Thematic Paper on the Status of Country Preparedness Capacities

Background report commissioned by the Global Preparedness Monitoring Board (GPMB)

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Background

At the request of the Global Preparedness Monitoring Board (GPMB), the World Health Organization (WHO) has developed this report as a contribution to the development of the Board's first annual report.

The Global Preparedness Monitoring Board (GPMB) provides the world with an independent, authoritative, comprehensive and inclusive overview of the state of its preparedness for health emergencies, and urges political action to prepare for and mitigate the effects of emergencies. For its first annual report, the GPMB analysed evidence from various sources, including reviewing progress made against global recommendations that emerged from reviews of the West Africa Ebola virus disease outbreak in 2014, and commissioned special reports on specific themes..

Contributing to the GPMB's work, WHO researched and analyzed high-level recommendations and data that emerged after recent public health events to provide an overview of country preparedness and to assess global progress in developing national capacities for health emergency management.

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Executive Summary

Background

Recent health emergencies have made it clearer than ever that a threat to public health anywhere in the world is now a threat to public health everywhere in the world.

Greater levels of interconnectedness through increased travel and trade and the persistent weakness of many international borders can make transmission of diseases difficult to control. Public health hazards beyond infectious diseases, including natural disasters and biological or chemical /radiation events, are also urgent threats that require global, national and community preparedness. The risks and impact of health emergencies can also be profound at the regional and national levels and in order to manage the risks of all hazards it is vital to have a clear picture of current emergency preparedness levels.

Through analysis of country level data, key stakeholder interviews, and reviews of high-level recommendations made in the wake of recent emergencies, this report provides an overview of the status of country preparedness capacities and global progress in implementing identified priority actions.

Key Findings

While some key health emergencies in recent years have catalyzed important progress in preparedness levels, the strength of capacities remains highly variable across all countries and between regions. Country-level data shows that most countries currently have low-to-moderate levels of national preparedness and that there is a wide distribution in preparedness levels across the world.

In general, analysis of national preparedness data indicates that the strongest capacities across all countries include laboratory systems, surveillance and immunization. The weakest include capacities for preparing against chemical and radiation emergencies as well as securing points of entry. Ensuring strong national legislation remains a critical concern for many countries too.

Current challenges that a lot of countries face include the development and identification of standard operating procedures for both preparedness and response activities. Achieving sufficient clarity on the necessary activities to improve preparedness levels is a difficulty for many countries too.

There is variance in the degree to which necessary steps toward improved country preparedness has advanced. Monitoring and evaluation of national capacities and high-level awareness of preparedness have improved over time while other essential elements remain limited. Health systems should be reinforced to enable preparedness for all health emergency risks instead of single diseases. Better coordination among multiple sectors is vital, particularly those essential to ensuring preparedness (e.g. security, local government, etc). More focus is needed toward the needs of the world's rapidly growing urban contexts given the highly dynamic and unique challenges that these settings face in terms of preparing for – and managing – health emergencies.

Engaging communities is an area that needs much improvement—but doing so offers great opportunities to strengthen preparedness. Finance and resources remain a consistent concern. Setting up regional and national public health institutes, meanwhile, offers a clear way to boost preparedness and share best practices.

Our findings also indicate that a number of important bottlenecks persist including financing flows, community preparedness and effective coordination and engagement across sectors.

Many developing nations and low-resource regions have critical gaps in their capacities that are yet to be addressed. Analysis of national preparedness data and stratification of results across income category shows that 31 lower-income countries have the lowest levels of preparedness, while the 45 highest-income countries score the highest capacity levels. But economic development is no guarantee for preparedness. When faced with a public health emergency, even the most economically developed countries are shown to have gaps in their health systems.

The Way Forward

This report identifies a subset of high-level recommendations that should be closely monitored in order to help strengthen country preparedness levels. These include greater and more targeted engagement of the private sector, strengthening multisectoral approaches and expanding the level of domestic resources allocated to preparedness.

Ultimately, significant advances are being made in global, regional and national preparedness, as shown by examples such as the swift declaration of the 2016 Zika outbreak, the rapid strengthening of operational readiness in countries currently at risk of Ebola and the establishment of national health institutes in several countries. However, there is still wide variance in national preparedness. Much better engagement must be made at the community level, and, as the world's population increasingly moves into cities, the challenges associated with urban environments must be addressed better.

Greater political will and coordinated approaches across all sectors can make the most of the many opportunities to strengthen country preparedness capacities and increase health security. Using robust investment cases that are designed to meet critical gaps in capacity, countries can better make informed decisions on how to build their preparedness levels.

There are also several key actions that the Global Preparedness Monitoring Board could consider for supporting country preparedness.

High-level conclusions for the GPMB:

Integrate and monitoring preparedness data: International organizations should present data from monitoring and evaluation of health emergency preparedness to the GPMB to help measure progress over time. The Board could call for data integration platforms and, as advocates, encourage all countries to publish the outputs of their monitoring and evaluation activities.

Bridge the gap between the health and non-health sectors: The Board should call for or set up a global multisectoral framework for preparedness to guide priority actions.

Elevate advocacy for preparedness at the high political levels: The Board should encourage health security leaders to consolidate gains made in preparedness capacities; to reach out as advocates to non-health stakeholders such as the security and private sector, trade and tourism; and find a small group of countries that can act as global champions for preparedness, sharing best practices.

Expand community preparedness: The Board should call upon countries and stakeholders to consider how public health stakeholders can better evaluate community engagement in countries, as well as to engage international organizations, governments, and civil society with best practices for sharing leadership with and actively empowering communities in all aspects of preparedness. Equity and empowerment of vulnerable groups should be embedded in emergency management strategies.

Support alignment of health systems and heath security: Partnerships, initiatives and resources should be mapped and matched with greatest priorities; call for greater alignment of technical and international support with national priorities that meet the critical gaps that countries experience and use national action plans for achieving progress in line with this; countries to ensure alignment of health systems and health security preparedness, and to

Encourage greater financing: To help ensure more sustainable financing, countries should maximally integrate their costed NAPHS with other related national plans, and to conduct resource mapping exercises to efforts to identify synergies and resources for preparedness. Countries with the ability to give more domestic resources toward preparedness should do so. The Board should facilitate this by helping countries to develop comprehensive investment cases and highlighting innovative ways to spur domestic resource allocation.

Acronyms and Abbreviations

Africa CDC	Africa Centers for Disease Control and Prevention
APSED	Asia Pacific Strategy For Emerging Diseases and Public Health Emergencies
CDC	U.S. Centers for Disease Control and Prevention
CFP	Common Framework for Preparedness
DRC	Democratic Republic of the Congo
DRM	Disaster Risk Management
EVD	Ebola virus disease
GHSA	Global Health Security Agenda
GPMB	Global Preparedness Monitoring Board
IANPHI	International Association of National Public Health Institutes
IDSR	Integrated Disease Surveillance and Response
IHR 2005	International Health Regulations (2005)
IHR MEF	IHR Monitoring and Evaluation Framework
JEE	Joint External Evaluation
MERS	Middle East Respiratory Syndrome
NAPHS	National Action Plan for Health Security
NTI	Nuclear Threat Initiative
OIE	World Organization for Animal Health
PVS	Performance of Veterinary Services
SIDS	Small Island Developing States
SPAR	State Parties Annual Reporting
UHC	Universal Health Coverage
WHA	World Health Assembly
WHO	World Health Organization

I. Introduction

The health and wellbeing of populations, public health systems, and the economies and political stability of communities and countries are constantly under threat by a range of hazards including outbreaks of emerging and re-emerging infectious diseases, natural disasters and biological or chemical/radiation events. Despite considerable measures to ensure prevention and strengthen national preparedness, health emergencies continue to negatively impact health systems in every region of the world.

For the purposes of this paper, national preparedness for health emergencies is defined as:

the knowledge and capacities and organizational systems developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, emerging, or current emergencies.1,2

These include "the development of national, intermediate and community/primary response level public health emergency response plans for relevant biological, chemical, radiological and nuclear hazards. Other components of preparedness include mapping of potential hazards and hazard sites, the identification of available resources, the development of appropriate national stockpiles of resources and the capacity to support operations at the intermediate and community/primary response levels during a public health emergency".[3]

As a legally binding instrument, the International Health Regulations (2005) (IHR) require countries to maintain a set of capacities "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade."[4]

Recent health emergencies clearly demonstrate that critical gaps exist at both the national and subnational (community) levels. To date, there have been four public health events that the WHO Director General determined to be public health emergencies of international concern (PHEIC) under the IHR (2005). These were prompted by:

- An outbreak of H1N1 (2009)
- The resurgence of polio (2014)
- The outbreak of Ebola virus in West Africa (2014)
- The outbreak of Zika virus (2016)

[1] WHO, Strategic Framework for Emergency Preparedness, 2017
[2] WHO, Framework for a Public Health Emergency Operations Centre, 2015.
[3] https://www.who.int/ihr/preparedness/en/
[4] International Health Regulations (2005)
https://apps.who.int/iris/bitstream/handle/10665/43883/9789241580410_eng.pdf?sequence=1

The impact of the Ebola virus outbreak in West Africa (2014), resulting in over 28,000 cases and 11,310 deaths, was a clear example of the risks associated with weak or fragile national preparedness capacities. Similarly, outbreaks of MERS CoV, plague and cholera in other countries in recent years highlighted the need for continued strengthening of national preparedness and health systems. Other types of health emergencies, including active conflict and protracted humanitarian crises (drought & famine), show that necessary capacities to prepare countries are often lacking.

These events, along with examples of pandemics including influenza, underscore the ability and potential of pathogens to spread across countries and regions quickly in an interconnected world. They also underline the urgency required to ensure all countries are adequately prepared and provide equitable access to the medical and other countermeasures necessary for response.

International and national stakeholders have rightly elevated emergency preparedness as a global public health issue. WHO's Thirteenth General Programme of Work 2019−2023 (GPW 13) includes an explicit aim to achieve '1 billion people more people better protected from health emergencies'. The UN Sustainable Development Goals (in particular Target 3.D[5]) recognise preparedness as a crucial part of international development. Regional approaches for emergency preparedness are also well-documented, and several initiatives are being led at the national level to support this.

Given the importance of national preparedness, several measures have been developed to evaluate and assess country capacities. These frameworks, strategies and initiatives have been critical in shaping efforts to strengthen country preparedness. Annex 1 provides more details about these.

Many global and regional institutions have used their position to promote and support country capacity building. The African Union/Africa CDC, European Union, Global Health Security Agenda (GHSA), and others are all deeply involved in activities to strengthen national preparedness.

Implementing national/community capacities for preparedness and for the IHR cannot be accomplished in a vacuum. The concrete solutions – for example, ensuring a qualified health workforce, securing the necessary resources, support for and integration of essential public health functions (e.g. surveillance, laboratory, information systems), building community trust in their health system, ensuring access to health commodities – require active integration between the health security and health systems worlds.

Several public health frameworks are essential to helping countries prepare for and better manage health emergencies. These include:

- UHC2030; Accelerating progress towards Universal Health Coverage and Health 2020
- The European Policy for Health and Well-Being (EURO)
- The Global Strategy on Human Resources for Health: Workforce 2030

[5] https://sustainabledevelopment.un.org/sdg3

Objectives

This paper assesses the current state of national preparedness and progress made toward an all-hazards approach for health emergency management. It considers the current level of preparedness in different settings with a close look at countries that are resource limited and those which experience a high vulnerability to outbreaks of infectious diseases and natural disasters.

The paper also assesses existing opportunities and challenges associated with strengthening country level preparedness and identifies a set of priority recommendations to be closely monitored for progress. It concludes by presenting key actions that can help achieve greater national capacities for health emergency preparedness.

Methods

The research and analysis for the chapter is based on a mixed-methods approach.

Desk-based analysis of high-level recommendations that have been made following recent health emergencies are supported by 39 key stakeholder interviews with individuals and groups from UN agencies and other multinational/supra-governmental institutions, state and non-governmental public health organizations, WHO Member States and academic institutions. Empirical data from evaluations of national preparedness and scientific research are also used as part of analytical methods. A reference group of international public health experts were convened to provide strategic advice throughout the development of the paper.

This paper primarily uses infectious disease outbreaks as case studies but adopts an all-hazards approach for the assessment of preparedness capacities and progress.

II. Current Level of Preparedness

Preparedness levels across regions and countries vary dramatically. Composite measures of different components of preparedness show a consistent lack of national preparedness and dramatic variation across countries and regions.

This variation is affected by many interrelated factors, including the relative significance that it is given as a national priority, the amount of available resources that can be dedicated to financing preparedness, and the nature of threats that a country faces.

Analysis of 231 high-level recommendations made after recent health emergencies, a review of how various preparedness frameworks, strategies and initiatives have been implemented, and outputs of key stakeholder interviews have provided important information about the current state of global and national preparedness levels.

Preparedness findings

The vast majority of countries currently have low or moderate levels of national preparedness. The outputs of IHR Monitoring and Evaluation framework (IHR MEF) provide one of the most comprehensive datasets on the status of country preparedness. The framework is a useful and powerful tool – made up of four components shown below in figure 1 – that provides a strong evidence base regarding national preparedness levels.

The four components of IHR monitoring and evaluation framework

	IHR MONITORING AND EVALUATION FRAMEWORK			
	States Parties self-assessment annual reporting (SPAR)	After action reviews (AAR)	Simulation exercices (SimEx)	Voluntary External Evaluations
Purpose	Monitor progress towards implementation of IHR core capacities	Assess the functionality of capacities during real events	Assess the potential functionality of capacities for non-real events	Evaluates objectively IHR contribute to health security
Mandate	Mandatory	Voluntary	Voluntary	Voluntary
Focus	Existence of capacities	Functionality of capacities	Functionality of capacities	Existence of capacities
Periodicity	Annually	Within 3 months of specific real events	Regularly when required as part of the exercise programme	Every 4-5 years
Type	Quantitative	Qualitative	Qualitative	Quantitative

Figure 1: Components of the IHR Monitoring and Evaluation Framework

Data gathered through States Parties Annual Reporting (SPAR) to the World Health Assembly on the progress of national IHR implementation – and information collected through the Joint External Evaluation (JEE) – show important information regarding the current state of preparedness.

State Parties perform annual reporting through a self-evaluation of the 13 IHR (2005) capacities using 24 indicators. These indicators, with defined attributes, are scored from 0–5 in an ordinal scale.

Figure 2 below shows the global average scores for each of the 13 IHR capacities using data submitted by countries to WHO in 2018. Analysis of the data shows that laboratory and surveillance capacities are the two technical areas of national preparedness where countries report the highest scores on average. In turn, some of the weakest capacities are in the areas of points of entry, chemical events and radiation emergencies.

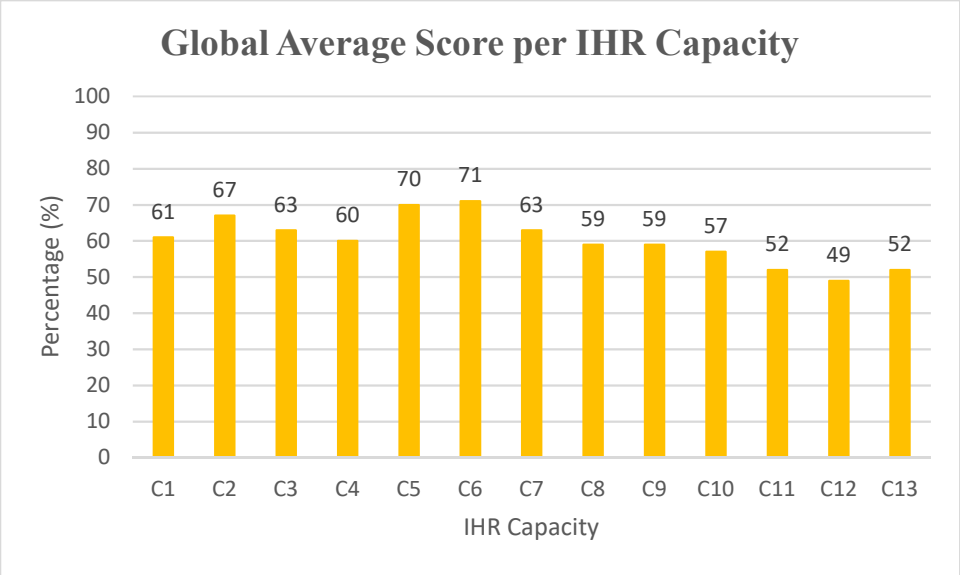


Figure 2: 2018 SPAR IHR implementation scores, Source: WHO 2019

The 2018 SPAR capacities are:

C1. Legislation and Financing
C2. IHR Coordination and National IHR Focal Point Functions
C3. Zoonotic events and the Human–animal interface
C4. Food safety
C5. Laboratory
C6. Surveillance
C7. Human resources
C8. National Health Emergency Framework
C9. Health Service Provision
C10. Risk Communication
C11. Points of entry
C12. Chemical events
C13. Radiation emergencies

A Health Emergency Protection Index (preparedness index) is being developed by WHO to monitor progress on the progress toward the goal of having "1 Billion people better protected from health emergencies" as part of its 13th General Programme of Work[6]. The index consists of three tracer indicators that capture activities to prepare for, prevent, detect and respond to health emergencies.

