HEALTH SYSTEMS FOR HEALTH SECURITY

A Framework for developing capacities for International Health Regulations, and components in health systems and other sectors that work in synergy to meet the demands imposed by health emergencies

World Health Organization

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ABBREVIATIONS AND ACRONYMS

AMR	Antimicrobial resistance
APSED	Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies
COVID-19	Coronavirus disease
CGH	Common Goods for Health
EDRM	Emergency and Disaster Risk Management Framework
EPHF	Essential Public Health Functions
HICs	High-income countries
HSforHS	Health Systems for Health Security
HWF	Health Workforce
IDSR	Integrated Disease Surveillance and Response
IEC	Information Education and Communication
IHR	International Health Regulations (2005)
IPC	Infection Prevention and Control
JEE	Joint External Evaluation
LMICs	Low and middle income countries
MERS CoV	Middle East Respiratory Syndrome Coronavirus
NAPHS	National Action Plan for Health Security
PHC	Primary Health Care
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SPAR	State Party Self-Assessment Annual Reporting
UHC	Universal Health Coverage
UNHCR	United Nations High Commissioner for Refugees
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

01 INTRODUCTION

1.1 Background

The world is increasingly interconnected and interdependent. People, goods, and their related services move easily and quickly across regions and countries. This has made achieving national and global health security complex, presenting both challenges and new opportunities. Foremost of concern are public health events that can emerge locally and spread globally, as has been seen from the recent COVID-19 pandemic. Other recent events have also demonstrated that the current status of preparedness capacities is insufficient to deliver an effective response to severe and large-scale public health emergencies. Major events such as the Zika virus outbreak in Latin America, Ebola outbreak in Western Africa and the COVID-19 pandemic have been brutal reminders of how important preparedness is to address all types of health emergencies at all levels for global health security. *(1)* Furthermore, the impact of these events can overwhelm health systems and impact many parts of society.

Improving health security is not a cost, but an investment. Evidence suggests that preparedness financing pale in comparison to the cost of inaction, and that investments can produce future cost-savings[1]. *(2)(3)* Without increased investments, global public health emergencies will continue to be an ongoing challenge. *(4)* Despite efforts to strengthen national and global health security, countries continue to have varied levels of capacities to achieve this. An analysis of International Health Regulations annual reporting data conducted in the context of the COVID-19 pandemic showed that countries vary widely in their ability to prevent, detect, respond to, and recover from outbreaks. *(5)* This is a reminder that we are only as strong as the weakest health system and country in our interconnected world. *(6)*

Countries may have different needs in ensuring that they can mobilise resources to adequately respond to health emergencies on top of their routine demands for health services. For example, low-and-middle income countries (LMICs) may require support to rapidly scale-up technically skilled and specialized human resources, given the vital role of the health workforce in health systems when responding to health emergencies[2]. On the other hand, in high-income countries (HICs) with established health systems, the main challenge during health emergencies may be capacity to manage a huge surge

[1] For instance, the World Bank sees the prevention and control of infectious disease as a highly effective, yet low cost, investment target.

[2] In this regard, the Global Strategy on Human Resources for Health: Workforce 2030 was developed for better investment in the health workforce toward improving health service coverage, as well as emergency and disaster risk management. The strategy not only helps countries to build overall health system resilience, it also reduces vulnerabilities by providing human resources required for management of emergencies. (76)

in demand for health services within a short period of time, as was seen in the COVID-19 pandemic. Finally, all countries, regardless of income, faced difficulties in the procurement of necessary medical equipment and medicines to address the surge in demand for such supplies during the pandemic, due to intense competition. *(7) (8) (9) (10) (11) (12)*

The recent crisis highlights the need for countries to identify upstream capacities and existing gaps, in order to ensure that health systems are prepared to withstand the increased stress caused by severe and large health emergencies, which can also threaten the delivery of essential health services. In this regard, effective and coordinated strengthening of health systems contributes to strengthening health security for better prevention, detection and response to public health events and threats, thus contributing to building a healthier and safer world.

Several studies highlight the overlap between efforts to strengthen and invest in Health Systems towards one that is reliable, sustainable and achieves universal health coverage (UHC); and also improves national and global health security. *(13) (14) (15) (16)* To illustrate this, a summary of a rapid scoping review on country case studies on health systems for health security in available in Annex 1.

