meeting is forthcoming and the Chatham House Centre on Global Health Security and the Global Health Centre of the Graduate Institute Geneva will work with HGHI and NAM to ensure coverage of the gaps identified during both meetings.

restrictions, research and development, knowledge and data sharing, and linkages between animal and human health. Reports on these will support the strengthening of the monitoring mechanisms that will constitute the global ecosystem of monitoring and accountability for preparedness for global health crises.

The Lancet has agreed to publish peer-reviewed reports from this process twice yearly.

The Chatham House Centre on Global Health Security and the Global Health Centre of the Graduate Institute of International and Development Studies, Geneva would like to thank participants and funders for their support.

Background to discussions

In the wake of the 2014–16 Ebola crisis, the potential threat to safety and security from pandemics continues to be highly visible. With the widespread transmission of the Zika virus in 2016 and the continued threat from influenza and the MERS Coronavirus, the issue of outbreaks from emerging and re-emerging infectious diseases remains prominent on the global stage. However, there is concern that attention may not be maintained without appropriate mechanisms to keep global health crises on the political agenda.

There have also been many reports with recommendations for actions at the national, regional and global level to prepare for future outbreaks. A summary of seven major post-Ebola reports, with an initial assessment of follow-up actions, found that the global health community has taken some steps to become better prepared to deal with crises, including the reorganization of the emergency functions of WHO into the WHO Health Emergencies Programme, the strengthening of the Global Health Security Agenda, Joint External Evaluations of public health capacity, the development of the WHO Blueprint for research during outbreaks, and the creation of the Coalition for Epidemic Preparedness Innovations that has garnered more than \$540 million in initial commitments for research and development of new vaccines for epidemic prevention and control.⁹

At the highest level, the UN Global Health Crises Task Force¹⁰ was established by Secretary-General Ban Ki Moon to support and monitor the implementation of the reports by the High-Level Panel on Global Response to Health Crises.¹¹ It provides quarterly reports to bring to the secretary-general's attention to gaps in the global health architecture that impact preparedness for recognizing and responding to crises. In 2016–17 the taskforce has monitored the following nine priority areas.¹²

- Strategic support for national health systems to prevent global health crises.
- Integrating communities in efforts to prevent global health crises.
- Supporting regional arrangements to prevent and respond to health crises.
- Strengthening UN system capacity during health emergencies.
- Testing capacities and processes for global health crises response through simulations.
- Catalysing focused research and innovation relevant to global health crises.
- Securing sustainable financing for work on global health crises.
- Focusing attention on the gender dimensions of global health crises.
- Ensuring health crises are a priority on global political agendas.

The task force has been monitoring cooperation between actors as part of its work but not via a formal mechanism. It is expected to make its final recommendations for monitoring preparedness for global health crises in July 2017, at the end of its mandate.

Regional stakeholders and networks such as the European Union, the Association of Southeast Asian Nations (ASEAN), the African Union, and the Economic Community of West African States (ECOWAS) also play a role in preparedness for global health crises. Participants discussed the importance of these networks but further research and discussion is required to understand the potential role of, and most appropriate methods for, monitoring and reporting at the regional level.

⁹ Moon, S. et al. (2017), 'Post-Ebola reforms: ample analysis, inadequate action' *British Medical Journal*, 356(j280), doi, <https://doi.org/10.1136/bmj.j280> (accessed 7 Mar. 2017).

¹⁰ United Nations (2016), 'Global Health Crises Task Force', New York: United Nations <http://www.un.org/en/global-health-crises-task-force/index.html> (accessed 22 April. 2017).

¹¹ United Nations (2016), *Protecting humanity from future health crises: Report of the High-level Panel on the Global Response to Health Crises*, New York: United Nations, http://www.un.org/ga/search/view_doc.asp?symbol=A/70/723.

¹² United Nations (2016), *Global Health Crises Task Force*.

Between 2015 and 2017, the G7 and G20 have also placed global preparedness high on the political agenda through their debates and declarations. Health ministers of the G20 countries, for example, were planning a simulation exercise for their summit in Berlin in May 2017, one through which they hoped to raise awareness and better understand the role of the G20 and G20 countries in preparedness for global health crises.

Several initiatives have established targets and indicators to measure strength and progress in preparedness. The Sendai Framework for Disaster Risk Reduction, for example, takes an all hazards approach and is particularly health-focused. However, the metrics from many of these initiatives are voluntary, vague and overlapping, and monitoring is mostly of actions by countries rather than of other actors. Lacking is the monitoring of commitments, actions and contributions made by multilateral organizations, development banks, regional organizations, civil society and companies in the private sector in support of national and global preparedness. In summary, there are many gaps in the efforts to hold these stakeholders – whether people, organizations or national governments – accountable to their responsibilities, actions and commitments.

Monitoring and reporting for global health crises preparedness

There are a number of existing international frameworks for monitoring and evaluation of global health preparedness. Several independent initiatives have also begun to, or will soon, monitor and report on specific aspects of preparedness. These frameworks and initiatives are listed below (many were laid out in the meeting's background paper while others have been added following discussions at the meeting itself).

International frameworks

National governments are responsible for preparing for and responding to health crises. There exist a number of internationally agreed frameworks for improving preparedness at the national and global level, which are outlined below. They incorporate monitoring and reporting, with varying levels of formality and realization. A summary of these frameworks and their reporting mechanisms is found in Table 1. Many include specific indicators and targets listed in Appendix 1.

The International Health Regulations

The primary mechanism to avoid and prepare for global health crises, and thus ensure preparedness, is the legally binding WHO International Health Regulations (IHR). The IHR require all countries to strengthen their public health capabilities, and gives the WHO Director-General the power to declare a public health emergency of international concern (PHEIC) where a disease is capable of international spread.¹³ The agreed and required capacities include national surveillance and response capability, and actions at ports, airports and ground crossings to limit the propagation of infectious disease vectors that could enter on public conveyances.