The prepare indicator measures the attainment of the IHR core capacities using SPAR data. This indicator is calculated using the mean sum of country implementation of all 13 self-reported core capacities.

Using the scores of the prepare indicator, countries can be categorized into 5 varying levels of preparedness as shown in the table below (Table 1).

[6] http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_5-en.pdf

Table 1: Five levels that comprise the Preparedness Index	
Level 1	<30%
Level 2	30%–<50%
Level 3	50%–<70%
Level 4	70%–<90%
Level 5	≥90%

As of April 30, 2019, data from 187 countries is available for the most recent reporting year (2018). Of this, 182 reports are in a format that can be included in analysis. Figure 3 below shows the results of the preparedness index analysis.

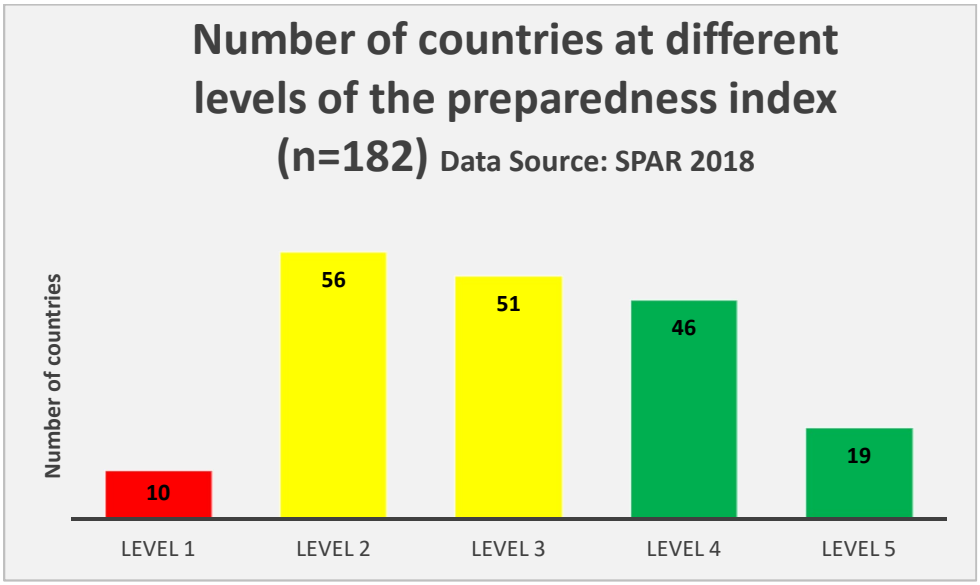


Figure 3: Number of countries in the different capacity levels of preparedness index

This analysis shows that the majority of countries currently have low or moderate levels of national preparedness. It is worth noting that the preparedness index takes data from across all 13 capacities. Based on the above stratification of preparedness capacity levels, 10 and 56 countries are at the levels of 1 and 2, respectively, suggesting an urgent need of capacity strengthening activity and investment.

51 countries are at level 3, which requires efforts to sustain and strengthen their capacities. The countries with levels 4 and 5 need to ensure that the achievements made in reaching these levels of capacity are maintained, and that technical assistance and sharing of knowledge/best practice can be provided to countries with weaker capacities.

Figure 4 below shows the global distribution of national JEE scores when using the average score of the indicators across the 19 technical areas that make up the evaluation (data reflects the results of JEEs in 83 countries).

The results show that the majority of countries (66%) have limited or developed capacity while a minority (34%) have demonstrated or sustainable capacity. This indicates that the majority of countries are only moderately prepared to manage emergencies. These findings are consistent with the analysis from preparedness index using SPAR data which also demonstrate that most countries fall into the middle levels of the scale (figure 3).

The JEE tool evaluates the strength of 19 national technical areas:

1. National legislation, policy and financing
2. IHR coordination, communication and advocacy
3. Anti-microbial resistance (AMR)
4. Zoonotic disease
5. Food safety
6. Biosafety and biosecurity
7. Immunization
8. National laboratory systems
9. Real time surveillance (Surveillance in the second edition)
10. Reporting
11. Workforce development (Human resources in the second edition)
12. Preparedness (Emergency preparedness in the second edition)
13. Emergency response operations
14. Linking public health and security authorities
15. Medical countermeasures and personnel Deployment
16. Risk communication
17. Points of entry (POE)
18. Chemical events
19. Radiation emergencies.

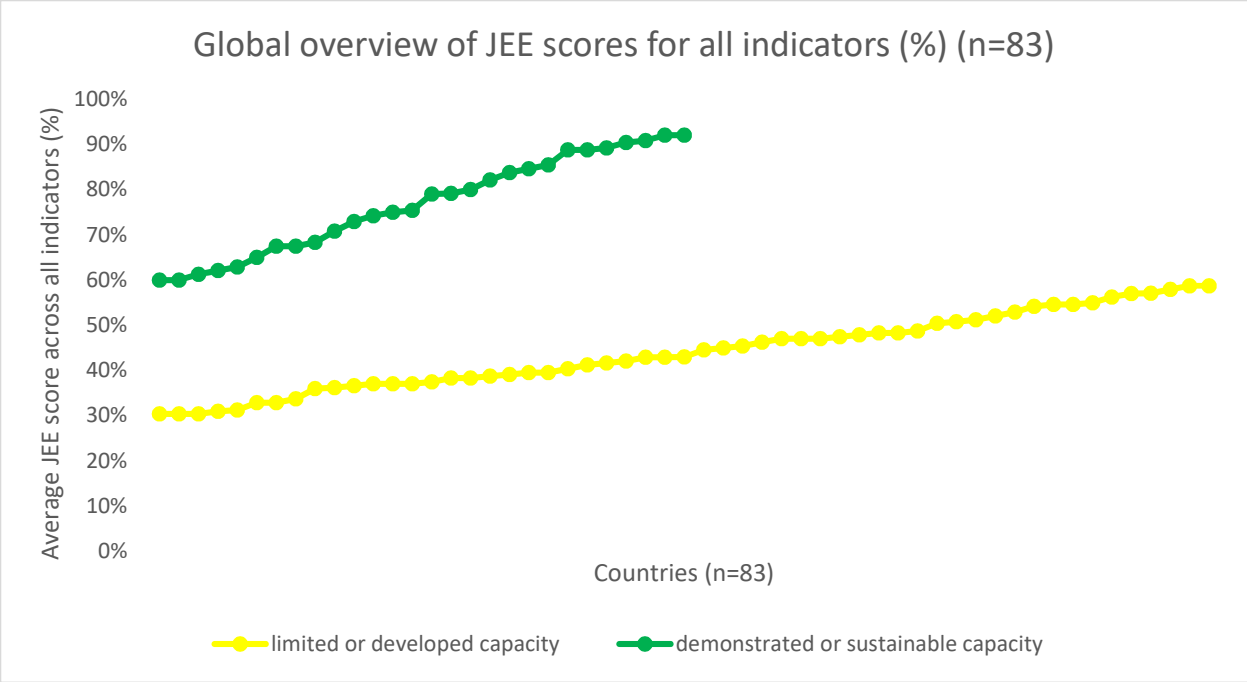


Figure 4 – Global distribution of national JEE scores when using the average score of all indicators across the 19 technical areas

In addition, figure 5 below shows the global average scores for the 19 technical areas that the JEE evaluates. It indicates that this assessment tool also identifies surveillance and national laboratory systems as among the strongest technical capacities for preparedness when all scores across the world are taken in to account. It also shows that immunization capacities are also strong.

However it is important to note that these strengths are relative to the other capacities. The data shows that the three strongest JEE capacities have scored a global average of 77%, 66% and 63% respectively which leaves a considerable amount unachieved. Of course, not all countries in the world have implemented a JEE to date and the distribution of scores will likely shift as more data becomes available.

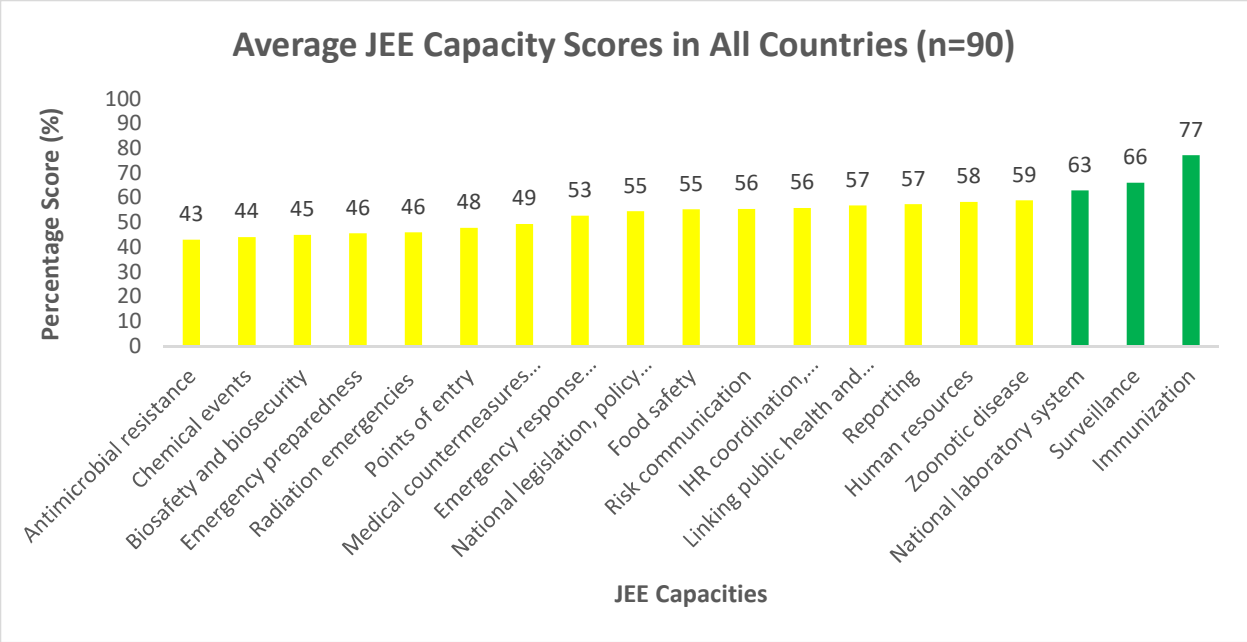


Figure 5: Average JEE scores for all 19 technical areas measured

Figure 6 below shows the preparedness index data analysis according to regional stratification.

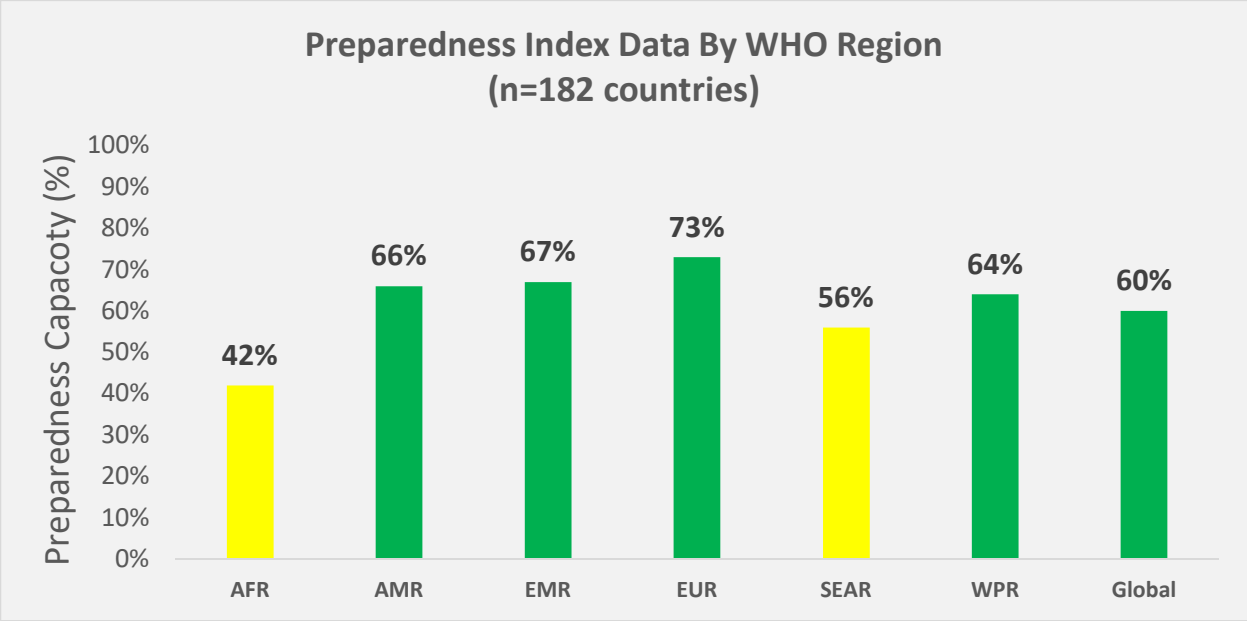


Figure 6: Preparedness capacity of countries by the WHO regions

The data shows that countries in the African region are the least prepared with an average score of 42%, indicating that a relatively significant level of effort is required to bring the region to the next highest level (minimum 50%).

The majority of other regions are in level 3 of the prepare indicator. Importantly, countries in South East Asia are at the lower end of this level and the only region to achieve a level 4 is Europe which

is 3 percent from being classified in level 3. When assessing global capacities according to the prepare indicator, the state of the world's capacity is at a level 3 (60%).

This data is updated each year and forms an important element for effective monitoring and evaluation of preparedness levels.

Figure 7 shows stratification of the preparedness index data according to World Bank national income groupings.

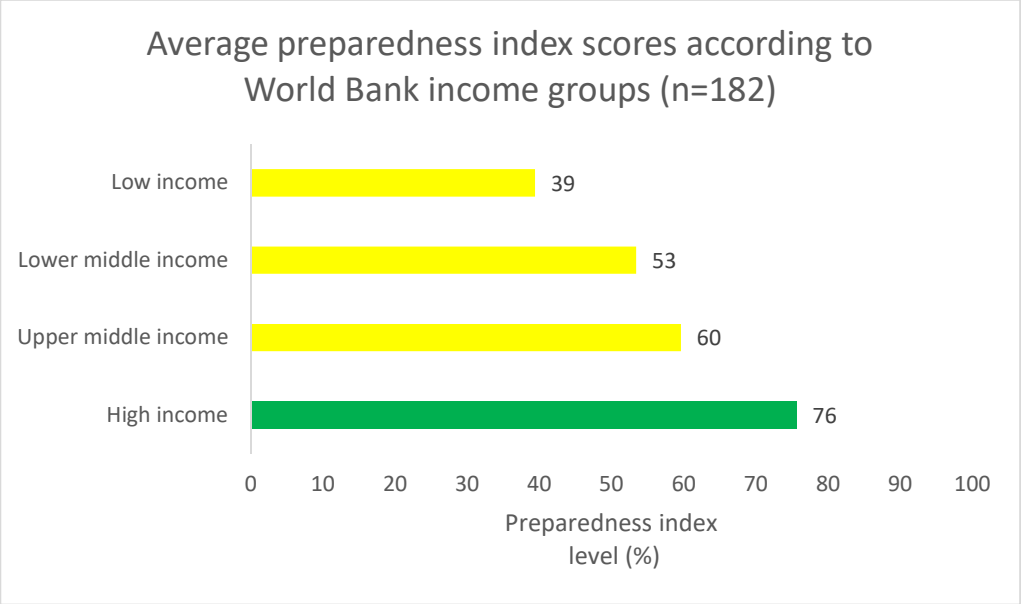


Figure 7: Preparedness capacities of countries by the income categories

As to be expected, countries with greater levels of national income have higher levels of national preparedness. 39 low-income countries have the lowest levels of preparedness, while higher-income countries score the highest capacity levels for preparedness.