Health Systems for Health Security is an approach that harmoniously brings together efforts to strengthen resources and capacities required for implementation of the International Health Regulations, components in health systems and those in other sectors for effective management of health emergencies, while maintaining the continuity of essential health services throughout.

Building and enhancing these linkages involves a complex set of conceptual and practical issues for countries, WHO and partners. There is need for a clear, common narrative and well-defined framework to build resilient and responsive health systems for these purposes. Furthermore, the messaging around investing in health security, the expected returns and outcomes needs to be strengthened. *(17)*

In particular, there is an important need to better understand: (i) what capacities are required for resilient and responsive health systems for health security; (ii) where the intersections between health systems, health security and other sectors are located, and; (iii) how challenges at these intersections can be overcome and opportunities leveraged for multisectoral and multidisciplinary, effective management of health emergencies.

> "Quality health systems not only improve health outcomes in "peacetime", they're also a bulwark against outbreaks and other public health emergencies. UHC and health security are two sides of the same coin."
>
> Dr. Tedros, the Director-General of WHO
> The Lancet

1.2 Purpose, Objectives and Target audience of the framework

Purpose

The purpose of this "health systems for health security" framework is to **support countries, WHO and partners in bringing together capacities required for the IHR, and components of health systems and other sectors for multisectoral, multidisciplinary, effective management of health emergencies.** It is an innovative approach that complements existing concepts and tools for global health security capacity-building, and covers different types of risks arising from biological and non-biological hazards and events.

Objectives

The objectives of the health systems for health security framework are to:

- **Promote a common understanding** of what health systems for health security entails and how it contributes to better national and global health security.
- **Delineate the essential components of health systems and other sectors** that play an important role in meeting the demands imposed by health emergencies.
- **Explain how countries can define, prioritize and monitor actions and investments** in health security, health systems and other sectors for multisectoral and multidisciplinary management of health emergencies toward better global health security.
- **Help partners and donors better support countries** in strengthening health security by identifying where more investment in health systems is most needed, how best to do so, and how financing can be sustained.
- **Highlight challenges related to implementation** of health systems for health security.

The outcomes would be:

- **Greater awareness** of the importance of building health systems for health security.
- **More synergistic working relationships** between health security, health systems and other sectors for multisectoral and multidisciplinary management of health emergencies.

Credit: © WHO / Mark Nieuwenhof

- **Increased investments in health systems** for both day-to-day service delivery (thus achieving UHC) as well as longer-term health security by preventing, detecting and quickly mitigating the occurrence and impact of health emergencies.

Target audience

The principal audience of the framework includes the following groups of people:

- **Decision-makers and public health experts in countries** responsible for defining, coordinating and implementing health security strategies. This extends beyond the Ministry of Health to include **stakeholders from other sectors** that are involved, in one way or another, in the management of health emergencies.
- **Partners and donors** supporting and financing strengthening of health security capacities or building health systems.
- **Research and academic institutions** interested or involved in research efforts to generate evidence for effective management of health emergencies.
- Other institutions and community leaders interested or that could be potentially involved in management of health emergencies.

02 GUIDING PRINCIPLES

The guiding principles of the health systems for health security framework are as described below.

All-hazards approach—Management of the entire spectrum of emergency threats and events is based on the recognition that there are common elements (and common capacities required) in the management of different types of risks, including in responses to emergencies.

Risk-based approach —The risks that emergencies pose to communities are directly related to communities' exposure to hazards, their vulnerabilities to these hazards and their capacity to manage them. Countries should have a good understanding of the risks to which they are exposed at local, subnational and national levels. Countries must build and strengthen their health systems for health security capacities to meet the demands imposed by relevant risks identified. This will contribute to minimizing health and other consequences of emergencies. *(18)*