Under the revised IHR, which came into effect in 2007, countries were given two years to complete a self-assessment of their national capability to meet minimum core capacities, followed by a further three years (until 2012) to achieve the required minimum level of core capacities. WHO granted two-year extensions

¹³ World Health Organization (2017), 'International Health Regulations', Geneva: World Health Organization, http://www.who.int/topics/international_health_regulations/en/ (accessed 8 Feb. 2017).

to almost 80 per cent (154 of 196) of countries to meet core capacity requirements by 2014,¹⁴ followed by the granting of additional extensions thereafter.

Each member state must designate a national focal point to serve as liaison with WHO to report on public health events and core capacity-building that occur at the national, intermediate and local community/primary response level. Despite the extensions granted, to date only one-third of countries worldwide have self-reported to WHO that they meet the necessary IHR core capacities to detect and assess risks as well as to respond to public health crises.

The IHR also provide the recognized framework for collective global response adopted by all WHO member states of. They require all countries to report any possible PHEIC. Unofficial reports can also be taken by WHO from other sources including the internet.

When a PHEIC is announced by the Director General, an emergency committee, convened at the discretion of the Director-General, is required to provide recommendations that maintain global public health. Member states are required under the IHR to follow these recommended procedures, and to avoid unwarranted restrictions on travel and trade so as to keep disruptions to a minimum. Private companies and other non-state actors are not beholden to IHR requirements.

No formal monitoring of unwarranted restrictions on travel and trade, or of the actions of private companies and non-state actors, during PHEICs is currently undertaken.

The World Organization for Animal Health Surveillance

The World Organization for Animal Health (OIE) coordinates global animal disease prevention and control. It maintains a list of 116 notifiable terrestrial and aquatic animal diseases for livestock and wildlife, and its 180 member countries are obliged to report all detected occurrences. It also created and manages the World Animal Health Information System (WAHIS) to provide public access to all information on all diseases on the list. This extensive database is critical in OIE efforts to improve the transparency, efficiency and speed with which animal health information is disseminated throughout the world.

Countries are expected to self-report to the OIE, but few have the veterinary skills or the surveillance capabilities to monitor wildlife and there is no monitoring system in place.¹⁵

The Sustainable Development Goals

The Sustainable Development Goals¹⁶ (SDGs) of the 2030 Agenda for Sustainable Development¹⁷ comprise 17 goals and 169 targets, representing a global call to action to reduce poverty and fight inequality. The SDGs are not legally binding but governments are expected to take ownership for meeting each target, with UN agencies taking responsibility for individual target oversight and data monitoring. Countries are expected to self-monitor progress towards these goals and report to the relevant UN agency.

SDGs 1, 2, 3, 11 and 13 include references to health and disaster risk reduction. Within these five SDGs, there are 20 targets and 39 indicators (see Appendix 1). SDG indicators have been categorized into three

¹⁴ World Health Organization (2014), 'Meeting of the IHR Review Committee on Second Extensions for establishing national public health capacities and on IHR implementation: Questions and Answers', Geneva: World Health Organization, <http://www.who.int/ihr/review-committee-nov-2014/en/> (accessed 22 Mar. 2017).

¹⁵ World Organization for Animal Health (2017), 'Animal Health in the World – Overview', Paris: World Organization for Animal Health, <http://www.oie.int/en/animal-health-in-the-world/> (accessed 20 Feb. 2017).

¹⁶ United Nations (2017), 'The Sustainable Development Agenda', New York: United Nations <http://www.un.org/sustainabledevelopment/development-agenda/> (accessed 8 Feb. 2017).

¹⁷ United Nations (2015), 'Resolution adopted by the General Assembly on 25 September 2015', New York: United Nations http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (accessed 8 Feb. 2017).

tiers, with Tier I being the most robust, and to date 13 of the indicators needed for monitoring health and disaster risk reduction were considered robust enough to be included in Tier I.¹⁸ However, the ability of countries to collect data to monitor even these Tier I indicators is uneven.

The Sendai Framework for Disaster Risk Reduction

The Sendai Framework for Disaster Risk Reduction 2015–30 is a voluntary, non-binding agreement adopted by governments recognized that they have primary responsibility for reducing disaster risk, but that other stakeholders (local governments, the private sector) have a role to play as well.¹⁹ It was adopted at the UN Conference on Disaster Risk Reduction in Sendai, Japan, in 2015, and includes strong health-related disaster indicators.²⁰

The Sendai Framework applies to all levels of disaster risk – local, national and global – and across all sectors.²¹ It specifies disasters as small-scale and large-scale, frequent and infrequent, sudden and slow-onset, naturally or deliberately caused, and related to environmental, technological and/or biological hazards and risks. The goal is to prevent and reduce disaster risk through “economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and institutional measures” that strengthen resilience.²²

The framework has seven targets in four priorities for action: understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction and enhancing disaster preparedness for effective response.²³ Four of the targets are directly linked to health, focusing on reducing mortality, strengthening early warning, promoting population well-being, and strengthening the safety of health facilities and hospitals at all levels of government.²⁴

National governments have primary responsibility for collecting the data required for the agreed set of indicators through national disaster loss databases and periodic national self-assessment. Global analysis is carried out by the UN International Strategy for Disaster Risk Reduction (UNISDR) and the results are reviewed and endorsed by an inter-governmental panel agreed by UN member states.

The Global Health Security Agenda

The Global Health Security Agenda (GHSA), initiated in 2014 by US President Barack Obama, is a non-binding coalition of countries, non-governmental organizations and international organizations working together to build national capacity to respond to infectious disease threats, to elevate global health security as a national and global priority, and ultimately to spur progress implementation of the IHR. The GHSA has 11 targets, called action packages, in three categories: preventing human and animal disease outbreaks, detecting outbreaks quickly and responding to confirmed disease threats.²⁵

18 United Nations (2016), Tier Classification for Global SDG Indicators. New York: United Nations Statistics Division <https://unstats.un.org/sdgs/files/meetings/iaeg-sdgs-meeting-04/Updated%20Tier%20Classification%20of%20SDG%20Indicators%2010-11-16.pdf> (accessed 8 Feb. 2017).