This is likely related to their ability to invest higher levels of domestic funding toward preparedness measures and to ensure effective management of health emergencies through strong technical capacities. Therefore, countries with difficulties and challenges in accessing required funds for preparedness should be supported with increased international funding. Given the complexity of both financial and technical support provided to low-income countries, it is essential for in-depth studies to be carried out to identify what levels of financial and technical support are required. Ensuring that this meets the critical gaps that developing countries face in the context of the specific vulnerabilities they experience is highly necessary.

Additionally, countries with lower national income levels are often those with greater vulnerability to the impact of health emergencies. Conflict, poverty, natural disasters and economic uncertainty all result in negative impacts to a country's national income and these factors also undermine the ability to effectively prepare for a health emergency.

However, economic development does not necessarily always result in adequate levels of preparedness. This is shown by the experience of some high-income countries during recent health

emergencies. The government of South Korea, for example, began to "reform the healthcare system, and healthcare sectors to invest further in infectious diseases and infection control" after it experienced the largest outbreak of MERS-CoV outside of the Middle East in 2015 for which it was not sufficiently prepared.[7] Similarly, preparedness levels for coastal storms in North America has not been strong enough to effectively mitigate the impact when they occur.[8] Despite these countries being highly resourced, the health impact of seasonal natural disasters is often seen repeatedly. This indicates that a sustained commitment to preparedness strengthening needs to be applied in order to mitigate these impacts in the future.

Case study: Preparedness index for countries managing conflict and small island developing states

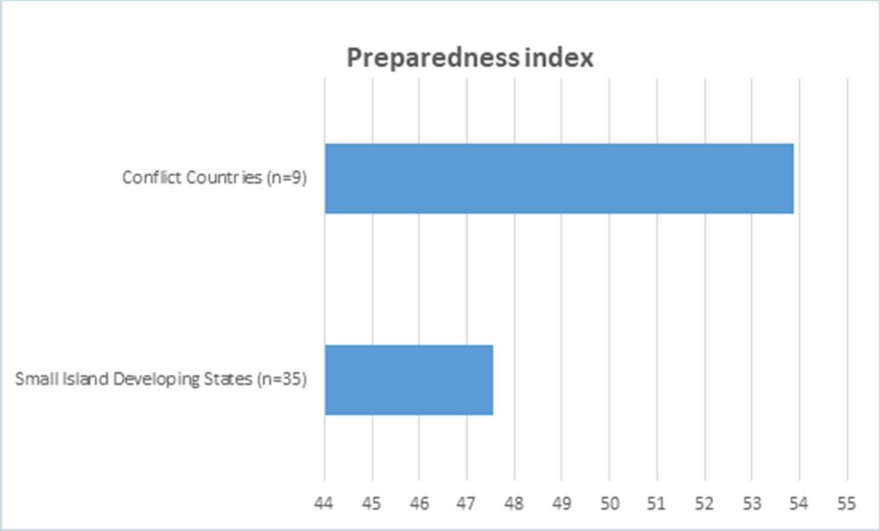


Figure 8: Conflict countries and small island developing states preparedness index

National contexts have direct and indirect impacts on a country's preparedness level.

Conflict countries and small island developing states (as well as federated states and overseas territories) face unique dynamics that dramatically influence their ability to manage health emergencies.

Conflict results in stresses to the healthcare system and other national systems required for health emergency management. The same applies to countries that are managing the increasing impact of natural disasters caused by the impacts of climate change.

[7] Middle East respiratory syndrome: what we learned from the 2015 outbreak in the Republic of Korea, Korean Journal of Internal Medicine 2018

[8] Health Effects of Coastal Storms and Flooding in Urban Areas: A Review and Vulnerability Assessment, Journal of Environmental and Public Health, 2013

The preparedness index sampled nine countries managing conflict[9] and 35 small island developing states[10]. Results are shown in the graph.

The data shows that both groups of countries have low or moderate levels of preparedness. The challenges that they face due to their contexts likely have a negative impact on the strength of their national health systems which undermines the level of preparedness that they can achieve.

Routine capacity building is often more difficult for such countries, which can further impede efforts to ensure national preparedness.

Summary of current status & limitations of data analysis

The data clearly shows that the state of national preparedness is highly variable across all countries and between regions. In addition, while certain capacities are more advanced than others, the ability of countries to effectively manage health emergencies is weak in many ways.

In particular, special context countries and developing nations have critical gaps in their capacities which are yet to be addressed. These countries with limited resources should be provided with the support they require to rapidly strengthen their capacities and improve preparedness levels.

A common limitation of using JEE and SPAR data is that both datasets are based on subjective assessments and can potentially lend themselves to interpretation biases. This can happen by countries when performing self-reporting and by groups of evaluators who are not standard across different countries. When looking at progress over time, the analysis shows a decline of capacities between 2016 and 2017. This can be explained by the increase in number of countries that reported but also by the fact that with countries engaging in JEE, SimEx and AARs there was a correction of scores of countries reporting through the Annual reporting. This helped in aligning and getting better quality of data.

There are however no other sources of data than SPAR and JEE that have measured over time the preparedness and response capacities of countries in such a comprehensive manner.

Another limitation of these data is that an average score is often assigned to a given technical area/capacity or as an overall score of the country. Doing so requires that each capacity is given an equal weighting despite some being comprised of more indicators than others. This skews the data and therefore somewhat obscures granular understanding of where a country is either strongly capacitated or experiencing weaknesses.

[9] Countries managing conflicts: Afghanistan, Central African Republic, Democratic Republic of the Congo, Iraq, Libya, Somalia, Sudan, Syrian Arab Republic, Yemen

[10] Small Island Developing States: Antigua and Barbuda, Bahamas, Bahrain , Belize, Cabo Verde, Comoros , Cook Islands , Cuba, Dominica, Dominican Republic , Fiji, Guinea Bissau , Haiti, Kiribati, Maldives , Marshall Islands, Mauritius, Nauru, Niue, Palau, Papua New Guinea, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles , Singapore , Solomon Islands, Suriname , Timor-Leste, Tonga, Trinidad and Tobago, Tuvalu, Vanuatu

While an average score is helpful in providing an overview of capacities it is important to also consider each technical area in the context of its indicators. Expert priority recommendations are also a crucial element that provide further insight into country capacities and preparedness levels.

It is also important to note that many key stakeholders interviewed suggested that surveillance and laboratory are still weak capacities in countries which contrasts with the results of the JEE and SPAR presented above. The difference between the analytical findings and the perspective of key stakeholders could be accounted for by the fact that country assessments of capacities provide scores at the national level, whereas information from stakeholders often refers to sub-national contexts.

Several organizations and groups have used IHR MEF data—in particular the Joint External Evaluations results—to create preparedness indices. These groups include:

- Metabiota – Epidemic Preparedness Index[11]
- Nuclear Threat Initiative (NTI) - Global health security index (GHS Index)[12]
- Resolve - Readiness index (Ready score)[13]

These indices support engagement in monitoring and evaluation, they raise awareness and facilitate the visualization of secondary data. However, they are also limited by the issues mentioned above.

Case study: Preparedness in urban settings

Expanded globalisation and rapid urbanisation influence infectious disease outbreaks and other health crises.[14] The impact of urbanisation on biodiversity and the natural environment can both increase the risk of emergencies and compound the challenges of responding effectively.

The rapid movement of people, animals and goods across borders can speed the rate with which pathogens travel across the world. It also makes it extremely difficult to coordinate international responses to unfolding emergencies.

Often urban environments are highly populated with migrants and refugees as well as local communities with multiple linguistic profiles. There is often a mix of socio-economic backgrounds between communities in urban settings that requires a complex response from local health authorities and national health systems during emergencies. Conducting surveillance and rumour control—essential elements of emergency management—requires additional consideration in urban settings.

Despite these challenges, there are many examples of sophisticated preparedness plans in place for urban environments. In highly urban communities, including global metropolitan cities, overarching preparedness infrastructure is often built to strengthen the management of communicable diseases and to also ensure defences against natural disasters, terrorism and civil

[11] https://gh.bmj.com/content/4/1/e001157
[12] https://www.nti.org/about/projects/global-health-security-index/
[13] https://preventepidemics.org/resources/behind-the-data/what-is-the-ready-score/
[14] Georgetown University , Report Symposium & Workshop On Health Threats And Opportunities In Vulnerable Urban Geographies, 2017

disturbance. Such preparedness infrastructure often spans multiple sectors and is usually based on planning and coordination across many emergency response programmes.

However, many of the challenges that exist in urban settings cannot be adequately met through national or regional interventions. Country-level policies and planning frameworks do not always meet the needs and requirements of cities. Sub-national and city-specific management plans can be developed to ensure preparedness in urban environments.

In order to assess existing priorities for preparedness in urban settings, a series of interviews were held with mayoral offices and local authorities. Below is a summary of the key issues that were raised:

- Early planning: The response to health emergencies in urban settings is usually dynamic. Many issues require management and the needs can often be highly complex. Conducting early planning at all levels can help ensure that cities are effectively prepared and well-positioned to manage emergencies when they occur.

- Clear roles and responsibilities: Coordination between city authorities and health care systems must be a priority to ensure effective preparedness. Clear understanding of local clinics and hospitals, their capacities and capabilities, and clarity in lines of responsibility should be established well in advance of emergencies.

- Strong communication at all levels: Clear communication systems are essential priorities for urban settings. This can help strengthen the coordination of frontline response plans among multiple agencies (fire, police, civil agencies and transport authorities) during crises. Effective communication can also help to reinforce understanding of roles and responsibilities.

- Sharing of best practice: Many urban settings around the world share common challenges. Regular sharing of knowledge is a good way of ensuring that important lessons learned are used as best practice and that potential issues are addressed at the earliest stages. Many cities conduct regular engagement with sister cities to share understanding of effective preparedness methods.

- Robust financing: Urban settings often face additional and unique financing requirements. It is not uncommon that financing needs are greater in cities and this is something that city authorities should address. Areas with limited resources will need assistance.

Importantly, these issues of concern for urban settings share parallels with country needs. The context and requirements for meeting these needs is unique for such settings.

III. Overview of High-Level Recommendation Analysis

231 high-level recommendations for national preparedness and health emergency management were identified and extracted, from 17 reports published by 11 institutions. The recommendations

demonstrated a significant amount of overlap and shared many cross-cutting themes. A number of important trends stood out.

Alignment of recommendations

- There is a great deal of consistency in many of the recommendations made as part of the reviews of each public health event. For example, several recommendations made after the 2009 H1N1 pandemic influenza are similar in theme and type to those that were made following the outbreak of Ebola in three West African countries during 2014. In some cases, this suggests a missed opportunity to address existing recommendations and implies that many challenges in strengthening preparedness have persisted.
- There were other instances where high-level recommendations did not directly match with each other. These areas are particularly evident with respect to those that centre on monitoring and evaluation, governance and accountability. For example, the role of independent external evaluation and monitoring—in contrast to self-assessments—is given different levels of priority by various recommending authorities.
- Calls for greater oversight and coordination of health emergency management (both in terms of preparedness and response) have often recommended that specific actions be led by different stakeholders.

Focus of recommendations

- The majority of high-level recommendations that were analysed focus on strengthening response rather than global or national preparedness. This is partly related to the nature of the reports selected, as efforts were made to identify reports that were published after major public health events. These are typically carried out as part of response reviews.
- Few recommendations discussed measures for prevention, mitigation or recovery after emergencies.
- The main focus has been targeted toward global preparedness rather national preparedness or specific to country contexts. While this is likely a result of the types of report that were identified, it may also reflect the political challenges associated with targeting high-level recommendations at countries, given that the implementation of high-level recommendations for country action depends on national contexts. This always vary between countries.
- Many of the high-level recommendations targeted at countries refer specifically to how compliance with IHR can be improved. Many of the recommendations address challenges associated with the factors that facilitate or impede IHR-related capacities: this includes levels of domestic financing, access to health services and community engagement.

In order to assess the high-level recommendations, a qualitative analysis framework was developed to support thematic grouping of 231 recommendations into relevant categories. The framework is comprised of 2 primary dimensions. One breaking down the recommendations by targeted levels

(global/regional level or national/subnational level) and the other by domains/thematic areas (strategic or technical/operational). As part of the analysis, each high-level recommendation was grouped according to the dimension, domain and thematic group to which it related.

Figure 9 below shows a proportional overview of the type and sub-type of all 231 high-level recommendations that were analyzed.

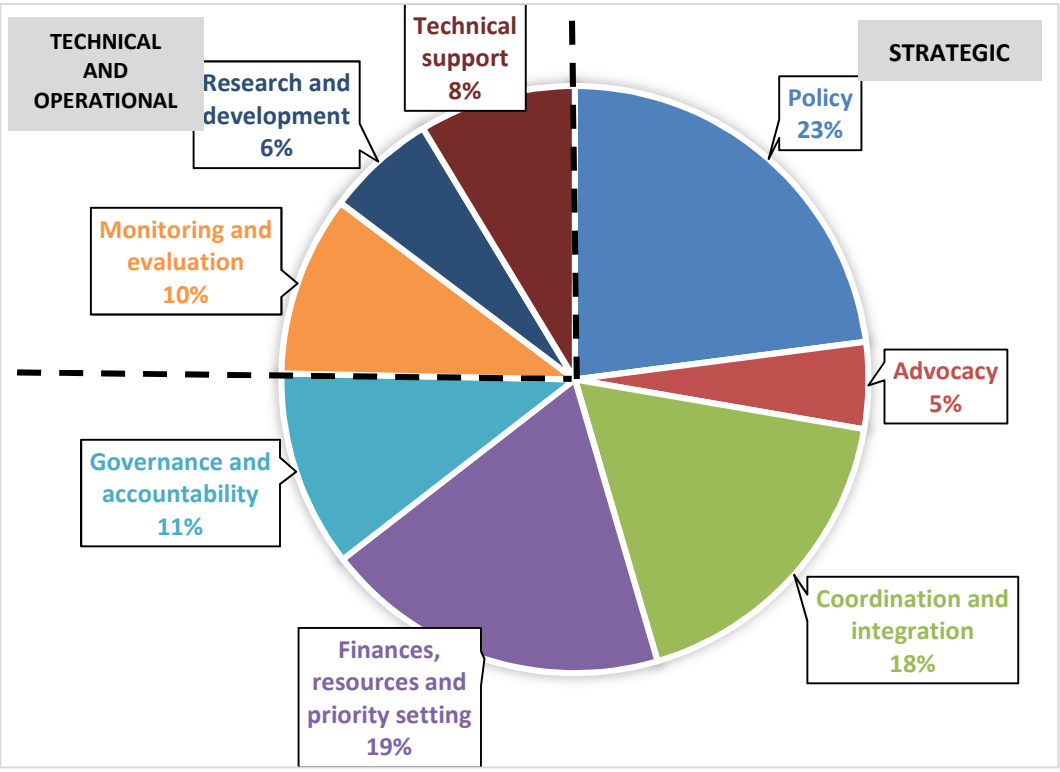


Figure 9: Overview of the type and sub-type of all 231 high-level recommendations

Sub-set of key recommendations for close monitoring

Below is an important subset of the 231 high-level recommendations that this report is based on which should be recognised as the urgent priority areas for implementation. The actions contained in the subset were identified through analysis of the most repeatedly cited recommendations made during reviews of recent high-impact health emergencies.