Whole of society and multisectoral approach —National policies in sectors other than health have a major bearing on the risk factors for diseases, and health gains can be achieved much more readily by influencing public policies in relevant sectors (such as environment, transport, trade, taxation, education, agriculture, urban development, food and energy) than by making changes in health policy alone. *(19)* National authorities should therefore adopt an approach to the prevention and control of these diseases that brings together multiple sectors and disciplines. To this end, WHO has published a multisectoral preparedness coordination framework. *(20)* At the same time, there are contributions and important roles played by other stakeholders, including individuals, families and communities, intergovernmental organizations and religious institutions, parliaments, civil society, academia, the media, voluntary associations and the private sector. Effectively anticipating, preventing and managing health emergencies require a whole-of-society, whole-of-government, One Health, multi-level engagement approach. Many authors describe such engagement as the best way to address health emergencies, thus weakness in any of the relevant sectors must also be accounted for in preparedness plans. *(21) (22) (23) (24)*

A national enabling environment is imperative – In order for the above-mentioned guiding principles to become an operational reality, it is necessary to create an enabling environment for effective management of health

emergency in all types of contexts[3]. This is a complex task that encompasses diverse structures and processes such as having appropriate legal frameworks, robust financial mechanisms and good governance structures. **Governments, WHO and partners all have a key role in** ensuring harmonious preparedness coordination when strengthening health systems for health security, in accordance with the International Health Regulations (IHR) 2005. *(25) (26)*

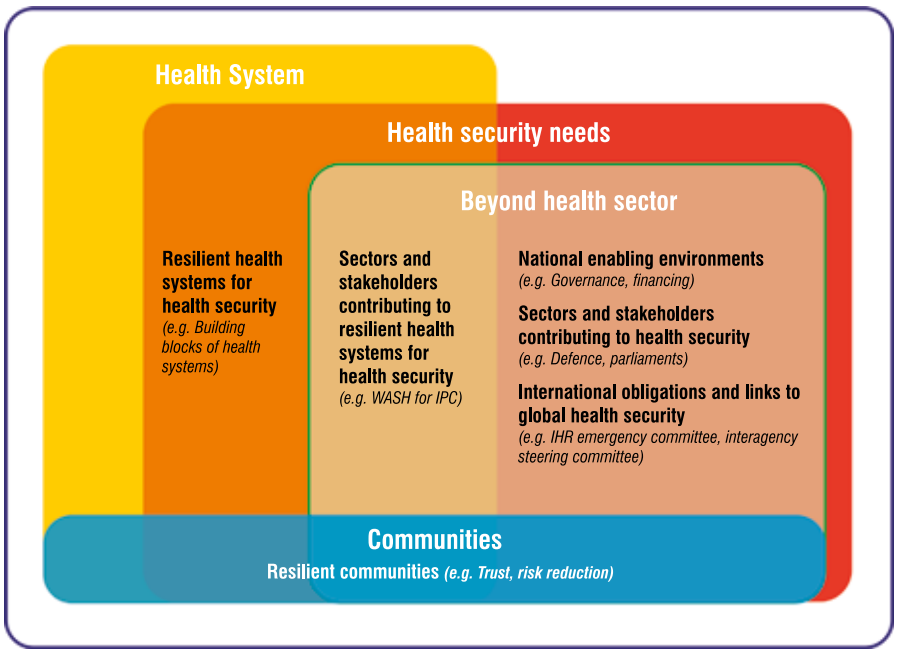
[3] The framework is intended to be applicable across all types of contexts, with necessary adaptations to local contexts, although some are given particular attention given their unique circumstances, such as conflict-affected settings, protracted emergency contexts, precarious economic contexts, population forcibly displaced, megalopolis, small islands, deteriorating environmental and climatic condition context and disaster-prone areas.

03 COMPONENTS OF THE HEALTH SYSTEMS FOR HEALTH SECURITY FRAMEWORK

Health Systems for Health Security must take into account the goals of UHC (all people can access good quality health services without financial hardship) and those of health security (minimize vulnerability to acute public health events that endanger the collective health of populations, including across geographic boundaries). This implies health systems that can resist, absorb, accommodate, adapt to, and recover from the effects of health emergencies in a timely and efficient manner.

Health systems and emergency preparedness capacities reinforce one another. *(27)* Strengthening health systems makes them more resilient and better able to detect and control outbreaks before they spread; and improved public health functions contribute to good-quality case management and to the strong surveillance and response systems necessary for early disease detection and control. Strong health systemsarethusessential for health security, and better health security is associated with health systems that are more resilient. Leveraging health systems for health security consists of developing, strengthening and maintaining IHR capacities, and components of health system as well as from other sectors which health systems are dependent on. All of this is based on having resilient communities that are involved in projects, interventions, or activities that address issues that affect their well-being, including before and during health emergencies. This is as illustrated in Figure 1.