19 United Nations Office for Disaster Risk Reduction (2015), Fact Sheet: Health in the Context of the Sendai Framework for Disaster Risk Reduction. Geneva: United Nations Office for Disaster Risk Reduction http://www.unisdr.org/files/46621_healthinsendaiframeworkfactsheet.pdf (accessed 27 Mar. 2017).

20 Ibid.

21 PreventionWeb (2017), Chart of the Sendai Framework for Disaster Risk Reduction 2015–2030. Geneva: United Nations Office for Disaster Risk Reduction, http://www.preventionweb.net/files/44983_sendaiframeworkchart.pdf (accessed 8 Feb. 2017).

22 United Nations Office for Disaster Risk Reduction (2017), ‘Sendai Framework for Disaster Risk Reduction’, Geneva: United Nations Office for Disaster Risk Reduction, <http://www.unisdr.org/we/coordinate/sendai-framework> (accessed 8 Feb. 2017).

23 PreventionWeb (2017), Chart of the Sendai Framework for Disaster Risk Reduction 2015–2030.

24 United Nations Office for Disaster Risk Reduction (2015), Fact Sheet: Health in the Context of the Sendai Framework for Disaster Risk Reduction.

25 Centers for Disease Control and Prevention (2014), Global Health Security Agenda: Action Packages, Atlanta, GA: Centers for Disease Control and Prevention, https://www.cdc.gov/globalhealth/healthprotection/ghs/pdf/ghsa-action-packages_24-september-2014.pdf (accessed 8 Feb. 2017).

Fifty-six members work together under its auspices. A key strength of the GHSA is that it includes non-country members in discussions on global health security. It also helps to draw attention to the importance of building capacity in-country to deal with infectious disease threats and has provided some funding for these activities under the IHR. The United States has committed to investing \$1 billion for infrastructure strengthening through the GHSA, and together members have made more than 100 specific commitments ranging from securing dangerous pathogens in Uganda to containing measles outbreaks in Pakistan.²⁶

The Biological Weapons Convention

The Biological Weapons Convention is a multilateral disarmament treaty banning the development, production or stockpiling of biological weapons, which came into effect in 1975.²⁷ Member states voluntarily provide annual reports – using standardized, agreed self-assessment forms – on specific activities related to the convention that include:

data on research centres and laboratories; information on vaccine production facilities; information on national biological defence research and development programs; declaration of past activities in offensive and/or defensive biological research and development programs; information on outbreaks of infectious diseases and similar occurrences caused by toxins; publication of results and promotion of use of knowledge and contacts; and information on legislation, regulations, and other measures.²⁸

In 2006, after years of negotiation, member states adopted a detailed plan for promoting universal adherence to the convention, and updated and streamlined the procedures for submission and distribution of confidence-building measures to prove that they do not have an biological weapons programme. Member states also agreed to create an Implementation Support Unit to help countries implement the convention, housed at the UN Office for Disarmament Affairs in Geneva.²⁹

Though member states are required to self-report, only 81 of the 147 countries that ratified the convention submitted a report in 2016, and only 30 of those agreed to make it public.³⁰ The remaining reports are shared on a password-protected site for states parties.

The Convention on Biological Diversity

The UN Environmental Programme spearheaded the Convention on Biological Diversity, adopted in 1992, to create an international legal instrument for the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.³¹ The Strategic Plan for Biodiversity 2011-2020³² provides a framework for the whole UN system, and contains 20 targets,³³ with associated indicators.³⁴

²⁶ Global Health Security Agenda (2016), *Advancing the Global Health Security Agenda: Progress and Early Impact from U.S. Investment*, Atlanta, GA: Global Health Security Agenda, <https://www.ghsagenda.org/docs/default-source/default-document-library/ghsa-legacy-report.pdf> (accessed 7 Mar. 2017).

²⁷ United Nations Office for Disarmament Affairs (2016), 'Biological Weapons', New York: United Nations Office for Disarmament Affairs <https://www.un.org/disarmament/wmd/bio/> (accessed 8 Feb. 2017).

²⁸ Ibid.

²⁹ United Nations Office at Geneva (2009), 'Implementation Support Unit', [http://www.unog.ch/80256EE600585943/\(httpPages\)/16C37624830EDAE5C12572BC0044DFC1?OpenDocument](http://www.unog.ch/80256EE600585943/(httpPages)/16C37624830EDAE5C12572BC0044DFC1?OpenDocument) (accessed 8 Feb. 2017).

³⁰ Ibid.

³¹ Convention on Biological Diversity (2017), 'History of the Convention', <https://www.cbd.int/history/> (accessed 6 Mar. 2017).

³² Ibid.

³³ Convention on Biological Diversity (2017), *Generic and Specific Indicators for Assessing Progress in the Attainment of the Aichi Biodiversity Targets, Including an Assessment of their Main Characteristics*. Montreal: Convention on Biological Diversity, <https://www.cbd.int/doc/strategic-plan/strategic-plan-indicators-en.pdf> (accessed 6 Mar. 2017).

³⁴ Convention on Biological Diversity (2017), 'About the Nagoya Protocol', <https://www.cbd.int/abs/about/> (accessed 6 Mar. 2017).

The Nagoya Protocol, a supplement to the convention that entered into force in 2014, focuses on fair and equitable access to genetic resources including plant seeds and micro-organisms. In January 2017, the WHO Secretariat published a report that assessed the ways in which the Nagoya Protocol could affect the sharing of influenza and other infectious disease pathogens, and the resulting public-health implications. This review was undertaken with regard to the 2016 Review of the Pandemic Influenza Preparedness (PIP) Framework.³⁵ While the final report deemed the protocol a helpful framework for sharing pathogens, recommendations include ensuring that protocols do not slow down the rapid actions needed for sharing of genetic material and information in emergency situations.³⁶

States parties self-monitor with national reports every four-to-five years. These review progress in the implementation of the Strategic Plan for Biodiversity and towards the biodiversity targets. Countries are encouraged to include non-government stakeholders in the review process. As of the fifth national reporting round in 2014, 183 of 196 of states parties had submitted national reports.