This subset of recommendations should be closely monitored to ensure continued progress. These recommendations represent crucial aspects that are highly important for ensuring effective management of health emergencies.

A traffic light system (table 2) has been used to identify those that the Board should focus on closely given that varying levels of progress have been made toward each of these.

Table 2: Subset of high-level recommendations that should be closely monitored

Recommendation Theme	**Specific Recommendations**	**Traffic Light Scoring for current level of implementation** **Red: Minimum progress** **Yellow: Partial progress** **Green: Advanced progress**		
Capacity building and technical support to countries	Technical capacity building including health workforce training should be implemented in low-resource settings and guidance to support this should be made available. In particular, laboratory and surveillance capacities should be strengthened.			
Mobilising donor funding	Partners should fulfil and build on existing collective and bilateral commitments to help finance preparedness in countries needing support.			
	Establish and finance a WHO Contingency Fund for Emergencies.			
Involvement of the private sector	The private sector should be integrated into preparedness planning discussions, and the value that they can contribute toward strategic plans should be identified and applied.			
	Public-private partnerships should be established to support collaboration between countries, public health stakeholders and private companies in building & implementing measures for emergency preparedness and response.			
Community engagement	International public health stakeholders should prioritize the integration of community participation in all areas of programming, including through strengthening partnerships with local communities and in shared decision-making and finding ways to better integrate local knowledge.			
Domestic investment	Counties should increase domestic resources dedicated to financing preparedness and capacity building.			
Trade & travel	States Parties and WHO should ensure compliance with Article 43 of the IHR which states that a clear public health rationale and scientific information must			

	be provided to support the introduction of additional health measures which interfere with international travel and trade.			
Monitoring & reporting outbreaks/emergencies	WHO should establish mechanisms to ensure that outbreaks and other health risks are monitored closely and that sufficient measures are in place to rapidly declare emergencies when they occur.			
Monitoring of IHR capacities	WHO should strengthen its periodic review of compliance with the IHR Core Capacity requirements.			
Coordination between the UN system	Clear mechanisms are needed for declaring emergencies and for coordinating and escalating responses to health crises, including those that are part of broader humanitarian crises that require mobilization of the entire UN system.			

The next section on progress and gaps in national preparedness is structurally organized according to recommendation themes.

IV. Progress and Gaps in National Preparedness

Important progress has been made in terms of strengthening global and national preparedness levels. Evidence for this is apparent through analysis of country-level monitoring and evaluation data and the outputs of 40 key stakeholder interviews. As is true with the current state of national preparedness capacities, there is considerable range in the progress made across regions and between countries. Some capacities – including preparedness as measured by SPAR between 2010 and 2017 – have seen rapid and transformative progress in many countries, while others have been impeded by persistent bottlenecks. These include risk communication and capacities at points of entry.

Analysis of SPAR data between 2010 and 2017 shows that the three capacities which have seen greatest average progress across all countries are radio nuclear, chemical events and preparedness (figure 10). However, further analysis indicates that despite this strong progress, both radio nuclear and chemical events remain the weakest capacities (figure 11). Important progress has also been made in human resources but it too remains relatively weak across all nations.

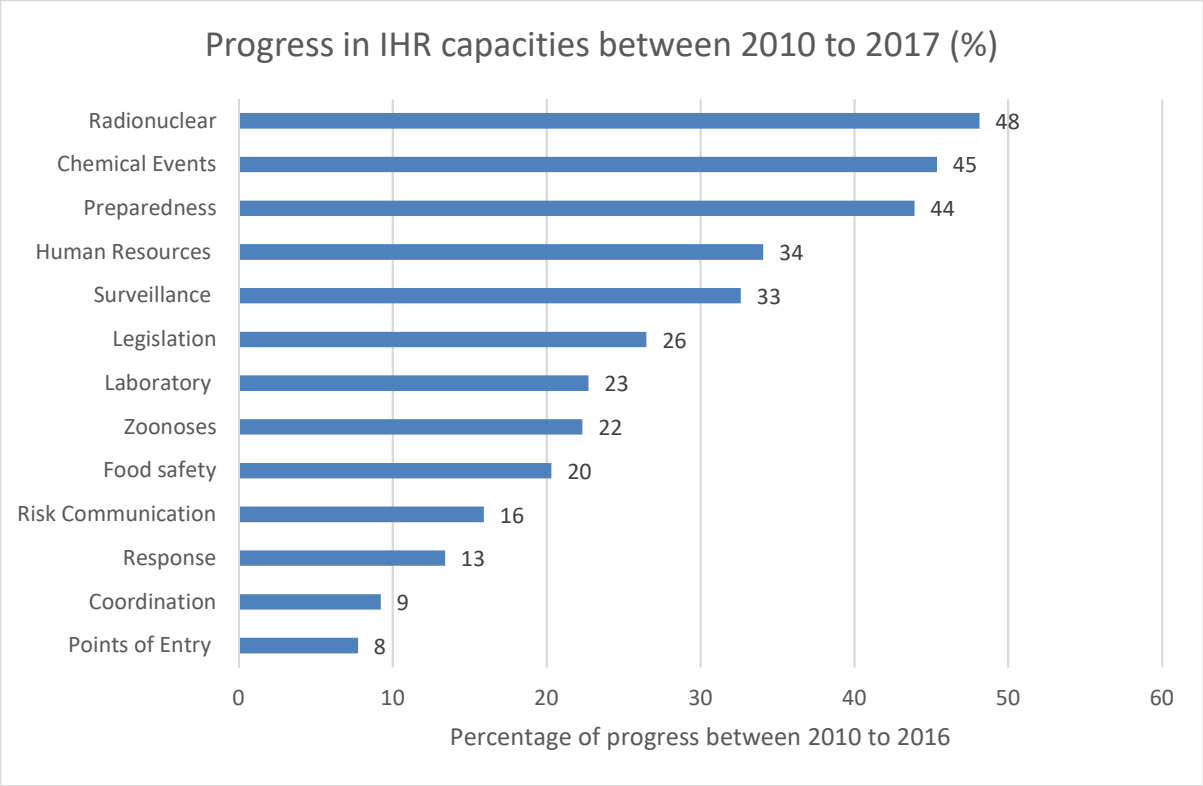


Figure 10: Progress rate of IHR capacities between the years 2010 and 2017 (in %)

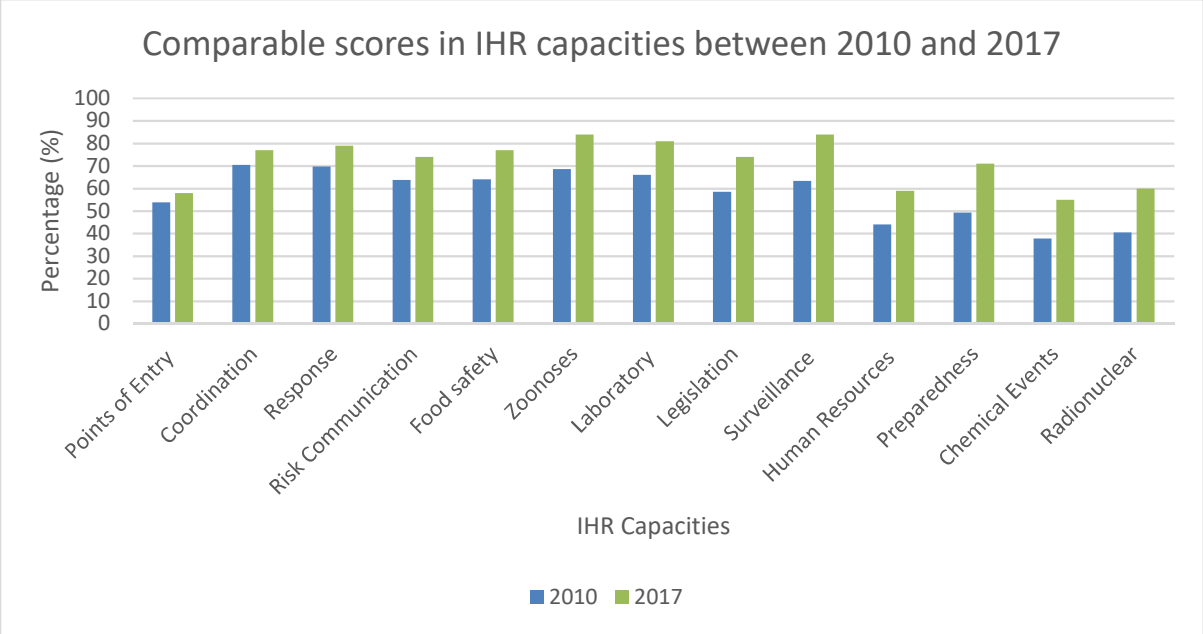


Figure 11: Comparable scores in IHR capacities achieved in 2010 and in 2017

In addition, the level of progress that has been made toward implementing established high-level recommendations has also been varied. Some targets have been achieved rapidly while progress toward others has been more limited.

High-level advocacy for preparedness

In recent years there has been greater global awareness of the importance of national preparedness. This has led to greater investment in preparedness activities. This is in part due to the high-impact recent emergencies have had on public health and economies. In addition, greater understanding of the intrinsic links between health systems and health security has helped improve preparedness levels in many countries. The benefits of ensuring that the planning and continual development of national health systems meet the needs of countries during emergencies has become more widely recognized but gaps remain in expanding this understanding to all stakeholders in both health systems and health security.

Despite this, the level of advocacy for preparedness can still be improved. In particular, some global actors who have taken leading roles in advocating for preparedness and supporting countries through financial investments and technical assistance are beginning to withdraw and/or scale back their involvement.

One way of countering this is to ensure that awareness of IHR and health security is expanded to all sectors of a country's government and the international community. Doing so would encourage the sharing of responsibility for preparedness and greater engagement in capacity building efforts. Expanding participation at high-level convenings to include non-health stakeholders such as Ministries of Finance, parliaments and traditional security actors (e.g. military) would also help.

Case Study: The government of Senegal expands advocacy for preparedness to support a comprehensive plan for better national preparedness

The government of Senegal experienced outbreaks of avian influenza in 2006 and 2007 and was threatened by the Ebola outbreak in its region during 2014. This raised awareness of the need for strong national preparedness and focused attention on the level of the country's capacities.

Health advocates pressed authorities to respond, and in Senegal they did, by setting three objectives:

1. To establish an Emergency Operations Centre
2. To establish a One Health Platform
3. To implement a Joint External Evaluation with a broad team of national and international public health experts, assessing the country's capacity to comply with IHR (2005) requirements to prevent, detect, and rapidly respond to public health threats.

Each of these objectives were fulfilled.

In 2017, Senegal also engaged in a workshop bringing its human health and animal health sectors together for training and dialogue. This helped strengthen the cross-sector preparedness of the country against zoonotic disease, which represent 70 percent of emerging infectious diseases.

These measures for strengthening preparedness were quickly tested by an outbreak of dengue. Senegal was able to quickly make samples available for testing during the outbreak—alleviating a concern that previously undermined the country's overall preparedness.

Setting the three priorities above and the coordinated implementation of activities to achieve them supported the country in its efforts to improve health emergency management.

Coordination and integration across sectors

Roles and responsibilities for managing emergencies is now better understood among international organizations. In particular, recent calls for reform to WHO's approach to managing emergencies have been recognized and adopted.

The Tripartite agreement between FAO, OIE and WHO signed in 2018 is a concrete example of strengthened collaboration between sectors for improved preparedness. This agreement was established to promote cross-sectoral collaboration to address risks from zoonoses and other public health threats existing and emerging at the human-animal-ecosystems interface, and to provide guidance on how to reduce these risks.[15]

Despite advances in global understanding of the importance of One Health approaches for health emergency preparedness, many stakeholders interviewed said that the One Health approach still needs to be better translated into actions, especially at local level.

This is clearly supported by the findings of the IHR-PVS National Bridging Workshops analysis presented in figure 12. The IHR-PVS National Bridging Workshops help countries assess and enhance collaboration between human and animal health sectors. The 17 workshops conducted so far have shown that coordination between these sectors at high levels (national) is far more advanced than coordination at local levels. The analysis also shows that cross-sector collaboration is lacking in critical areas for preparedness including Surveillance, Outbreak Response and Communication.

[15] https://www.who.int/foodsafety/areas_work/zoonose/concept-note/en/

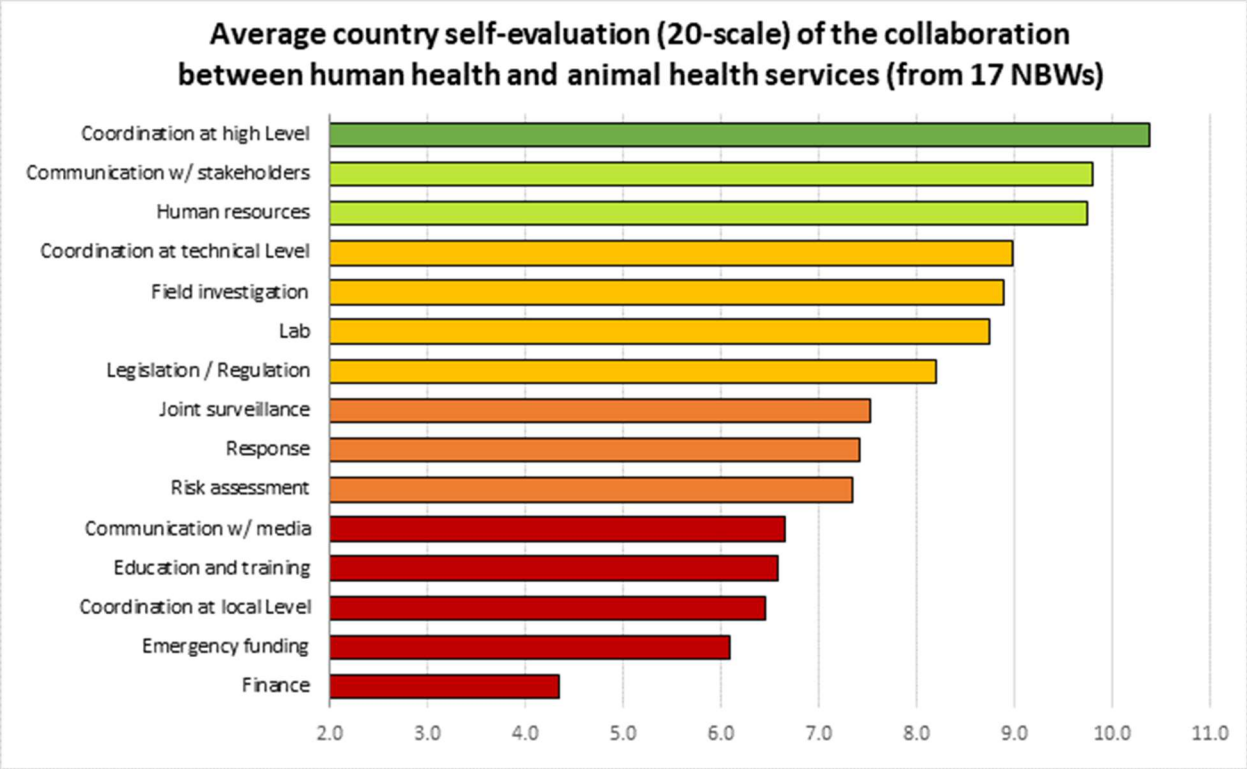


Figure 12: Average country self-evaluation of the collaboration between human health and animal health services

Other examples that illustrate improved multi-sectoral engagement for preparedness and broader health emergency management include the Global Taskforce on Cholera Control, as well as the Inter-Agency Standing Committee (IASC). The IASC is the primary mechanism to coordinate UN and non-UN humanitarian partners.