Figure 1: Components of the Health Systems for Health Security approach and interlinkages between one another. Strong health systems are an important component of achieving health security ▼



This Framework thus builds upon i) the IHR capacities, *(28)* ii) additional components from health systems, and iii) components from other sectors (beyond health sector) that form critical dependencies with health and that strengthen health systems for health security[4]. Each of these three major components are further elaborated below.

3.1 IHR capacities

Health security relies on the effective implementation of the core capacities of the **International Health Regulations** (2005). *(29)* The IHR 2005 is a binding instrument of international law and its purpose is 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. (30) At regional level, the implementation of IHR is supported by regional frameworks, such as Integrated Disease Surveillance and Response (IDSR) in the African region, and the Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies (APSED III).

The IHR Capacities cover the full spectrum of requirements to prevent, detect, respond to, and recover from health emergencies:

[4] For example these include capacities at animal health sectors, agriculture, food industry, water and sanitation, energy, urbanism, workplace, transport, communities, communication, etc.

1	**Leadership:** From the highest level of governments and along the chain of command, mechanisms and tools to facilitate decision making, linking science to policies
2	**Advocacy:** Keeping preparedness high on political agendas / sustaining investments
3	**Legislation and policy:** to implement the IHR, laws, regulations, administrative requirements, policies and other government instruments operationalised and coherent throughout relevant sectors, regular review processes to incorporate lessons learnt
4	**Financing:** sustainable national financing mechanisms for IHR implementation and response in emergencies
5	**Multi-level, Multisectoral, Whole of Society Coordination:** Including One Health approach, involvement of civil society, parliamentarians and civil-military collaborations; and coordination with subnational and local levels, cities and urban settings
6	**Coordination of IHR:** IHR National Focal Point functions including IHR communications and reporting, global coordination mechanisms and architecture
7	**Community participation and engagement, and Risk communication:** Communication systems, coordination, public communication, engagement, addressing perceptions, misinformation, empowering citizens, leveraging community capacities, community health workers / primary health care approach, trust in governments and systems
8	**Human resource capacity:** Workforce development strategy, availability, competencies, key disciplines, geographic coverage, surge, trainings
9	**Surveillance:** Indicator, event and community based, systems, electronic tools, sharing and analysis of data
10	**National laboratory system:** Coordination system / diagnostic network, referral, transport, testing of priority health threats, influenza surveillance, pooling of resourcing and expertise, data management, reporting, quality control
11	**Biosafety and biosecurity:** System, training, practices
12	**Points of Entry:** Coordination, surveillance and routine capacities, effective response
13	**Immunization:** Coverage, access, delivery, vaccine manufacturing capacity

14	**Infection prevention and control:** Programmes and initiatives in primary to tertiary care facilities, community infection prevention and control
15	**Antimicrobial resistance:** National antimicrobial resistance strategy, stewardship, appropriate prescribing
16	**Access to, and continued provision of, essential health services:** Including access to primary care, support services (e.g. mental health), safe health facilities
17	**Risk assessments, preparedness and response planning, testing:** Monitoring and evaluation of risk, resources and vulnerabilities, plans for health security including Business Continuity Plans, functional testing including exercise management, capacities for monitoring and evaluation of preparedness status
18	**Emergency response operations:** Response coordination, operations centre, capacity to manage cases and surge, disaster management, recovery planning and coordination
19	**Medical countermeasures and personnel deployment:** Logistics and supplies, stockpiling, activating and coordinating countermeasures and reassignment of personnel
20	**Research and Development / innovation:** For preparedness and emergency risk management
21	**Additional interventions:** For the management of i) zoonotic diseases, ii) food safety events; iii) chemical events; vi) radiation emergencies; vii) deliberate events
22	**Linkages to other determinants of preparedness:** Gender considerations, climate, land cover, infrastructure (e.g. roads), intrinsic and extrinsic determinants impacting vulnerable populations

**Governance would be captured under leadership, advocacy, legislation, policy, financing, coordination, etc.*

This list was drafted on the basis of existing frameworks and their suite of associated tools to support IHR core capacity monitoring and evaluation, development and strengthening. However, it also includes lessons learnt from recent major public health emergencies (including the COVID-19 pandemic).