³⁵ World Health Organization (2016), 2016 Review of the PIP Framework. Geneva: World Health Organization, http://apps.who.int/gb/ebwha/pdf_files/EB140/B140_16-en.pdf?ua=1, (accessed 6 Mar. 2017). The PIP Framework aims to improve the sharing of influenza viruses and low- and middle-income country access to associated vaccines and medicines.

³⁶ World Health Organization (2016), Implementation of the Nagoya Protocol and Pathogen Sharing: Public Health Implications. Geneva: World Health Organization, http://www.who.int/influenza/pip/2016-review/NagoyaStudyAdvanceCopy_full.pdf (accessed 6 Mar. 2017).

Table 1. Indicators and status of monitoring efforts for various internationally agreed frameworks

Mechanisms and initiatives	Indicators	Monitoring
International Health Regulations	IHR indicators are not measurable or specific; however they can now be measured via Joint External Evaluations (JEEs).	Compliance is self-reported by ministries of health. JEEs provide a mechanism for countries to compare their self-assessment with assessments by other experts. There is no external evaluation of technical or financial contributions by others. There is no monitoring of compliance of non-state actors during PHEICs as they are not bound by the IHR.
World Organisation for Animal Health Surveillance	Countries must report any occurrence of 116 livestock or wildlife diseases.	Countries self-report, but few have the veterinary skills or the surveillance capabilities to monitor wildlife and there is no monitoring system in place.
Sustainable Development Goals	Every target has been assigned an indicator, but none for preparedness are robust enough to be as ranked Tier I.	Compliance is voluntarily self-reported by countries to the appropriate UN agency.
Sendai Framework for Disaster Risk Reduction	Specific, measurable indicators were created by a UNISDR Intergovernmental Expert Working Group.	Countries are expected to self-report with oversight by UNISDR. The indicators do not include actions by non-state actors.
Global Health Security Agenda	11 targets in the form of action packages with 1–2 indicators per target and an external assessment tool that has been further developed into the JEE tool.	Action packages provide scope for countries and other actors to make commitments and work together to achieve global health security. Despite input in the development stage by non-country GHSA members, indicators do not include actions by non-state actors.
Biological Weapons Convention	The aim is to completely ban development, production or stockpiling of biological weapons, but there is limited public access to indicators of progress.	State parties self-report annually, and there is no independent verification that they are complying although there is a new peer-review process for compliance. Only 55 per cent of countries have submitted a report to the Implementation Support Unit and only 20 per cent make this public.
Convention on Biological Diversity	Target 16 of the Strategic Plan for Biodiversity includes an indicator that countries have adopted the Nagoya Protocol.	Countries self-report every four to five years. In 2014, 93 per cent of countries had submitted reports.

Voluntary evaluation initiatives

Two voluntary evaluation tools have been devised to assist countries in fulfilling their requirements under the IHR and OIE reporting standards.

The Joint External Evaluation Tool

The Joint External Evaluation Alliance (Alliance for Country Assessments for Global Health Security and IHR Implementation) emerged from the GHSA to assist countries in meeting the requirements under the IHR and GHSA-relevant capacities. The Joint External Evaluation (JEE) is a voluntary and collaborative process to assess a country's capacity to prevent, detect and rapidly respond to public health threats by using a tool that assesses 19 technical areas. It allows countries to identify and prioritize the most urgent needs within their health system, and to then develop a plan to address these needs and use the plan to engage with donors and technical partners to target resources effectively.³⁷

Conducting a JEE is a two-stage process with a national self-evaluation phase and an in-country external evaluation by a multisectoral team comprising experts from WHO member states, the WHO secretariat, the OIE, the UN Food and Agriculture Organization and other organizations such as INTERPOL.³⁸ As of March 2017, 32 JEEs had been completed, with 29 more in the pipeline to be undertaken.

Supporters of the JEE have praised it as a standardized tool. However, it has also been criticized because the results are not directly tied to national action, or to national or donor funding needed to make the recommended changes. Consequently, two additional components are being added to the JEE process. One is a set of national action packages that include multisectoral participation. The other is a rapid financing assessment tool being developed by the World Bank so that budget and financing issues are addressed simultaneously with the JEE technical review. The financing assessment tool is being designed to assess current budget allocations and to project additional budget needs as well as to review contingency funding strategies.

The OIE Performance of Veterinary Services tool

In 1994, the OIE expanded to advising on diseases of wildlife, creating the Performance of Veterinary Services (PVS) tool to evaluate national capacity to detect and respond to outbreaks of veterinary disease. The PVS Pathway is a voluntary and continuous process whereby member countries formally request the guidance necessary to evaluate their situation and address weaknesses. This process shifts the emphasis from short-term, emergency-type approaches to more sustainable, long-term capacity-building. As with the JEE, the tool is expected to lead to a national plan for strengthening veterinary public health capacity, and to a budget for these activities that can then be used to garner national and international funding and technical support.³⁹

As of March 2017, 136 PVS evaluation requests had been received by the OIE, with 69 country assessment reports available to relevant stakeholders and 24 available on the OIE website.⁴⁰

³⁷ Global Health Security Agenda (2017), 'Assessments and JEE', <https://www.ghsagenda.org/assessments> (accessed 7 Mar. 2017).

³⁸ World Health Organization (2016), Joint External Evaluation tool, Geneva: World Health Organization, http://www.who.int/ihr/publications/WHO_HSE_GCR_2016_2/en/ (accessed 22 Apr. 2017).

³⁹ World Organization for Animal Health (2017), 'The OIE Tool for the Evaluation of Performance of Veterinary Services (OIE PVS Tool)', Paris: World Organization for Animal Health, <http://www.oie.int/en/support-to-oie-members/pvs-evaluations/oie-pvs-tool/> (accessed 16 Feb. 2017).