The greater integration of the private sector in emergency management is a sign of progress also however this is limited in the extent to which companies currently contribute toward strengthening preparedness. The private sector is much more advanced in its contribution to response efforts as seen in responses to recent health emergencies including the Ebola outbreak in West Africa where the private sector was lauded by many public health authorities for their highly coordinated contribution to the international response.

A fundamental reason for the disparity between the strength of private sector involvement in preparedness and response this is the lack of a common framework to support assistance in preparedness activities at the national and global levels.

Mechanisms for coordinating the involvement of multiple sectors in preparedness activities remain weak. Efforts are being made to bring together stakeholders from multiple national sectors around a National Action Plan for Health Security (NAPHS) in order to address this issue. NAPHS are based on priorities that are determined through assessments of a country's preparedness capacities including the JEE and SPAR.

As of April 2019, only 52 countries have developed a NAPHS despite many more having completed the associated evaluations. Of these 52 national plans, only 27 are fully costed and 8 are publicly available. Such limited progress in developing, costing and implementing national action plans for preparedness is a continuing bottleneck for many countries in all regions.

To overcome these issues countries have begun mapping and mobilizing financial and technical resources to support implementation of the national action plans.

Financing, priority setting and other resources

Financing preparedness is complex and multifaceted. It spans issues related to national and international political priorities as well as economic development. As such, financing is central to the assessment of country preparedness capacities and the evaluation of opportunities and challenges associated with strengthening.

The level of funding for preparedness activities has increased with the launch of initiatives such as the Global Health Security Agenda (GHSA) and the establishment of financing mechanisms including the World Bank Pandemic Emergency Financing Facility (PEF) and WHO's Contingency Fund for Emergencies.

International partners have increased investments in preparedness, but dedicated domestic (national) resources are still scarce. This is an untapped potential as recent resource mapping exercises have demonstrated. Through a process of aligning national action plans for health security and for relevant diseases, and mapping respective domestic financing and external donors, significant funds can potentially be identified for supporting preparedness.

Often countries face these difficulties due to competing priorities. Additionally, there are currently too few incentives to encourage countries to invest in preparedness, and there has been limited progress in developing innovative financial motivators (e.g. matched funding from donors).

Moreover, many countries are faced with the challenge of balancing their priorities against objectives that are related to the aims of donors. National and regional preparedness would benefit from countries being able to de-link their priorities from being associated with what funding has been made available to them. Countries have the opportunity to use national action plans to establish priorities that are more closely aligned with addressing critical gaps in capacity.

Ensuring horizontal funding approaches for preparedness has seen little progress. Investments remain structured within vertical mechanisms that limit the possibility of sharing money for different activities or related priorities across sectors. This is often the case even among different ministries within a single government.

Monitoring and reporting health emergencies

Stakeholders mentioned progress has been made in the rapid declaration of health emergencies overall but noted that, in some cases, countries are still reluctant to declare outbreaks due to the potential impact on trade and the economy. One way of encouraging this is to better demonstrate

the benefits of reporting. Currently, the negative impact that national economies sustain when an emergency is declared (especially infectious disease outbreaks) is well understood but incentives for doing so are often lacking. Addressing this issue would likely result in countries being more forthcoming which would help strengthen the mitigation of health impacts which can go unchecked if not declared effectively.

According to stakeholders interviewed, the issue of travel and trade continues to be neglected. Political sensitivities and economic anxieties remain an impediment for some countries to report emergencies to WHO.

Case Study: Progress in the effective and early declaration of health emergencies – Zika virus outbreak

A major bottleneck historically impeding global and national preparedness has been the reluctance of countries to report emergencies and the international community to declare them. This can present challenges in effectively coordinating global stakeholders and mobilizing essential resources.

The mosquito-borne Zika virus spread in sudden and prominent case numbers during the early part of 2015. One key lesson learned from the Ebola virus outbreak in West Africa, which began in 2014, was the problems caused by delayed declaration of outbreaks as emergencies.

As the number of Zika cases grew, the WHO Director General declared that the spread of Zika virus and its associated complications constituted a public health emergency of international concern (PHEIC) under the IHR (2005). Two weeks after the declaration of a PHEIC, WHO launched the global Zika Strategic Response Framework and Joint Operations Plan.

WHO also established a digital portal to better coordinate the response at global, regional, and national level, providing a central point of reference for partners. It showed who was doing what, where, and when at the global, regional, and national level. By December 2016 there were over 600 activities by 60 partners tracked through the portal. This helped to deliver value for money by ensuring that efforts are directed to where they are most needed, and duplications and deficits were minimized.

The quick declaration of the emergency stimulated an international collective effort, scientific research, and funding that helped stabilize the crisis.[16] It strengthened integrated surveillance for mosquito-borne viruses, and accelerated understanding of the modes of transmission and the abnormalities associated with congenital Zika virus syndrome. In addition, countries were better poised for regional coordination and with international/national authorities.

Community engagement in preparedness

There is a great challenge associated with the integration of communities in preparedness. The ability of health authorities to secure, manage and retain the trust of local communities is limited in many countries where capacities for managing emergencies is weak.

[16] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30325-2/fulltext

Although it is an area which is difficult to assess, interview subjects recognize community engagement as an area that many countries need to rapidly improve upon.

A common underlying factor in weak community engagement is poor risk communications. Supporting countries to improve their risk communications through consultations on messaging, developing outreach strategies and managing rumour control during emergencies could help better integrate community involvement. Succeeding in this is also highly dependent on strong political will and many other factors however the strategic improvement of risk communication could add much value in community engagement.

Monitoring and evaluation

One of the most important recent key recommendations for improving IHR implementation and strengthening national has been the call for broader approaches of capacity assessments. In 2014, the IHR Review Committee on Second Extensions for establishing national public health capacities and on IHR implementation (WHA68/22 Add.16) officially recommended that the WHO considered this.

Since 2014, significant progress has been made in the level of monitoring and evaluation of country capacities for preparedness as well as the approaches taken to do this. The outputs of the greater levels of monitoring and evaluation have led to key information about preparedness levels being much more available.

In particular, countries have been more engaged with implementation of IHR Monitoring and Evaluation Framework components and there has been increased participation in reporting IHR progress by States Parties. This is in addition to additional monitoring and evaluation exercises that countries do independently of any international or regional health authorities.

Figure 13 below shows the current rate of engagement in the WHO's IHR MEF.

Figure 13: Status of implementation of the IHR MEF, NAPHS, IHR-PVS Bridging workshops, September 2019

Interview subjects noted that implementation of the IHR Monitoring and Evaluation Framework and the IHR-PVS National Bridging Workshops has been successful at raising awareness and making sectors work together toward preparedness.

Technical support to countries

A wealth of data that can identify gaps in a country's capacity is currently available. Large volumes of data from monitoring and evaluation frameworks and country development data can facilitate targeted capacity building but it remains underutilized. Countries have the opportunity to access this data but progress can be made in helping to make the analysis and interpretation of this information more available.

Using analytic findings from data could help scale up efforts to improve preparedness and support the design of policy and activities that can address critical gaps. International agencies including WHO should make more effort to disseminate its data and analysis to its Member States and other stakeholders.

An important element of preparedness strengthening is the regular review (and stress testing) of how capable national capacities are in terms of managing emergencies. Outputs from such reviews can provide useful insight into the current state of country preparedness levels. WHO uses Simulation Exercises (SimEx) and After-Action Reviews (AAR) for this purpose.[17]

When grouping and matching the specific examined functions of SimEx and AARs against the 13 IHR capacities, it was found that all capacities were reviewed/tested at least once. IHR Coordination and National IHR Focal Point Functions (C2), National Health Emergency Framework (C8), Health Service Provision (C9) and Communication (C10) are the most frequently assessed IHR capacities through AAR and SimEx.

Figure 14 below shows the highest recurrent recommendations for capacity building associated with these exercises.

[17] https://www.who.int/ihr/publications/WHO-WHE-CPI-2018.51/en/

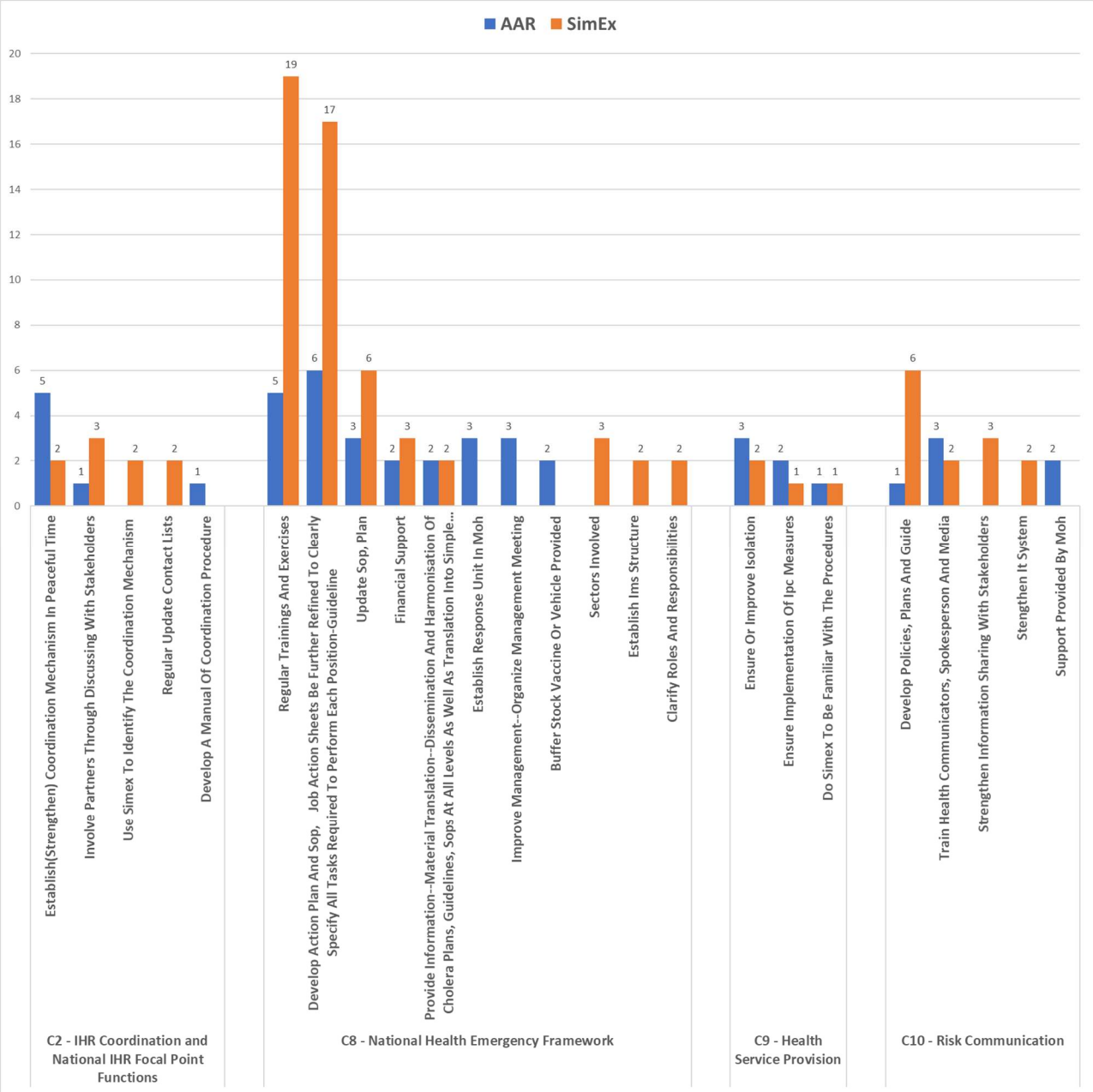


Figure 14: Highest recurrent recommendations made for the four most tested IHR capacities through SimEx and AARs

Analysis of this data indicates that the specific priority actions which regularly emerge as part of SimEx and AARs include the development of action plans and the identification of standard operating procedures for both preparedness and response activities. Providing greater clarity about the tasks and activities required for better national preparedness are also highly frequent recommendations that are made. The implementation of more regular trainings and exercises are also called for frequently.

<u>Operational readiness</u>

Operational readiness is defined as:

the outcome of planning, allocation of resources, exercising and organising, to build, sustain and improve operational response capabilities based on risk assessment.[18]

An example where technical support has proven to be impactful in strengthening country preparedness has been the development of operational readiness in the 9 countries that surround the Democratic Republic of Congo (where an outbreak of Ebola virus is ongoing at the time of writing this report).

Figure 15 below shows how operational readiness for Ebola virus disease (EVD) has improved in the four highest priority countries, as assessed through two multi-agency Ebola virus missions using a standard tool with key performance indicators between May 2018 and January 2019.

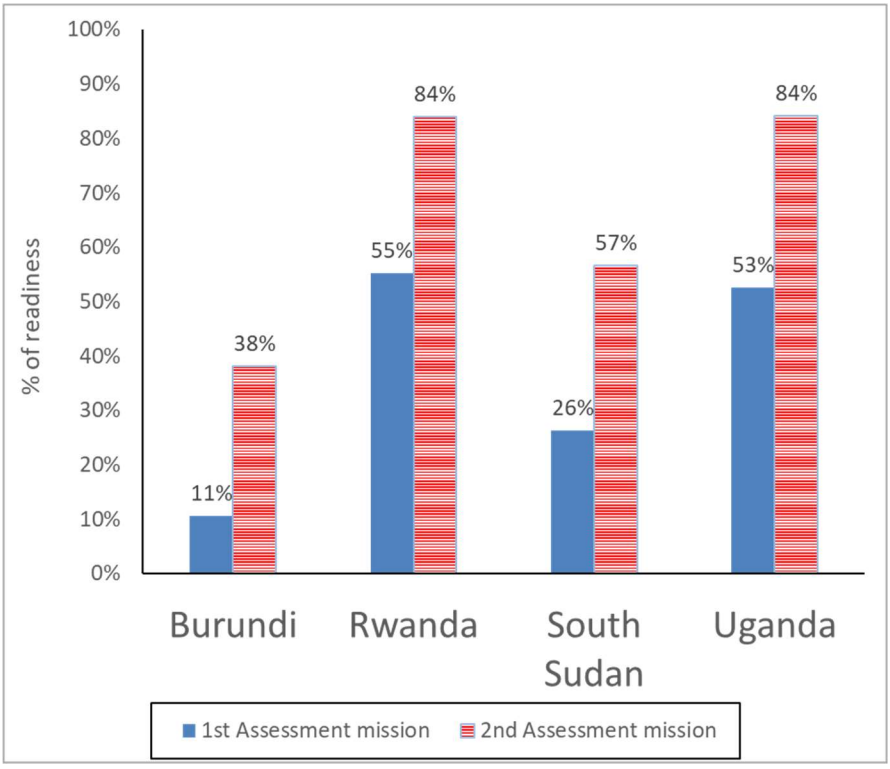


Figure 15: Progress in minimum EVD readiness levels in DRC surrounding countries, Source: WHO 2019

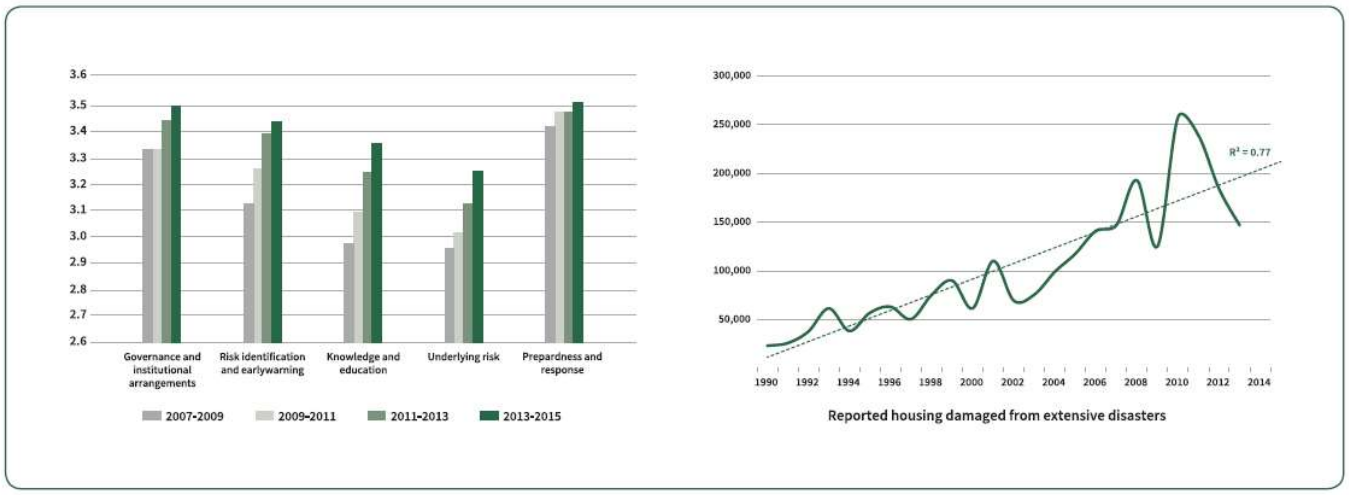
As is shown through the data, the operational readiness of the four highest EVD risk countries has considerably increased following initial assessment. Each country has strengthened its operational readiness by at least 20 percentage points. This data – and the recent events in Uganda where a small number of Ebola cases were rapidly identified and addressed through a well prepared response system – demonstrates the power of coordinated and targeted efforts to achieve advances in preparedness and the value of using evaluation tools to support this.