The development and maintenance of IHR 2005 core capacities is guided by collective and coordinated actions described in the WHO IHR Monitoring and Evaluation Framework (IHR MEF) *(31)* and associated tools including the WHO Benchmarks for IHR Capacities *(28)*, National Action Plans for Health Security (NAPHS) *(32)*, IHR-PVS (Performance of Veterinary Services) National Bridging Workshops (NBW) *(33)* and the Strategic Tool for Assessing Risks (STAR). *(28)*

- The **IHR MEF** is a set of tools developed by WHO and partners, which comprises 4 components: The mandatory States Parties self-assessment annual reporting (SPAR) and three voluntary components, namely after action reviews (AAR), simulation exercises (SimEx) and Joint External Evaluations (JEE). The IHR-MEF aims to provide a comprehensive, accurate, country-level overview of the implementation of requirements under the IHR to develop and monitor capacities to detect, monitor and maintain public health capacities and functions.
- The **national action plan for health security** is a country owned, multi-year, planning process that can accelerate the implementation of IHR core capacities, and is based on a One Health, all-hazards, whole-of-government approach. It captures national priorities for health security, brings sectors together, identifies partners and allocates resources for health security capacity development.
- The **WHO Benchmarks for IHR Capacities** guide States parties, partners, donors and international and national organizations on suggested actions needed to improve IHR capacities for health security. This can help countries in development of national plans, such as their action plans for IHR or health security.
- The **IHR-PVS National Bridging Workshops** are three-day events facilitated by WHO and the World Organisation for Animal Health (OIE), bringing together participants from public health and from animal health services. The objective is to analyze and improve collaboration between the two sectors in the prevention, detection and response to zoonotic diseases and other health events at the animal-human interface (including food safety, food security and antimicrobial resistance).

- Finally, the **Strategic Tool for Assessing Risks (STAR)** is a tool developed by WHO to support Member States in risk assessment using a standardized methodology. It enables countries to conduct an evidence-based assessment of a specific risk in a comparable, reproducible and defensible manner.

  All IHR related materials can be found on the Strategic Partnership for Health Security and Emergency Preparedness (SPH) Portal. The SPH portal is an interactive digital platform that facilitates the sharing and exchange of information on multisectoral health security investments, activities and capacities on a national, regional and global scale. It also centralizes all IHR related frameworks and tools, as well as data and reports. The portal also provides stakeholders with documents, data and resources covering key areas vital for global health security, such as One Health operations, health systems, universal health coverage (UHC), Sustainable Development Goals, pandemic influenza preparedness, disaster risk management, antimicrobial resistance (AMR), WHO Emergency Dashboard, WHO Global Health Observatory (GHO) and the IHR (2005). *(34)*

3.2 Health systems

The World Health Organization (WHO) has a framework that describes health systems in terms of six building blocks. *(35) (36)* These define essential components that all health systems around the world (regardless of how they are organized) need to have to achieve their goals. The building blocks are defined as follows:

1. **Leadership and governance** involves ensuring strategic policy frameworks exist and are combined with effective oversight, coalition building, regulation, attention to system-design and accountability.
2. A well-performing **health workforce** is one which works in ways that is responsive, fair and efficient to achieve the best health security outcomes possible, given available resources and circumstances. (i.e. there are sufficient staff, fairly distributed; they are competent, responsive and productive).
3. A good **health financing** system raises adequate funds for health, in ways that ensure people can use needed services, and are protected from financial catastrophe or impoverishment associated with having to pay for them. It provides incentives for providers and users to be efficient.

4. Responsive **health services** are those which deliver effective, safe, quality personal and non-personal health interventions to those that need them, when and where needed, with minimum waste of resources.
5. A well-functioning **health information system** is one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status.
6. A well-functioning health system ensures equitable access to essential **medical products, vaccines and technologies** of assured quality, safety, efficacy and cost-effectiveness, and their scientifically sound and cost-effective use.