⁴⁰ World Organization for Animal Health (2017), 'PVS Evaluation missions', <http://www.oie.int/en/support-to-oie-members/pvs-evaluations/status-of-missions/> (accessed 22 Apr. 2017).

Independent monitoring and reporting initiatives

Several monitoring and reporting initiatives by independent, non-government or UN organizations and coalitions have recently been announced, with some under way and others still in development.

The Lancet Countdown: Tracking Progress on Health and Climate Change

The Lancet, a British weekly peer-reviewed general medical journal, has created an annual report that will use indicators to chart the world's response to climate change and whether health is positively improving because of it. Working groups have developed draft indicators for five thematic areas: health impacts of climate change, health resilience and adaptation, health co-benefits of climate change mitigation, finance and economics associated with health and climate change, and political and broader engagement. Published in March 2017, the indicators will likely be refined based on input from *The Lancet* readership.⁴¹

The Skoll Outbreak Timeliness Measures

The Skoll Global Threats Fund (SGTF) is creating indicators to measure the timeliness of the key steps that need to be taken by ministries of health and the global health community to fight an epidemic.⁴² These include the timelines of outbreak detection, reporting, verification and response.⁴³

The SGTF adapted its methods from existing studies that looked at a WHO dataset of outbreaks at the global level. These showed trends at a global and regional level, but were not comprehensive enough to draw conclusions about specific diseases or country-level trends. The SGTF is working with field epidemiology training programmes through a partnership with the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) as well as with regional disease-surveillance networks that are under the Connecting Organisations for Regional Disease Surveillance umbrella to apply a similar approach at the country level that they hope will help ministries of health improve specific surveillance policies and practices.⁴⁴

The SGTF aims to begin sharing quantitative results to measure timeliness in late 2017.

The Rockefeller Resiliency Index

The Rockefeller Foundation is leading an approach to define and measure the resilience of health systems to shocks and stresses, including disease outbreaks. A Resilience Index has been developed, comprising a set of preliminary measures that builds upon existing metrics (e.g., from the IHR, the GHSA and the SDGs) and relevant ones from non-health fields. The index also proposes new resilience measures that require further development and testing. It is intended to bridge the gap between the slower needs of the health systems agenda, such as staff training, with the speedier needs of the preparedness agenda, such as rapid reallocation of funds. Many of the indicators intentionally reflect characteristics of everyday resilience that promote health-system function in chronic, everyday stresses as well as effective responses during acute shocks, so that the index can inform national health plans as well.⁴⁵

41 Watts, N., et al. (2017), 'The Lancet Countdown: tracking progress on health and climate change', *Lancet*, 389(10074), doi: [http://dx.doi.org/10.1016/S0140-6736\(16\)32124-9](http://dx.doi.org/10.1016/S0140-6736(16)32124-9) (accessed 22 Mar. 2017).

42 Klumberg, S. et al. (2016), 'Global Capacity for Emerging Infectious Disease Detection, 1996–2014', *Emerging Infectious Diseases*, 22(10), doi: <https://dx.doi.org/10.3201%2F2210.151956> (accessed 7 Jun. 2017); Chan, E. et al. (2010), 'Global capacity for emerging infectious disease detection', *Proceedings of the National Academy of Sciences of the United States of America*, 107(50), doi: [10.1073/pnas.1006219107](https://doi.org/10.1073/pnas.1006219107) (accessed 7 Jun. 2017)

43 Smolinski, M. et al. (2017), 'Finding outbreaks faster', *Health Security*, 15(2), doi:10.1089/hs.2016.0069 (accessed 7 Jun. 2017).

44 Email correspondence with Adam Crawley, Research Associate, Pandemics, Skoll Global Threats Fund, 29 March 2017

45 Email correspondence with Manisha Bhinge, Associate Director, Health, The Rockefeller Foundations, 29 March 2017

The next steps planned by the Rockefeller Foundation are to review and extend the list of measures, and to develop and validate indicators as required, with input from community leaders and non-health-sector actors. The Resilience Index indicators will then be embedded into mainstream measurement and monitoring of efforts to prepare for health crises.⁴⁶

The Global Health Security Index

The Nuclear Threat Initiative and the Johns Hopkins Center for Health, in partnership with the Economist Intelligence Unit, have recently announced a new initiative – the Global Health Security Index – that will develop a framework and collect data to measure country capacity to respond to global health threats and measure progress over time. The index is modelled on the Nuclear Security Index, which puts issues related to nuclear security on the agenda and has had success in driving change on related issues.

The Global Health Security Index partners will consult with an international panel of experts to inform the development of the index framework. The Economist Intelligence Unit will then work to collect data from open sources and analyse it. Where there is no publicly available data, they will look at other means to evaluate capacity and will have in-country teams conduct interviews to help build the index dataset.

Lessons in monitoring from other sectors

The Access to Medicine Index

The Access to Medicine Index (ATM) ranks the world's largest pharmaceutical companies on their success in making medicines, vaccines and diagnostics more accessible in low- and middle-income countries. The scope covers seven aspects of company operations: strategy, governance, R&D, pricing, licensing, capacity-building and donations. The ATM focuses on endemic diseases and health problems such as neonatal and maternal health. Emerging and re-emerging infectious diseases, such as those caused by the Zika and Ebola viruses and the MERS Coronavirus, usually have no approved medicines and are therefore absent from the list.⁴⁷

The ATM uses 83 indicators to monitor access as defined by measures to ensure broad geographic and disease coverage as well as the types of new products being developed. Measurement is done in collaboration with 20 companies every two years, and is often cited internationally as an example of a robust approach to health-related indicators. The methodology for ranking companies is reviewed during every two-year cycle and adjustments are made based on learnings and input from experts.⁴⁸

A similar approach may be applicable to measuring some elements of country preparedness, and the ATM is a good example of the role non-state actors can play in monitoring and reporting preparedness for global health crises.