[18] WHO, Planning Checklist for WCO Readiness, 2017

These national-level results contrast sharply with sub-national capacity assessments for EVD preparedness, highlighting the need to pay attention to how they are strengthened and financed at the sub-national level.

Preparedness against natural hazards

Figure 16 below shows that progress has been made across the Hyogo Framework's Priorities for Action, which is a 10-year plan to make the world safer from natural hazards. However, UNISDR data analysis on the impact of extensive disasters indicates that physical damage caused by emergencies has increased. Low-resource countries which remain vulnerable to the impact of emergencies need to therefore ensure that their preparedness levels are sufficient to effectively manage crises. The analysis of the data and interviews presented in this report supports this.



Source: UNISDR

Figure 16: Progress made across the Hyogo Framework's Priorities for Action

Case study: The development of a National Public Health Institute and sharing of best practice by the government of Zambia

In 2017, Zambia developed a technical institute under the ministry of health focusing on health security and the implementation of IHR. In 2018, the new National Public Health Institute (NPHI) faced a cholera outbreak, the country's sixth outbreak of the disease in 15 years.

This outbreak had the potential to be one of the biggest ever seen by Zambia but the Institute's ability to convene stakeholders quickly and support the effective coordination of a response limited the scope of the outbreak.

The NPHI supported daily meetings for national response and regularly convened meetings with five cabinet ministers focusing on the outbreak: the ministries for Water and Sanitation, Health, Local Govt, the ministry of the Vice President's Disaster Management and Mitigation Unit, the ministry of Agriculture and Ministry of Education.

It was the NPHI's efforts to build bridges among these actors as a preparedness measure—before an emergency—that made it easier for these relevant stakeholders to be able to come together and face the outbreak.

The NPHI's success in facing the cholera outbreak gained notice in the region, with other African states wanting to replicate Zambia's best practices. Botswana, Namibia, Malawi, Angola and Zimbabwe are all considering Zambia's work in setting up the NPHI and making it effective.

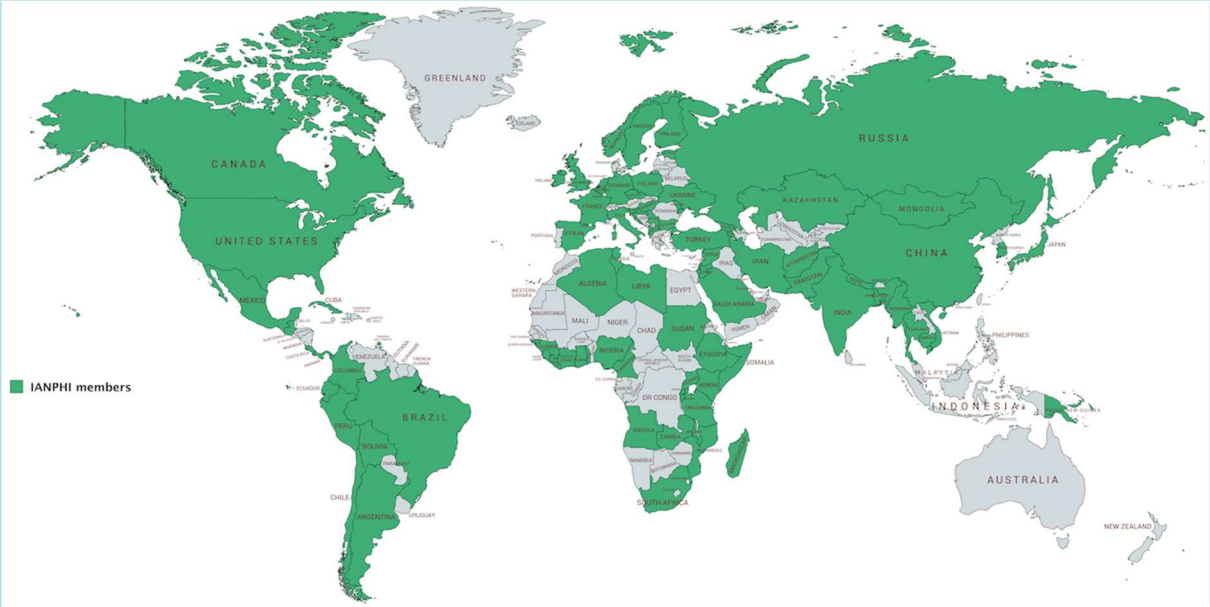


Figure 17: Map of INAPHI members

Over the past decade, there has been a significant increase in the number of countries that have established National Public Health Institutes (NPHIs). These institutions are often part of, or work closely with, national governments and can be responsible for many of the technical and operational functions that are essential for national and subnational preparedness.

IANPHI has 100 members from 88 countries but many more exist or are being developed. For example, the African Centres for Disease Control (ACDC) and African Union have prioritized the formation of 15 NPHIs in the African continent, as part of an approach to strengthening regional health security.

A great opportunity exists for countries to ensure better regional preparedness by sharing best practices with neighbouring countries. Where one country has succeeded in building capacities or used innovative approaches to support emergency management, other countries can benefit from applying similar methods. There is a lot of interest and support available for this type of knowledge sharing and countries should take advantage of it where possible. NPHIs can play an important role in facilitating this type of cross-border knowledge share.

V. Way Forward

Significant and noteworthy advances in global, regional and national preparedness have been made during recent years. Greater political will and coordinated approaches across all sectors can help this scale up and better mitigate the impact that health emergencies continue to have in all regions of the world. Improved national preparedness is an essential requirement to better protect lives and livelihoods.

1. Key actions for implementation

In addition to the subset of recommendations above, below are a series of key actions for the GPMB to also consider in context of the opportunities presented in this report.

Integrating, analyzing and monitoring data from relevant sources

- International organizations should provide the outputs of analysis performed on monitoring and evaluation of health emergency preparedness to the GPMB to ensure that measuring progress over time can be done. The Board should create data integration platforms for analysis and monitoring, populated with the data on the different aspects of preparedness (for example preparedness data from WHO, World Bank, UNDP, FAO, OIE and others).
- As part of its advocacy for greater preparedness, the GPMB should encourage all countries to publish the outputs of their monitoring and evaluation activities. This is currently a missed opportunity that can be addressed through high-level, targeted advocacy by the Board and its members. The Board should support international organizations to disseminate the findings of global and regional analysis.

Multisectoral collaboration

- A global multisectoral framework for preparedness should be established by the Board to guide priority activities at the global level. This could be facilitated by mapping all relevant stakeholders involved in implementing/financing preparedness activities. The value of such a framework would help to engage and coordinate multidisciplinary stakeholders, particularly those who operate outside of the public health sector.

Advocacy & Partner Engagement

- The Board should encourage international global health security leaders/authorities to engage in consolidating gains made and to scale up implementation of IHR and capacity building, without compromising coherence and efficiency.
- International public health institutions should expand advocacy for national preparedness to non-health stakeholders (private sector, tourism, trade etc.). Specific guidance should be considered to support engagement of different target audiences and better understand their role in preparedness strengthening.

- The GPMB should identify a small group of countries that can act as global champions for preparedness. These champions would demonstrate the value of preparedness at the highest levels by showcasing how they have applied best practice to create value in managing health emergencies.

Community preparedness

- The Board should consider how public health stakeholders can better measure community engagement in countries. At present there are inadequate mechanisms to effectively capture how well countries are conducting community engagement.
- The GPMB should engage parliaments and civil society to support how countries establish shared leadership with communities as part of preparedness efforts and building community resilience.
- Countries should ensure that principles of equity and empowerment of vulnerable groups are embedded in emergency management strategies. No communities should be left behind.

Aligning Health systems and health security

Health systems and health security are two sides of the same coin. Health systems must be resilient enough to surge and absorb disruption, adapt and respond as needs evolve and contexts change during health emergencies. In order to ensure better preparedness, countries must integrate health security with broader health system strengthening and capacity building.

- The GPMB should encourage countries to identify critical gaps in their health systems and ensure that measures for strengthening include actions that go beyond the provision of public goods and allow health systems to effectively manage health emergencies
- All countries should continue making progress toward Universal Health Coverage and review national plans to ensure that all aspects of its health system support the achievement of targets for UHC by 2030 as per the SDGs.

Aligning support to national priorities

- Existing partnerships, initiatives and resources should be mapped and matched to the greatest priorities and needs in the countries.
- The board should advocate that international institutions have robust capacities to scale up support to countries as they pursue the achievement of preparedness targets.
- Technical and international support for preparedness that is provided to countries should be aligned to national priorities as established in national action plans. This includes identification of:
    - What technical support is needed to address critical gaps in vulnerable and low-resource countries
    - The level of technical support that is available to priority countries
    - The range of stakeholders that are best able to provide technical support

- How countries can achieve the best value from receiving this

Financing

- Countries with the ability to dedicate more domestic resources toward preparedness should do so as a national priority.
- To facilitate this, the GPMB should help the development of comprehensive investment cases and the identification of innovative methods for incentivizing domestic resource allocation.

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VII. Annexes

Annex 1: Main frameworks for preparedness

IHR Monitoring and Evaluation Framework (IHR MEF)

The International Health Regulations (2005) Monitoring and Evaluation Framework aims to provide a comprehensive, accurate, country-level overview of the status of implementation of requirements under the IHR to develop, strengthen and maintain capacities to detect, assess, notify, and respond to public health risks and emergencies (Article 5, 13).[19]

It is comprised of four components; State Parties Annual Reporting (SPAR) to the World Health Assembly which is mandatory for States Parties; as well as Simulation Exercises, After-Action Reviews and Joint External Evaluations (JEE), which are all voluntary. The outputs of each of these components provide important insight into both the capacity of countries to manage health emergencies, and the broader state of global health security. It contributes to mutual accountability for global public health security among States Parties and the WHO secretariat and it helps to build trust through transparent reporting, sharing of best practices, and dialogue. It proposes both quantitative and qualitative methods for monitoring, as well as approaches for periodic and continuous evaluations.

OIE Evaluation of Performance of Veterinary Services (PVS)

In recognition of the significant role that national veterinary services and animal health sectors have in strengthening emergency management and preparedness, the World Organisation for Animal Health (OIE) has developed a tool for the Evaluation of Performance of Veterinary Services (OIE PVS Tool). The OIE PVS Tool is 'designed to assist veterinary systems to establish their current level of performance, to identify gaps and weaknesses in their ability to comply with OIE international standards, to form a shared vision with stakeholders (including the private sector) and to establish priorities and carry out strategic initiatives'.

Sendai Framework

The Sendai Framework for Disaster Risk Reduction 2015-2030 outlines seven clear targets and four priorities for action to prevent new and reduce existing disaster risks. It aims to 'achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries'.

Pandemic Influenza Preparedness Framework

[19] WHO, International Health Regulations (2005) Monitoring and Evaluation Framework, 2018

The Pandemic Influenza Preparedness Framework aims to improve pandemic influenza preparedness and response, and strengthen the protection against the pandemic influenza by improving and strengthening the WHO global influenza surveillance and response system ("WHO GISRS"), with the objective of a fair, transparent, equitable, efficient, effective system for, on an equal footing:

(i) the sharing of H5N1 and other influenza viruses with human pandemic potential; and
(ii) access to vaccines and sharing of other benefits.

Regional Frameworks

The Asia Pacific Strategy For Emerging Diseases and Public Health Emergencies (APSED III) supports countries in the Asia Pacific region to strengthen public health emergency preparedness and response capacity by improving core public health systems, increasing regional connectivity and coordination, and investing in ongoing performance improvement.

The Integrated Disease Surveillance and Response (IDSR) system is a strategy for multi-disease surveillance of selected priority diseases or conditions. It links the community, health facility, district and national levels, allowing the rational use of resources for disease control and prevention.

Other frameworks

The Common Framework for Preparedness (CFP) uses an integrated approach to strengthening country preparedness by collectively assessing capacity and need and jointly developing programmes and plans. It 'situates preparedness within an overall, nationally led, disaster risk management (DRM) context, which includes prevention, mitigation, preparedness, response and recovery measures.'

Annex 2: Methodology

The research and analysis for the chapter is based on a mixed-methods approach.

Desk-based analysis of high-level recommendations that have been made following recent health emergencies are supported by key stakeholder interviews with individuals and groups from UN agencies and other multinational/supra-governmental institutions, state and non-governmental public health organizations, WHO Member States and academic institutions. Empirical data from evaluations of national preparedness and scientific research are also used as part of analytical methods.

This chapter primarily uses infectious disease outbreaks as case studies but adopts an all-hazards approach for the assessment of preparedness capacities and progress.

Some of the main public health events to frame the chapter's research and analysis include, in alphabetical order:

- Cholera
- Ebola (2014), Ebola (2018)
- H1N1 (2009)
- H5N1 (2005)
- H5N9 (2015)
- H7N9 (2013)
- Lassa Fever (2015)
- MERS-CoV (2015)
- Plague (2014) & Plague (2017)
- Yellow fever (2016)
- Zika (2015)
- Etc.

The recommendations contained in the chapter have been made with an all-hazards view for preparedness.

The analysis of the opportunities and challenges associated with achieving stronger national preparedness should also be viewed through an all-hazards lens. To support interpretation of country preparedness, the findings of the research and interview analysis have considered a number of national contexts including:

- Countries experiencing active conflict
- Small Island Developing States (SIDS)
- Federated States
- Protracted natural disasters such as drought/famine

- Nations that are geographically vulnerable to the impacts of climate change

1. Analysis of high-level recommendations

A systematic approach was used to identify grey literature and academic publications from 2009-2019. A PubMed search with specific inclusion and exclusion criteria revealed few publications. We therefore employed a desk-based review to reveal prominent, authoritative reports containing high-level recommendations for strengthening health emergency preparedness.

Given that most of the initial research led to a high number of reports related specifically to the outbreak of Ebola virus in West Africa (2014), the desk-based review was complemented by consultations with key global health security experts who supported identification of suitable reports to broaden the scope.

In total, 17 reports published by a range of organizations were identified. The recommendations were categorized into themes and sub-themes, in a spreadsheet that also outlined who the recommendation was targeted at.

In order to assess the high-level recommendations, a qualitative analysis framework was developed to support thematic grouping of 231 recommendations into relevant categories. The framework also supports the identification of opportunities and challenges as well as options for a way forward to stronger national preparedness.