Substantial links and complex interactions exist between the six building blocks of health system. *(37)* For instance, some are cross-cutting components, such as *leadership and governance,* and *health information system,* which provide the basis for the overall policy and regulation of all the other health system blocks. Key input components to the health system include specifically, health *financing* and *health workforce*. And the last two health system components, namely essential *medical products, vaccine and technologies, and health services,* reflect the immediate outputs/outcomes of the health system, i.e. the availability and distribution of care. *(36)*

In addition to the building blocks a number of key notions must be taken into account to have a full and comprehensive view of health systems capacities, notably:

- Common Goods for Health (CGH) *(2) (38) (39)*
- Essential public health functions (EPHFs) *(40)*
- Primary health care (PHC) *(41) (42)*

Despite being diverse, various health systems approaches/frameworks are complementary, in that they offer synergistic view to the health system and place high focus on its various elements. *(43)* They can all be used to assess, plan and prioritize, implement and monitor the building and strengthening of health systems.

In particular, adopting a PHC approach is key to building strong and resilient health systems for health security. This is especially because although prevention, detection and response to health emergencies involves all levels of health system, it fundamentally begins, and involves, local communities. A PHC orientation of health systems, and the systematic integration of emergency risk management within it, can provide the essential foundations for both UHC and health security.

Common Goods for Health (CGH)

CGH provide the critical enabling environment for personal health services provided by the health system, and more broadly are essential to building national and global health security, including preventing and mitigating epidemic and environmental threats to human societies. *(37)* These population-based functions and interventions are either public goods or have large social externalities in that they benefit society, rather than a single individual. As a result of these characteristics, market forces will never finance or establish CGH. The CGH agenda applies economic principles to public health to identify key functions that require public financing, regardless of whether they are provided by the public or private sectors. *(81)* CGH fall under five categories with select examples provided:

- **Policy and Coordination:** Formation of national policies, institutional capacities and coordination mechanisms
  - → (e.g. Planning and management of emergency preparedness and response; Health security and environmental risk policies and strategies; Community engagement and management; Institutional capacities & plans; Coordination platforms/systems; Sector and sub-national policies & strategies);
- **Regulation and legislation:** Full range of legal instruments
  - → (e.g. Regulation of the safety of medicines and medical devices; Legislation for IHR capacities; Environmental regulations and guidelines (e.g. for biodiversity, water, and air quality); Accreditation of health facilities and providers)
- **Taxes and subsidies:** Financial instruments to influence individual and market behaviour
  - → (e.g. Taxes on products with health impact to create market signals leading to behavior change);
- **Information, analysis & communication:** Collect and analyse information, and monitor population-level change
  - → (e.g Human and animal disease, environmental, and risk (e.g., AMR, chemicals and radiation) surveillance; Communication and dissemination; Community behavior change communication; Research and evaluation);
- **Population Services:** Services that impact all of society and are fundamental to public health
  - → (e.g. Sewage treatment and control, Vector control, Medical and solid waste management).

CGH form the foundation for health security-related objectives. They provide the economic rationale for why it is critical for governments to invest in the IHR capacities, yet CGH extend beyond public health threats and events, to also include risk factors stemming from social determinants, environmental degradation and non-communicable diseases. All these efforts are essential for making effective progress towards universal health coverage (UHC). *(36)*

It is important to highlight that CGH do not all sit within the health sector, nor are they all financed nationally. There are specific CGH that need to be governed and financed at regional and global levels (e.g. knowledge sharing, research and development, cross-border initiatives for health emergency preparedness and response), as COVID-19 has clearly highlighted.

Essential public health functions (EPHFs)

Given the broad scope and intersectoral nature of public health structures and practices another approach that has been used to describe services that fall under the public health remit is that of Essential public health functions (EPHFs). EPHFs have been described by Yach *(91)* as a set of fundamental activities that address the determinants of health, protect a population's health, and treat disease. Since the first WHO list of EPHFs was published in 1998, they have been a recurring method used by WHO regions, Member States and other global health actors to help define public health competencies and chart health system reforms.

The content of the EPHF frameworks can be divided into two categories *(38)*:

- **Cross-cutting (horizontal) functions**, based roughly on the building blocks of health systems (Governance, financing, human resources, health information systems, research and social participation and health communication)
- **Service-based (vertical) functions** comprising the traditional public health services provided by modern health systems (health protection, health promotion, disease prevention, health care, preparedness for public health emergencies, and other vertical functions).