The UN Human Rights Council Universal Periodic Review

The UN Human Rights Council undertakes a Universal Periodic Review (UPR) of states' human-rights records, and is now in its third four-year review cycle. UPRs are a state-driven process that allow for monitoring and accountability for human-rights violations. The UPR was established under Resolution

⁴⁶ Ibid.

⁴⁷ Access to Medicine Index (2016), 'About the Index', Amsterdam: Access to Medicine Foundation, <http://accesstomedicineindex.org/about-the-index/#what-we-measure> (accessed 27 Mar. 2017).

⁴⁸ Access to Medicine Index (2015), *The 2016 Access to Medicine Index; Methodology 2016*, Amsterdam: Access to Medicine Foundation, <http://accesstomedicineindex.org/media/atmi/2015-Methodology-for-2016-Access-to-Medicine-Index.pdf> (accessed 27 Mar. 2017).

60/251 of the UN General Assembly in 2006. The process is conceived as a cooperation mechanism and not one for naming and shaming. It requires the full involvement of the country concerned, with careful consideration given to its capacity-building needs.⁴⁹

The UPR is a political mechanism, rather than a technical mechanism, so it must be complementary to the existing technical mechanisms such as the work of treaty bodies and special rapporteurs. Gender must be integrated throughout the process. While its most visible element takes place in Geneva, the purpose of the UPR is to encourage change at the national level.⁵⁰

Lessons learned during the first two four-year cycles of the UPR include

the importance of state-to-state engagement; the need for universal participation of all UN member states on equal terms; and that the participatory nature of the review allows for free, open and meaningful participation of different stakeholders in all phases, including civil society organizations, academia and national human rights institutions.⁵¹

The principles incorporated in the monitoring process of the UPR may be useful and applicable to the monitoring of countries and global stakeholders in their contributions to national and global preparedness for health crises.

⁴⁹ United Nations Human Rights Council (2017), 'Basic Facts about the UPR' Geneva: UN Human Rights Council, <http://www.ohchr.org/EN/HRBodies/UPR/Pages/BasicFacts.aspx> (accessed 22 Apr. 2017)

⁵⁰ Information from UPR presentation during the meeting.

⁵¹ Ibid.

Appendix 1. Existing indicators for global health crises preparedness

International Health Regulations	
Core capacities	Indicators
1. National legislation, policy and financing	1.1.1 Legislation, laws, regulations, administrative requirements, policies or other government instruments in place are sufficient for implementation of IHR
2. Coordination and national focal point communications	2.1.1 A functional mechanism is established for the coordination of relevant sectors in the implementation of IHR
	2.1.2 IHR NFP functions and operations in place as defined by IHR (2005)
3. Surveillance	3.1.1 Indicator-based surveillance includes an early warning function for the early detection of a public health event
	3.2.1 Event-Based Surveillance is established and functioning
4. Response	4.1.1 Public health emergency response mechanisms are established and functioning
	4.2.1 Infection Prevention and Control (IPC) is established and functioning at national and hospital levels
5. Preparedness	5.1.1 Multi-hazard National Public Health Emergency Preparedness and Response Plan is developed and implemented
	5.1.2 Priority public health risks and resources are mapped and utilized
6. Risk Communication	6.1.1 Mechanisms for effective risk communication during a public health emergency are established and functioning
7. Human Resource Capacity	7.1.1 Human resources available to implement IHR Core Capacity requirements
8. Laboratory	8.1.1 Laboratory services available to test for priority health threats
	8.2.1 Laboratory biosafety and laboratory biosecurity (Biorisk management) practices in place and implemented
9. Points of Entry	9.1.1 General obligations at PoE are fulfilled (including for coordination and communication)
	9.2.1 Routine capacities and effective surveillance are established at PoE
	9.3.1 Effective response at PoE is established
10. Zoonotic Events	10.1.1 Mechanisms for detecting and responding to zoonoses and potential zoonoses are established and functional
11. Food Safety	11.1.1 Mechanisms are established and functioning for detecting and responding to foodborne disease and food contamination
12. Chemical Events	12.1.1 Mechanisms are established and functioning for detection, alert and response to chemical emergencies that may constitute a public health event of international concern

13. Radiation Emergencies	13.1.1 Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies that may constitute a public health event of international concern
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Sustainable Development Goals	
Target	Indicators
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.	1.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people.
	1.5.2 Direct disaster economic loss in relation to global gross domestic product (GDP)
	1.5.3 Number of countries with national and local disaster risk reduction strategies.
1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions.	1.a.2 Proportion of total government spending on essential services (education, health and social protection).
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	3.1.1 Maternal mortality ratio
	3.1.2 Proportion of births attended by skilled health personnel
3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births	3.2.1 Under-five mortality rate
	3.2.2 Neonatal mortality rate
3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases	3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations
	3.3.2 Tuberculosis incidence per 100,000 population
	3.3.3 Malaria incidence per 1,000 population
	3.3.4 Hepatitis B incidence per 100,000 population
	3.3.5 Number of people requiring interventions against neglected tropical diseases
3.4 By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease
	3.4.2 Suicide mortality rate

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders
	3.5.2 Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol
3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	3.6.1 Death rate due to road traffic injuries
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes	3.7.1 Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods
	3.7.2 Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group
3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.	3.8.1 Coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population).
	3.8.2 Proportion of population with large household expenditures on health as a share of total household expenditure or income
3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	3.9.1 Mortality rate attributed to household and ambient air pollution
	3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)
	3.9.3 Mortality rate attributed to unintentional poisoning
3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate	3.a.1 Age-standardized prevalence of current tobacco use among persons aged 15 years and older
3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all	3.b.1 Proportion of the target population covered by all vaccines included in their national programme
	3.b.2 Total net official development assistance to medical research and basic health sectors
	3.b.3 Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis

3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States	3.c.1 Health worker density and distribution
3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.	3.d.1 International Health Regulations (IHR) capacity and health emergency preparedness.
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people
	11.5.2 Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services
11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.	11.b.1 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.
	11.b.2 Number of countries with national and local disaster risk reduction strategies ¹ .
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of countries with national and local disaster risk reduction strategies ¹ .
	13.1.2 Number of deaths, missing persons and persons affected by disaster per 100,000 people
15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed.	15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits.