The framework is comprised of 2 primary dimensions. One breaking down the recommendations by targeted levels (global/regional level or national/subnational level) and the other by domains/thematic areas (strategic or technical/operational). Figure 1 below shows the structural basis of the framework:

Global and regional stakeholders:

1. Strategic
   a. Policy
   b. Advocacy
   c. Coordination and integration across sectors, between regional approaches for preparedness and integration with other health system strengthening priorities
   d. Financing, priority setting and other resources
   e. Governance and accountability
2. Technical and operational
   a. Monitoring and evaluation
   b. Research and development
   c. Technical support to countries

National and subnational organisations:

1. Strategic
   a. Policy
   b. Advocacy
   c. Coordination and integration across sectors, between regional approaches for preparedness and integration with other health system strengthening priorities
   d. Financing, priority setting and other resources
   e. Governance and accountability
2. Technical and operational
   a. Monitoring and evaluation
   b. Research and development
   c. Technical support to countries

Annex Figure 1: Qualitative analytical framework used to thematically group high-level recommendations, WHO

As part of the analysis, each high-level recommendation was grouped according to the dimension, domain and thematic group to which it related. See Annex 3 for details regarding the definitions of the grouping that supported the qualitative analysis.

WHO has also developed a database to house the recommendations and facilitate tracking of progress during the grouping analysis. This can help serve as a baseline for monitoring the implementation of the recommendations over time. See the supplementary annexes for a list of the recommendations analyzed.

2. Key stakeholder interviews

WHO engaged a broad and comprehensive selection of relevant stakeholders that support country preparedness through interviews. These stakeholders were selected as the primary subjects for interviews given their important role in supporting national preparedness strengthening. Many of these stakeholders have been closely involved in the design of high-level recommendations for preparedness and they have often conducted activities at the country level to support implementation and performed significant analysis of national preparedness capacities and/or of the recommendations that this chapter will assess.

The number of interview subjects expanded in line with findings from the analysis and incorporated additional subjects as they were identified in real-time. Where possible, multiple experts from each institution were interviewed.

Table 1 shows a list of the institutional affiliations associated with interview subjects. A total of 39 interviews were conducted.

Annex Table 1: List of organisations/institutions interviewed *(alphabetical order)*
The African Union (AU) & Africa Centres for Disease Control and Prevention (Africa CDC)
Burkina Faso – Ouagadougou Townhall Authority
EcoHealth Alliance
European Commission
Food and Agriculture Organization of the United Nations (FAO)
Gavi, The Vaccine Alliance
Global Fund to Fight AIDS, Tuberculosis and Malaria
Graduate Institute of International and Development Studies
IHR Emergency Committee regarding the Ebola outbreak in West Africa
Inter-Agency Standing Committee (IASC)
International Air Transport Association (IATA)
International Civil Aviation Organization (ICAO)
International Federation of the Red Cross
Inter-Parliamentary Union (IPU)
International Rescue Committee (IRC)
International Working Group on Financing Preparedness
Morocco – Ministry of Health
Netherlands National Institute for Public Health and the Environment (RIVM)
Republic of Indonesia – Ministry of Health
Islamic Republic of Pakistan – Ministry of National Health Services Regulations & Coordination
Private Sector Stakeholders
Public Health England (PHE)
Republic of Senegal – Office of the Prime Minister
Review Committee on the functioning of the International Health Regulations (2005) and on Pandemic Influenza A (H1N1) 2009
Kingdom of Thailand – Ministry of Public Health
Towards a Safer World network for Pandemic Preparedness
UK Department for International Development (DFID)
UNICEF
United Nations International Strategy for Disaster Reduction (UNISDR)
United States of America – New York City Department of Health and Mental Hygiene
United States Agency for International Development (USAID)
United States Centers for Disease Control and Prevention (CDC)
Wellcome Trust
WHO Country Offices
WHO Regional Offices
World Economic Forum (WEF)
World Organisation for Animal Health (OIE)
Zambia Public Health Institute

All interview subjects were asked standard questions, which spanned a number of important areas associated with the implementation of high-level recommendations for national preparedness and

health emergency management. The majority of interview questions were largely open-ended to engage subjects on their insights and perspective and to probe them on their views regarding the current state of national and global preparedness. Close-ended survey questions with a rating scale of 1-5 were also asked in order to determine specific assessments of progress made.

All interviews were conducted under the condition of anonymity and no answers given have been attributed to any specific persons. Please refer to Annex 5 for a list of the questions.

A template was developed to capture the outputs of the interviews and each one was fully transcribed.

Analysis of the role that the private sector has played in strengthening national preparedness has also been carried out as part of this chapter. Specifically, analysis of high-level recommendations that were targeted closely at private sector actors and those involved in building cross-sector partnerships have been integrated in the research. Additionally, specific stakeholders with expertise in the private sector's role and contributions to national preparedness have been engaged as part of the interviews and a sub-set of questions have been strategically included to assess this aspect of health emergency management.

3. Reference group

To support development of the chapter, WHO convened a reference group of a limited number of public health experts from institutions and advisory groups involved in preparedness activities to provide strategic advice throughout the development of the chapter.

The reference group provided recommendations and comments to support the design of the chapter's scope, the analytical methods used, and interpretation of the findings from the research. Table 2 below shows a list of the institutions that members of the reference group represent and the names of representatives are shown in annex 5.

Annex Table 2: List of organisations/institutions that participated in the expert reference group *(alphabetical order)*
Food and Agriculture Organization of the United Nations (FAO)
National Public Health Institute (Republic of Zambia)
Public Health England (PHE)
Resolve to Save Lives
Strategic and Technical Advisory Group on Infectious Hazards (STAG – IH): •
United Nations International Children's Emergency Fund (UNICEF)
World Health Organization (WHO)
World Bank Group (WB)

Annex 3: Definitions for the recommendation analysis

Level 1: Groupings by targeted levels

Global stakeholders - organisations with an international membership, scope or presence. Membership can include sovereign states, as in the United Nations system and organisations. International non-governmental organisations, such as the International Federation of Red Cross and Red Crescent are also included in this category.

Regional stakeholders – refers to supranational entities with a geographical, geopolitical or economic basis for membership. Examples include the African Union (AU), Association of Southeast Asian Nations (ASEAN) and European Union (EU). WHO regional offices are also included as regional organisations.

National stakeholders – are those limited to a particular country, with a remit relating to the entire country. This can include governmental and non-governmental organisations.

Subnational stakeholders – are similar to national organisation, but with a remit limited to part of a particular country. They can also include governmental and non-governmental organisations.

Level 2: Groupings by thematic areas – *each one is comprised of a number of thematic areas*

Strategic – refers to the approach, overall aims or long-term goals of the activities involved in health security. Recommendations in this category often relate to strategic decisions, made by senior leadership or management of an organisation, that are critical for planning purposes.

Within this category we include recommendations that relate to:

- Policy
- Advocacy
- Coordination and integration across sectors, between regional approaches for preparedness and integration with other health system strengthening priorities
- Financing, priority setting and other resources
- Governance and accountability

Technical and operational – refers to the work, tasks and short-term goals of the activities involved in health security. Recommendations in this category often relate to the day-to-day work conducted by experts and professionals within the organisation, as part of preparedness, alert and response.

Within this category we include recommendations that relate to:

- Monitoring and evaluation
- Research and development

- Technical support to countries

Definition of themes that comprise each domain

Policy – can refer to policies designed or adopted at the country level or by international stakeholders. This can also include broad principles, a course of action or approaches that are shaped by high-level directive guidance.

Advocacy – this includes recommendations relating to raising awareness or support for a particular issue, such as improved sharing of data between countries as part of preparedness activities. This also includes recommendations related to communication efforts that seek to improve understanding of core issues.

Coordination and integration across sectors, between regional approaches for preparedness and integration with other health system strengthening priorities refers to recommendations centred on the facilitation of bridging gaps and supporting multi-sector approaches for technical and operational preparedness activities.

Examples of types of activity or recommendation that are included in this category:

- Coordination with other health or non-health organisations, e.g. across the UN system, or with non-state actors
- Coordination with other divisions, centres or departments within the same organisation, e.g. between headquarters, regional and country offices of WHO, or between clusters.
- Coordination across regional and sub-regional organisations and networks e.g. WHO working with AU, ASEAN and EU
- Integration with other priorities, sectors and programmes, e.g. Sustainable Development Goals, One Health, private sector, health system strengthening

Financing, priority setting and other resources includes recommendations relating to how financial, human and other resources should be managed and prioritised for national preparedness, health emergency management and broader health security activities that support preparedness. This includes recommendations on mobilising domestic or international funding for health security, the allocation of funding to programmes and activities, and managing other non-financial resources, such as human resources.

Governance and accountability refers to activities that facilitate better stewardship of national preparedness strengthening efforts. It is important to note that this does not exclusively refer to country-level stewardship but relates to global and regional stakeholders too as per the dimensions above.

Monitoring and evaluation refers to activities at the technical and operational level that are used to assess and improve the performance and results of programmes, projects and organisations. It is often key in informing activities related to governance and accountability. This includes

recommendations related to tools and frameworks designed to evaluate national preparedness levels.

Research and development refers to recommendations related to the development of tools and measures including medicines, medical countermeasures, vaccines, diagnostics and other technologies, as part of preparedness and health emergency management.

Technical support to countries includes recommendations relating to technical assistance at the country level on issues such as surveillance, diagnostic capacities and biosecurity. Technical assistance beyond these examples is of course included.

Annex 4: Recommendations by target audience

231 high-level recommendations for national preparedness and health emergency management were identified and extracted, from 17 reports published by 11 institutions. The stakeholders, groups of organizations and institutions that published these reports are shown below in Annex table 3.

Annex Table 3: List of organisations and institutions that published reports from which high-level recommendations were extracted	
Author / organisation	**Number of high-level recommendations**
Commission on a Global Health Risk Framework for the Future—National Academy of Medicine	25
European Commission	33
Government of Sierra Leone, Ministry of Health and Sanitation	5
Graduate Institute of International and Development Studies	3
The Harvard-LSHTM Independent Panel on the Global Response to Ebola	10
International Federation of Red Cross and Red Crescent Societies (IFRC)	10
John Hopkins Center for Humanitarian Health	20
UN High-Level Panel on Protecting Humanity from Future Health Crises	27
World Health Organization	74
World Bank Group	12
World Economic Forum	12
Grand Total	**231**

Annex Table 4 below provides an overview of how each high-level recommendation was grouped according to the type, subtype and stakeholder target.

Annex Table 4: Groupings used in qualitative analysis of high-level recommendations			
	Recommendation targeted at:		
Type and sub-type of recommendation	**Global / Regional stakeholders**	**National / Subnational stakeholders**	**Total**
STRATEGIC	**141**	**33**	**174**
Policy	47	6	53
Advocacy	11	0	11
Coordination and integration	25	16	41
Finances, resources and priority setting	36	8	44
Governance and accountability	22	3	25
TECHNICAL AND OPERATIONAL	**43**	**14**	**57**
Monitoring and evaluation	18	5	23
Research and development	14	0	14

Technical support	11	9	20
Total	**184**	**47**	**231**

Recommendations targeting global and regional stakeholders

Strategic recommendations

Most high-level recommendations that targeted global and regional stakeholders focused thematically on strategic issues (141 of 184 recommendations, 77%), below:

Policy

Policy-related recommendations were the largest and most diverse group of recommendations. They accounted for 47 of 141 recommendations (33%) and fell under the categories of trade and travel restrictions, community engagement, equity and ethical considerations and the procedures for declaring health emergencies. Policy-related recommendations specifically highlighted:

- Specific approaches global agencies should take to address trade and travel restrictions.
- Involving communities in response to outbreaks in order to address stigma, harmful traditional practices and promote health education.
- Prioritizing hard-to-reach and marginalized groups, ensuring access to medicines and vaccines and considering gender issues.
- Procedures for how the IHR (2005) should be used to alert the global community to health emergencies.

Examples of key "policy" related recommendations:

Trade and travel restrictions
"The WTO and WHO convene an informal joint Commission of Experts to study possible measures to strengthen coherence between the IHR and the WTO legal frameworks regarding trade restrictions imposed for public health reasons." (UN High-level Panel on the Global Response to Health Crises, 2016)

Community engagement
"We recommend that all governments (including donors) and humanitarian organizations invest much more heavily in community resilience and local response capacities before disasters and other crises. This means scaling up the use of anticipatory funding for predictable and recurrent hazards in international and domestic response systems and promoting legal and policy frameworks for disaster risk management that focus on the needs of the most vulnerable people." (IFRC, World Disasters Report, 2018)

Equity and ethical considerations
"We recommend that donors define 'value for money' in light of the goal of leaving no one behind and reaching the people most in need – even if doing so is more expensive. This means prioritizing the people

who are hardest to reach and incentivizing their assistance through proactive and tailored strategies and tools." (IFRC, World Disasters Report, 2018)

Procedures for declaring health emergencies
"A transparent and politically protected WHO Standing Emergency Committee should be delegated with the responsibility for declaring public health emergencies." (Harvard-LSHTM Panel on the Global Response to Ebola, 2015)

Advocacy

Of all recommendations that were related to strategic issues for global and regional stakeholders, 11 recommendations out of 141 (8%) called on global or regional stakeholders to promote, support or advocate for a particular issue with respect to national preparedness.

Advocacy-related themes include:

- Improved access to vaccines, medicines, medical countermeasures and diagnostic tools
- Improved financing for R&D during emergencies and increased sharing of benefits from research
- Greater stewardship regarding implementation of the IHR (2005)

Examples of key "advocacy" recommendations:

Improved access to vaccines, medicines, medical countermeasures and diagnostic tools
"In concert with efforts by Member States, and building on existing vaccine distribution systems, WHO should encourage advance agreements with and among appropriate agencies and authorities in Member States, vaccine manufacturers and other relevant parties that would facilitate approval and delivery of pandemic vaccines to low-resource countries, to increase equity in supply and support advance planning for administration of vaccines." (WHO Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic (H1N1) 2009, 2011)

Improved financing for R&D during emergencies and the increased sharing of the benefits of research
"(The European Parliament) stresses that the EU should promote effective and fair financing of research that benefits the health of all and ensures that innovations and interventions lead to affordable and accessible solutions" (European parliament resolution, 2015)

Greater stewardship regarding implementation of the IHR
"Increase awareness of the IHR and reaffirm the lead role of WHO within the UN system in implementing the IHR. Awareness and recognition of the IHR is improved within the UN system through the designation of an advocate. The key role of WHO in leading and governing implementation of the IHR should be reaffirmed." (WHO Review Committee on the Role of the International Health Regulations (2005) in the Ebola Outbreak and Response, 2016)

Co-ordination and integration

25 (18%) of 141 were focused on coordination and integration across sectors, within regional approaches to preparedness and on integration with other health system strengthening priorities. These themes include:

- Coordination across the UN system including integrating management of health crises and humanitarian efforts.
- Strategies for ensuring the entire UN system works to sustain health system capacities during humanitarian crises and in fragile or failed states
- Coordination across the three levels of WHO, across regions and among neighbouring countries.
- Another theme focused on integrating health system strengthening activities with implementation of IHR (2005) and Pandemic Influenza Preparedness (PIP), as well as activities related to gender equality and the pursuit of Sustainable Development Goal (SDG) targets.
- More coordinated multisector approaches for preparedness also emerged, including better involvement of the private sector in national preparedness and health emergency management and integrating activities of non-state actors at the country level, including local and international NGOs.