Based on the above description, there are clear linkages between EPHFs and both health system building blocks and IHR capacities for health emergencies.

Primary Health Care (PHC)

Building, strengthening and maintaining health systems should be based on adopting a Primary Health Care (PHC) approach. These contribute to greater efficiency and fairness in health care and greater security in the health sector and beyond. *(40)*

The primary health care (PHC) approach provides an essential foundation for health emergency and risk management, and for building community and country resilience. PHC has three interrelated and synergistic pillars: (a) empowered people and communities; (b) multisectoral policy and action for health; and (c) strong and integrated health services, with good-quality primary care.

Through these three pillars, PHC promotes not only an effective emergency response, but also a prepared and resilient system that can prevent, mitigate, withstand and recover from emergencies, while continuing to provide essential health services throughout. *(39)*

The importance of adopting a PHC approach is also mentioned in a position paper on building resilient health systems for UHC and Health Security.

3.3 Other Sectors

Health systems and the IHR Capacities alone cannot encompass all that is required to fully ensure timely, whole-of-society and efficient prevention, detection and response to public health emergencies. Indeed, beyond components described above, additional capacities from other sectors are required to ensure a true whole-of-society approach for global health security. This imperative has been demonstrated in the COVID-19 pandemic, which principally hit vulnerable persons negatively impacted by preventable risk factors, economics and social determinants. *(44)* Societies form a complex adaptive system, with change in any interconnected parts of the system having reverberations throughout. *(45)*

To fully engage in sustainable health security, there is a need to go beyond the health sector *(46)* and towards the full scope of upstream determinants and actions needed to sustainably provide health systems for health security. This includes the involvement of other sectors that support health systems, in particular service delivery and adequate workforce. *(47)*

For example, health services are dependent on the adequate provision of essential services and support from safe water and sanitation for Infection Prevention and Control (IPC) and continuous energy supply to operate medical devices. Sustainable financing is also required to ensure that these capacities in other sectors do not diminish over time.

Examples of contributions from, and interdependency with other sectors

Example of Antimicrobial resistance (AMR): AMR has root causes in sectors ranging from health, water and sanitation, food safety and agriculture to environment and trade. As such, no single government department or independent organization can tackle it alone. Containing and controlling AMR demands coordinated action across diverse sectors and disciplines, with a broad range of stakeholders. In the long term, effective multisectoral collaboration requires governments to take ownership of the implementation process, and ensure it is appropriately resourced and given sufficient visibility to keep it a national priority.

The relationship between AMR and primary care is bidirectional. Good-quality primary care services, which includes vaccination, the rational use of medicines, the availability of effective antibiotics, and effective IPC measures and WASH infrastructure is one way to mitigate risks of AMR. At the same time, mitigating the risks of AMR will help to preserve the effectiveness of antibiotics, which is central to providing primary care and preventing and control of the spread of infections. *(86)*

Credit: © WHO / Dermot Tatlow

Finally, community engagement is essential for health security. Inclusive participation of local people in projects, interventions, or activities that address issues affecting their well-being is critical to building community resilience and local capacity to prevent, detect, and respond to health emergencies, and thereby contain threats at their source. *(48)*

When a country is capable of preventing, detecting or effectively addressing a public health threat, the greatest beneficiary is society at large, given the critical interdependencies between health and other sectors. *(13)* Beyond the health sector, other actors benefit from a safer world where public health emergencies do not spread globally and have limited impact on international travel, trade and the economy.

The interdependencies of these three components of health systems for health security (IHR Capacities, components in health systems and other sectors) have been repeatedly illustrated in countries, as exemplified in a series of country case studies presented in Annex 1.

3.4 Bringing them together

Instead of being distinct entities, additional components from health system building blocks and other sectors can be mapped against and added to the proposed list of IHR capacity technical areas.

Health systems for health security (HSforHS) combine health security capacities and components from health systems and other sectors that work in synergy to meet the demands imposed by health emergencies including severe pandemic threats. This leads to improved health security, responsive and resilient health systems, social and financial protection with improved efficiency and healthier populations, as illustrated in the figure 2.