Sendai Framework for Disaster Risk Reduction 2015–30	
Target	Indicators
Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared with 2005-2015.	Number of deaths attributed to disasters, per 100,000 population.
	Number of missing persons attributed to disasters, per 100,000 population.
Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared with 2005-2015.	Number of injured or ill people attributed to disasters, per 100,000 population.
	Number of people whose damaged dwellings were attributed to disasters.
	Number of people whose destroyed dwellings were attributed to disasters.
	Number of people whose livelihoods were disrupted or destroyed, attributed to disasters.

Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.	Direct agricultural loss attributed to disasters.
	Direct economic loss to all other damaged or destroyed productive assets attributed to disasters.
	Direct economic loss in the housing sector attributed to disasters.
	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters.
	Direct economic loss to cultural heritage damaged or destroyed attributed to disasters.
Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.	Number of destroyed or damaged health facilities attributed to disasters.
	Number of destroyed or damaged educational facilities attributed to disasters.
	Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters.
	Number of disruptions to educational services attributed to disasters.
	Number of disruptions to health services attributed to disasters.
	Number of disruptions to other basic services attributed to disasters.
Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.
	Percentage of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies.
Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.	Total official international support, (official development assistance (ODA) plus other official flows), for national disaster risk reduction actions.
	Total official international support (ODA plus other official flows) for national disaster risk reduction actions provided by multilateral agencies.
	Total official international support (ODA plus other official flows) for national disaster risk reduction actions provided bilaterally.
	Total official international support (ODA plus other official flows) for the transfer and exchange of disaster risk reduction-related technology.
	Number of international, regional and bilateral programmes and initiatives for the transfer and exchange of science, technology and innovation in disaster risk education for developing countries.
	Total official international support (ODA plus other official flows) for disaster risk reduction capacity-building.
	Number of international, regional and bilateral programmes and initiatives for disaster risk reduction-related capacity building in developing countries.

	Number of developing countries supported by international, regional and bilateral initiatives to strengthen their disaster risk reduction-related statistical capacity.
Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.	Number of countries that have multi-hazard monitoring and forecasting systems.
	Number of people per 100,000 that are covered by early warning information through local governments or through national dissemination mechanisms.
	Percentage of local governments having a plan to act on early warnings.
	Number of countries that have accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels.
	Percentage of population exposed to or at risk from disasters protected through pre-emptive evacuation following early warning.

Global Health Security Agenda	
Target	Indicators
<p>Prevent 1 – Antimicrobial resistance: Support work being coordinated by WHO, FAO, and OIE to develop an integrated and global package of activities to combat antimicrobial resistance, spanning human, animal, agricultural, food and environmental aspects (i.e. a one-health approach) , including: a) Each country has its own national comprehensive plan to combat antimicrobial resistance; b) Strengthen surveillance and laboratory capacity at the national and international level following agreed international standards developed in the framework of the Global Action plan, considering existing standards and; c) Improved conservation of existing treatments and collaboration to support the sustainable development of new antibiotics, alternative treatments, preventive measures and rapid, point-of-care diagnostics, including systems to preserve new antibiotics.</p>	Number of comprehensive plans to combat antimicrobial resistance agreed and implemented at a national level, and yearly reporting against progress towards implementation at the international level
	Number of countries actively participating in a twinning framework, with countries agreeing to assist other countries in developing and implementing comprehensive activities to combat antimicrobial resistance, including use of support provided by international bodies to improve the monitoring of antimicrobial usage and resistance in humans and animals.
<p>Prevent 2 – Zoonotic disease: Adopted measured behaviours, policies and/or practices that minimize the spillover of zoonotic diseases from lower animals into human populations.</p>	Identify the five zoonotic diseases/pathogens of greatest public health concern and strengthen existing surveillance systems for prioritized zoonoses.

<p>Prevent 3 – Biosafety and biosecurity: A whole-of-government national biosafety and biosecurity system is in place, ensuring that especially dangerous pathogens² are identified, held, secured and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach are conducted to promote a shared culture of responsibility, reduce dual use risks, mitigate biological proliferation and deliberate use threats, and ensure safe transfer of biological agents; and country-specific biosafety and biosecurity legislation, laboratory licensing, and pathogen control measures are in place as appropriate.</p>	<p>Number of countries who have completed/Completion of a national framework and comprehensive oversight system for pathogen biosafety and biosecurity, strain collections, containment laboratories and monitoring systems that includes identification and storage of national strain collections in a minimal number of facilities.</p>
<p>Prevent 4 – Immunization: A functioning national vaccine delivery system—with nationwide reach, effective distributions, access for marginalized populations, adequate cold chain, and ongoing quality control—that is able to respond to new disease threats.</p>	<p>At least 90% coverage of the country's fifteen-month-old population with at least one dose of measles-containing vaccine as demonstrated by coverage surveys or administrative data.</p>
<p>Detect 1 – National laboratory system: Real-time biosurveillance with a national laboratory system and effective modern point-of-care and laboratory-based diagnostics.</p>	<p>A nationwide laboratory system able to reliably conduct¹ at least five of the 10 core tests on appropriately identified and collected outbreak specimens transported safely and securely to accredited laboratories from at least 80 percent of districts in the country.</p>
<p>Detect 2/3 – Real-time surveillance: Strengthened foundational indicator- and event-based surveillance systems that are able to detect events of significance for public health, animal health and health security; improved communication and collaboration across sectors and between sub-national, national and international levels of authority regarding surveillance of events of public health significance; improved country and regional capacity to analyze and link data from and between strengthened, real-time surveillance systems, including interoperable, interconnected electronic reporting systems. This can include epidemiologic, clinical, laboratory, environmental testing, product safety and quality, and bioinformatics data; and advancement in fulfilling the core capacity requirements for surveillance in accordance with the IHR and the OIE standards.</p>	<p>Surveillance for at least three core syndromes indicative of potential public health emergencies conducted according to international standards.</p>
<p>Detect 4 – Reporting: Timely and accurate disease reporting according to WHO requirements and consistent coordination with FAO and OIE.</p>	<p>Number of countries trained for reporting of potential public health events of international concern to WHO and to other official reporting systems such as OIE-WAHIS. (and/or) Number of National IHR Focal Points connected to the learning package on reporting to WHO.</p>
<p>Detect 5 – Workforce development: A workforce including physicians, veterinarians, biostatisticians, laboratory scientists, farming/livestock professionals, and at least 1 trained field epidemiologist per 200,000 population, who can systematically cooperate to meet relevant IHR and PVS core competencies.</p>	<p>One trained field epidemiologist per 200,000 population, and one trained veterinarian per 400,000 animal units (or per 500,000 population), who can systematically cooperate to meet relevant IHR and PVS core competencies.</p>