Examples of key "coordination and integration" recommendations:

Co-ordination of national preparedness and health emergency management activities across the UN system including integration with management health crises and humanitarian crises efforts
By the end of 2016, the United Nations (UN) and the World Health Organization should establish clear mechanisms for coordination and escalation in health crises, including those that become or are part of broader humanitarian crises requiring mobilization of the entire UN system. Commission on a Global Health Risk Framework for the Future / US National Academy of Medicine)

Co-ordination of preparedness activities and health emergency management across the three levels of WHO
"By the end of 2016, the World Health Organization should create a Center for Health Emergency Preparedness and Response— integrating action at headquarters, regional, and country office levels—to lead the global effort toward outbreak preparedness and response. This center should be governed by an independent Technical Governing Board." (Commission on a Global Health Risk Framework for the Future, 2016)

Co-ordination of preparedness activities and health emergency management across regions
"By the end of 2017, the World Health Organization should work with existing formal and informal regional and sub-regional networks to strengthen linkages and coordination, and thus enhance mutual support and trust, sharing of information and laboratory resources, and joint outbreak investigations amongst neighboring countries." (Commission on a Global Health Risk Framework for the Future, 2016)

Improved integration with associated other priorities and programmes
"WHO and States Parties should ensure that all programs to strengthen health systems specifically address IHR core capacities." (WHO Review Committee on the Role of the International Health Regulations (2005) in the Ebola Outbreak and Response, 2016)

Stronger and more coordinated multisector approaches for preparedness
"Existing UN Clusters or groups, particularly in logistics and telecommunications, should consider how to expand their preparedness mechanisms, incorporate more private sector partners and tackle key protocol or regulation hurdles" (World Economic Forum, 2015)

Financing, priority setting and other resources

Out of 141 high-level recommendations related to strategic issues, 36 related to financing, priority setting and other resources (26%) were identified. These themes include:

- Mobilizing domestic and international funding for national preparedness, health emergency management and broader health security.
- Mobilizing resources for other priorities that impact health security such as humanitarian assistance, support for fragile states, health system strengthening, research and development, including recommendations preparing for the onset of a health emergency (e.g. resources for deployable regional or global response capacities)
- Insurance-based mechanisms and incentives for domestic investments.
- Financing contributions to WHO.
- Contingency fund for emergencies.

Examples of key "Financing, priority setting and other resources" recommendations:

Mobilising domestic and international funding for national preparedness, health emergency management and broader health security
"The global community must agree on a clear strategy to ensure that governments invest domestically in building such capacities and mobilize adequate external support to supplement efforts in poorer countries. This plan must be supported by a transparent central system for tracking and monitoring the results of these resource flows." (Harvard-LSHTM Panel on the Global Response to Ebola, 2015)
"By the end of 2016, the World Health Organization should work with global R&D stakeholders to catalyze the commitment of $1 billion per year to maintain a portfolio of projects in drugs, vaccines, diagnostics, personal protective equipment, and medical devices coordinated by the Pandemic Product Development Committee." (Commission on a Global Health Risk Framework for the Future, 2016)

Insurance-based mechanisms and incentives for domestic investments
"The Insurance Development Forum, the World Bank, and other partners should work together to: (i) develop the next iteration of the Pandemic Emergency Financing Facility (PEF 2.0) that specifically ties recipient countries' investments in preparedness to relief of their contributions to PEF 2.0 premiums; (ii) deliver maximum participation from the insurance markets to provide capacity for PEF 2.0; and (iii) investigate how insurance for business interruption resulting from disease outbreaks can be provided to private sector companies in target countries." (World Bank, 2017)

Financial Contributions to WHO
"By the end of 2016, the World Health Organization should create and fund a sustainable contingency fund of $100 million to support rapid deployment of emergency response capabilities through one off

contributions or commitments proportional to assessed contributions from member states." (Commission on a Global Health Risk Framework for the Future, 2016)

Governance and accountability

Out of 141 high-level recommendations related to strategic issues, 22 related to governance and accountability (16%). Governance and accountability themes include:

- Governance in the UN system, stewardship beyond the health sector, and the involvement of other UN agencies. Reform and leadership from key organizations, including WHO, also features.
- Improved governance and stewardship regarding international data sharing, R&D, biological specimen sharing etc.
- Compliance with the IHR and other international frameworks, including second extension requests from state parties and the regulations on aid effectiveness e.g. Paris Declaration on Aid Effectiveness and the Accra Agenda.

Examples of key "governance and accountability" recommendations:

Governance in the UN system
"An independent UN Accountability Commission should be created to do system-wide assessments of worldwide responses to major disease outbreaks." (Harvard-LSHTM Panel on the Global Response to Ebola, 2015)

Improved governance and stewardship regarding international data sharing, R&D, biological specimen sharing etc.
"WHO champions the open sharing of information on public health risks and expands guidance on global norms for sharing data of biological samples and gene sequence data during public health emergencies. WHO and States Parties should ensure that sharing of samples and sequence data is balanced with benefit-sharing on an equal footing." (WHO Review Committee on the Role of the International Health Regulations (2005) in the Ebola Outbreak and Response, 2016)

Compliance with IHR and other international frameworks
"All States Parties that have requested a second extension (or do so at a future date) should be granted the extension for 2014–2016. In granting this extension, the Director-General should note if the request was accompanied by an implementation plan and if so, whether or not the plan adequately addressed the criteria for the extensions noted by the Sixty-sixth World Health Assembly. (WHO Review Committee on Second Extensions for Establishing National Public Health Capacities and on IHR Implementation, 2014)

Technical and Operational Recommendations

Of 184 recommendations identified and analyzed for global and regional stakeholders, 43 related specifically to technical and operational issues (23%). The main themes in this division are summarized below.

Monitoring and evaluation

18 high-level recommendations out of the 43 centered on monitoring and evaluation (42%).

Key themes include:

- Monitoring country preparedness, including recommendations on independent assessments and/or self-assessment for monitoring and evaluating IHR capacities
- Monitoring and reporting public health events
- After-action reviews and simulation exercises for preparedness

Examples of key "monitoring and evaluation" recommendations:

Monitoring country preparedness
"The Review Committee recommends that the Director-General consider a variety of approaches for the shorter- and longer-term assessment and development of IHR core capacities as follows: States Parties should urgently: (i) strengthen the current self-assessment system (e.g., if not already done, the annual self-assessment reports and planning processes should be enhanced through multi-sectoral and multi-stakeholder discussions); and (ii) implement in-depth reviews of significant disease outbreaks and public health events. In parallel, and with a longer-term vision, the Secretariat should develop through regional consultative mechanisms options to move from exclusive self-evaluation to approaches that combine self-evaluation, peer review and voluntary external evaluations involving a combination of domestic and independent experts." (WHO Review Committee on Second Extensions for Establishing National Public Health Capacities and on IHR Implementation, 2014)

Monitoring and reporting public health events
"By the end of 2016, the World Health Organization (WHO) should establish a mechanism to generate a daily high-priority "watch list" of outbreaks with potential to become a Public Health Emergency of International Concern to normalize the process of reporting of outbreaks by country and encourage necessary preparedness activities. The WHO should communicate this list to national focal points on a daily basis and provide a public summary on a weekly basis." (Commission on a Global Health Risk Framework for the Future, 2016)

After-action reviews and simulation exercises for preparedness
"After-action reviews of practice after a cholera outbreak should be standard practice for each responding organization. An after-action review for each agency (UN, INGOs, NNGOs, etc.) after the first wave would have been beneficial for identifying gaps and weaknesses in preparedness that required resolution before the second wave occurred." (John Hopkins Center on Humanitarian Health, 2018)

Research and development

14 out of 43 high level recommendations in technical and operational division related to research and development (33%). Key themes include:

- Research capacity at the global and regional levels
- Public-private partnerships for R&D
- R&D for influenza and pandemic products

Examples of "research and development" recommendations:

Research capacity at the global and regional levels
"(The European Parliament) Calls for research infrastructure to be bolstered by the establishment of a regional public infectious disease research centre in West Africa, and for inter-university cooperation to be established with the participation of the EU and its Member States" (European Parliament, 2015)
"The WHO leads efforts to assist developing countries in building research and manufacturing capacities for vaccines, therapeutics and diagnostics, including through South-South cooperation." (UN High-level Panel on the Global Response to Health Crises, 2016)

Public-private partnerships for R&D
"The leading private vaccine, drug and diagnostic researchers should convene with public health experts (e.g. WHO, CDC) to establish a group to drive forward the research agenda, building on the lessons learned through collaboration on the Ebola response. Related to this, a leading foundation or other convening organization is called upon to steer the design and set-up of such a mechanism." (World Economic Forum, 2015)

Technical support to countries

11 out 43 high-level recommendations in the technical and operational division were related to technical support to and/or from countries (26%). Themes include:

- Greater technical resources for supporting countries
- Training national medical staff
- Laboratory and surveillance capacity building
- Support to national IHR focal points
- Developing a reserve of skilled and trained public health workforce that can be deployed as part of response efforts during a national health emergency

Examples of key "technical support" recommendations:

"The World Health Organization (WHO) should provide technical support to countries to fill gaps in their core capacities and achieve benchmark performance. (Technical support will be coordinated through a WHO Center for Health Emergency Preparedness and Response)" (Commission on a Global Health Risk Framework for the Future, 2016)

"Member States, in concert with WHO, should establish a more extensive global reserve workforce of experts and public health professionals to be mobilized as part of a sustained response to a global health emergency and deployed for service in countries that request such assistance." (WHO Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic (H1N1) 2009, 2011)

Recommendations to national and subnational stakeholders

Of all 231 high-level recommendations, only 47 were found to be targeted at the national or subnational level. This represents a mere 20% and the findings are briefly summarized below:

Strategic recommendations

As with global and regional recommendations, most national/subnational recommendations focused on strategic issues. In total, 33 of the 47 national/subnational level recommendations were centred on strategic issues (70%).

Policy

Six of the 33 recommendations were specifically related to national/subnational policies, with a key theme being commitments to domestic funding, compliance with IHR, community engagement and gender equality.

Coordination and integration

Sixteen of the 33 were related to coordination, including the involvement of the private sector in health security, multi-sectoral and multi-disciplinary action for health security, rationalizing the public health system and coordinating response partners in-country.

Financing, Priority Setting and Other Resources

Eight of the 33 recommendations related to financing, priority setting and other resources, all related to mobilizing domestic financial and human resources for health security or health system strengthening.

Governance and accountability

Three of the 33 recommendations centered on strategic issues related to compliance with IHR MEF and PVS assessments, developing national action plans, and ensuring aid effectiveness

Technical and Operational recommendations

Only 14 recommendations at the national/subnational level centred on improved technical and operational issues. Five were recommendations on monitoring either country preparedness or delivery of programs by NGOs and other partners; the remainder focused on support to national IHR focal points and strengthening core capacities—including laboratories, surveillance and response—through technical assistance.

Examples of key national/subnational level recommendations:

Policy

"Governments and responders strengthen and streamline their community engagement and promote local ownership and trust." (UN High-level Panel on the Global Response to Health Crises, 2016)

Co-ordination and integration
"National governments should incorporate the private sector into their strategy for reinforcing preparedness, through a combination of awareness-building, direct involvement in preparedness and response planning, and regulation. Where private sector companies contribute directly or indirectly to the risks of disease outbreak and spread by the nature of their business, national governments should introduce regulations requiring such companies to invest in risk mitigation and preparedness." (World Bank, 2017)
"In-country operators in high-risk countries should gather to discuss how best to organize themselves to prepare for a crisis. The relevant companies should identify one or a few among the group to take a leadership role and catalyze their activity." (World Economic Forum, 2015)

Financing, Priority Setting and Other Resources
"To increase fiscal space, national governments should examine ways of generating incremental domestic resources to finance preparedness, whether by (i) improving overall tax design and collection; or (ii) introducing earmarked taxes where they might be an effective way to generate additional resources." (World Bank, 2017)
"Each national government should develop an investment case, articulating the political and economic arguments for integrating the costed plan into national budget cycles and committing resources to reinforce and sustain preparedness, plus a change management strategy to engage and coordinate relevant stakeholders." (World Bank, 2017)

Governance and accountability
"By the end of 2017, all national governments should commit to participate in, and by the end of 2019, conduct a Joint External Evaluation (JEE) to assess their capacity to comply with the requirements of the International Health Regulations 2005 (IHR) to prevent, detect, and rapidly respond to public health threats; (ii) By the end of 2017, all national governments should commit to participate in, and by the end of 2019, conduct an evaluation of Performance of Veterinary Services (PVS) to assess their capacity to comply with the World Organization for Animal Health (OIE) standards." (World Bank, 2017)
"Within nine months of completion of JEE and PVS, national governments should develop and publish a prioritized and costed plan to implement recommendations emerging from the JEE and PVS assessments, including regional elements where relevant." (World Bank, 2017)

Monitoring and evaluation
"By the end of 2016, all countries should commit to participate in the external assessment process as outlined in Recommendation B.2, including publication of results." (Commission on a Global Health Risk Framework for the Future, 2016)

"Supervision to improve knowledge, data, and quality of care in more remote areas, by considering various technological solutions (e.g., similar to those used in telemedicine), working closely with national non-governmental organization (NGOs), and by employing third party monitoring (TPM) of data collection, laboratory practices, and quality of practices, needs to be expanded and funded." (John Hopkins Center for Humanitarian Health, 2018)

Technical support
"State Parties should ensure that designated National IHR Focal Points have the authority, resources, procedures, knowledge and training to communicate with all levels of their governments and on behalf of their governments as necessary." (WHO Review Committee on Second Extensions for Establishing National Public Health Capacities and on IHR Implementation, 2014)

Annex 5: Key Questions for Stakeholder Interviews

Status of country preparedness

1. How well do you think country-level preparedness has advanced since Ebola (2014)? (rate on a scale between 1 to 5). Please explain your rating including the measures that you think have contributed to this.
2. A number of recommendations have been made to strengthen preparedness following recent health emergencies, what do you think the current status of implementing these recommendations is? Why?
    a. What do you think progress has been at global level? 1-5 rating – Why?
    b. What do you think progress has been at country level? 1-5 rating – Why?
    c. What areas of national and global preparedness do you think are the strongest and weakest? – Why?
    d. What do you think the limitations have been at the global and country level? – Why?
    e. Which measures do you think are the best ways to overcome the challenges? – Why?
    f. Which areas of global and country-level preparedness do you think that high-level recommendations have been missed out? – Why?
3. How can we improve methods of tracking country progress against targets and recommendations for better preparedness?
4. How can the strengthening of preparedness capacities be better integrated with health system strengthening at country level?
5. How well do you think that national preparedness strengthening has taken into account the needs of both human health and animal health and how can this be improved?

Progress made

6. How successful do you think multisectoral approaches for preparedness have been?
7. To what extent you think that progress in the implementation of IHR capacities is reflected in better management of public health events at the country level?
8. How do you think a One Health approach has improved preparedness capacities in both human and animal health? How can it be better implemented?

Opportunities and Challenges

9. What do you think are the most successfully applied lessons learned that have improved preparedness capacities?
10. What key opportunities do you think have been missed following reviews of high-impact health emergencies?
11. How do you see the role of the following groups in terms of strengthening preparedness? What measures do you think could incentivize them to be more aligned in collaborating with countries?

a. UN agencies including WHO
b. International Networks & Initiatives (e.g. GHSA)
c. Private Sector
d. Non-state actors (NGOs, Civil societies, local community leaders)
e. Academic community

12. How do you see the current opportunities and challenges associated with scaling up IHR implementation?
13. How can we prioritize and track countries based on the different level of preparedness?

Way forward

14. What measures are needed to achieve greater progress toward existing recommendations and targets for global preparedness? (e.g. GPW 13)
15. How do you think that health system strengthening can be better leveraged in order to support emergency preparedness?
16. How can countries and other public health stakeholders be made better aware of the recommendations that exist and how they can be best applied?
17. Do you think that any key recommendations for preparedness have been missed and what new recommendations would you suggest?
18. How can a One Health approach for country preparedness be better implemented?

Private Sector Specific

19. How do you see the private sector's role in building preparedness?
20. What do you think are the greatest risks to private sector stakeholders when country preparedness is weak?
21. What measures beyond financial support can the private sector provide to countries in terms of strengthening preparedness? (logistic, coordination, risk comms. etc.)
22. What recent progress has been made toward better integrating the private sector into national preparedness?
23. How do you think the private sector sees its role in working with countries and international public health stakeholders?
24. What are the opportunities and challenges in terms of fostering collaboration between the private sector and governments?
25. How do you think the private sector can be made more aware of the role it can play in preparedness?

Annex 6: Reference group members

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