<p>Respond 1 – Emergency Operations Centers: Every country will have a public health Emergency Operations Center (EOC) functioning according to minimum common standards; maintaining trained, functioning, multi-sectoral rapid response teams (RRTs) and "real-time" biosurveillance laboratory networks and information systems; and trained EOC staff capable of activating a coordinated emergency response within 120 minutes of the identification of a public health emergency.</p>	<p>Documentation that a public health EOC meeting the above criteria is functioning.</p>
<p>Respond 2 – Linking public health with law and multisectoral rapid response: In the event of a biological event of suspected or confirmed deliberate origin, a country will be able to conduct a rapid, multi-sectoral response, including the capacity to link public health and law enforcement, and to provide and/or request effective and timely international assistance, including to investigate alleged use events.</p>	<p>Evidence of at least 1 response within the previous year that effectively links public health and law enforcement, OR a formal exercise or simulation involving leadership from the country's public health and law enforcement communities.</p>
<p>Respond 3 Medical countermeasures and personnel deployment: A national framework for transferring (sending and receiving) medical countermeasures and public health and medical personnel among international partners during public health emergencies.</p>	<p>Evidence of at least 1 response to a public health emergency within the previous year that demonstrates that the country sent or received medical countermeasures and personnel according to written national or international protocols, OR a formal exercise or simulation that demonstrates these things.</p>

<p style="text-align: center;">Convention on Biological Diversity</p>	
<p style="text-align: center;">Target</p>	<p style="text-align: center;">Indicators</p>
<p>By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.</p>	<p>Number of Parties to the CBD that have deposited the instrument of ratification, acceptance, approval or accession of the Nagoya Protocol.</p> <p>Number of countries that have adopted legislative, administrative and policy frameworks for the implementation of the Nagoya Protocol (SDG indicator 15.6).</p>

Appendix 2. WHO and the World Bank Group financing initiatives

The WHO Contingency Fund for Emergencies

In 2015 WHO established a Contingency Fund for Emergencies (CFE) to enable an immediate release of funds at the beginning of an emergency until resources from other financing mechanisms begin to flow. The CFE builds on a smaller fund created in the early 2000s with funding from the Nuclear Threat Initiative, and will allow WHO to deploy resources and begin emergency operations immediately, financing WHO leadership, national emergency operations and partner coordination in an emergency response. The CFE is designated to respond not just to infectious disease outbreaks but also to all crises with health and humanitarian consequences, including natural disasters. Specifically, the CFE will focus on recruitment and deployment of surge emergency human resources; coordination of emergency medical teams; travel of technical experts to where they are needed; the setting up of information technology systems where needed; procurement and delivery of medical supplies; compilation, analysis, mapping and communication on health and emergency response information; establishment and operation of field offices; and provision of technical advice to local authorities on all aspects of the emergency response. The CFE will provide financing for WHO and/or WHO-led emergency operations for up to three months.⁵²

As of January 2017, the CFE had raised \$32.65 million of its target of \$100 million of flexible voluntary contributions.⁵³

The World Bank Group Pandemic Emergency Financing Facility

In response to the 2014–16 Ebola outbreak that saw sufficient financing flows begin only three months after the PHEIC declaration, the World Bank Group created a Pandemic Emergency Financing Facility (PEF). Similar in premise to the WHO CFE, the PEF seeks to provide rapid financing for public health emergencies. A key distinction between the two is the level of autonomy granted to WHO to release funds from the inception of an emergency; the World Bank will only release funds according to a previously agreed upon trigger point and reporting that said trigger point has been reached.⁵⁴

To trigger PEF funding, specific criteria are required to be met. These are based on the size, growth and spread of the outbreak: number of deaths, growing over time, and affecting two or more countries, respectively. Funding is also available to outbreaks that do not meet these criteria, primarily for supplementary financing to severe but not trigger-point outbreaks: outbreaks that occur in only one country, and outbreaks caused by a new or unknown pathogen. The World Bank Group worked closely with WHO in designing the PEF. While the CFE can be activated by health and humanitarian events, the PEF is specifically designed for outbreaks with pandemic potential.⁵⁵

As of March 2017, the PEF had received one contribution of \$50 million. It aims to reach \$500 million to be fully operational.⁵⁶

⁵² World Health Organization (2017), 'About the Contingency Fund for Emergencies', Geneva: World Health Organization, http://www.who.int/about/who_reform/emergency-capacities/contingency-fund/en/ (accessed 23 Mar. 2017).

⁵³ World Health Organization (2017), 'Contingency Fund for Emergencies income and allocations', Geneva: World Health Organization, http://www.who.int/about/who_reform/emergency-capacities/contingency-fund/contribution/en/ (accessed 7 Apr 2017).

⁵⁴ World Bank (2017), 'Pandemic Emergency Facility: Frequently Asked Questions', Washington, DC: World Bank, <http://www.worldbank.org/en/topic/pandemics/brief/pandemic-emergency-facility-frequently-asked-questions> (accessed 7 Apr. 2017)

⁵⁵ Ibid.

⁵⁶ Ibid.