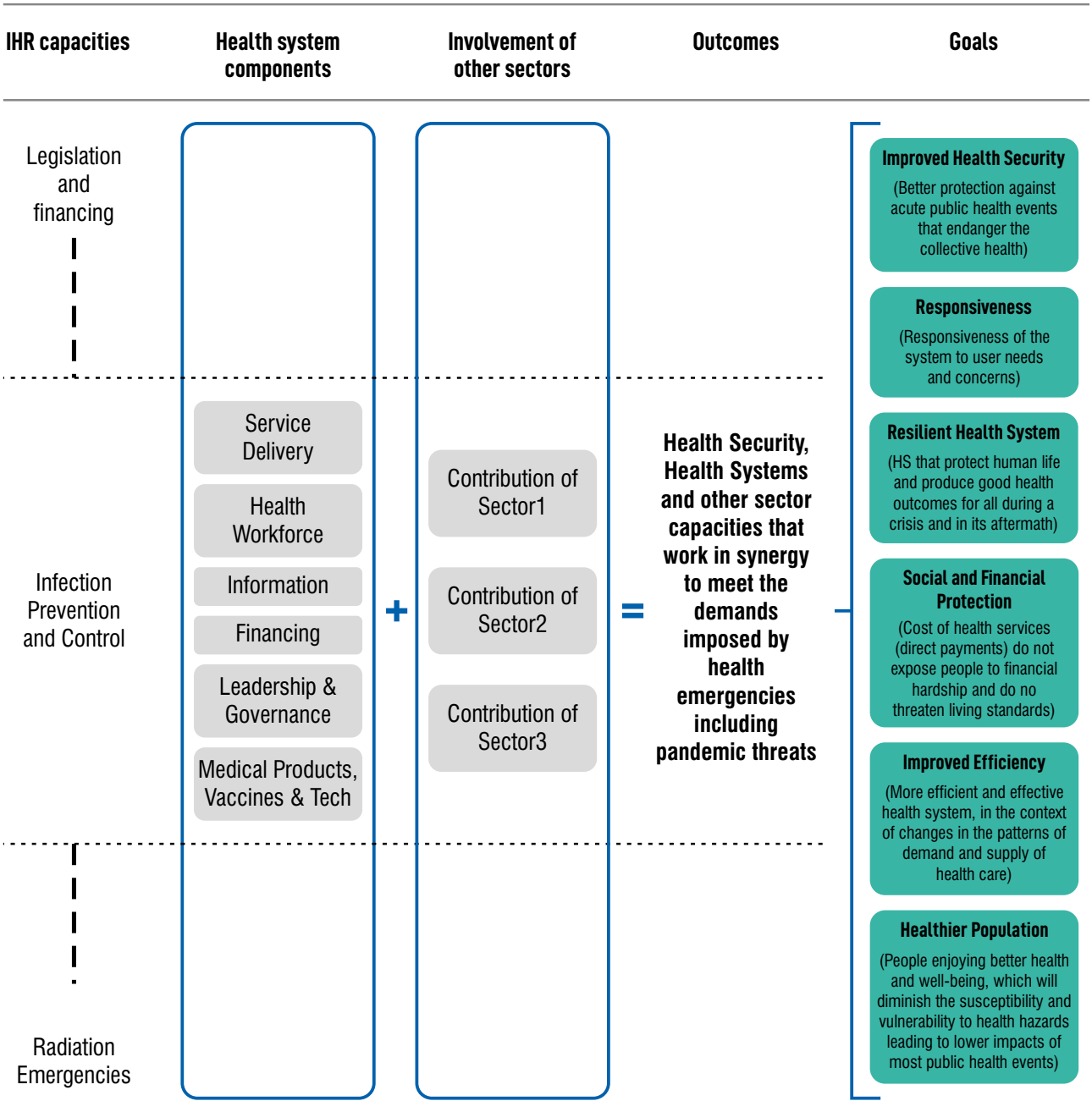


Figure 2: Building health systems for health security capacities to meet the demands imposed by health emergencies ▲

04 FROM CONCEPT TO ACTION

4.1 Four steps for building HSforHS

Countries keen to move beyond a conceptual approach to concrete actions for Health Systems for Health Security should:

- First assess existing capacities for IHR, and the current state of key components in Health Systems (the 6 building blocks) and other sectors. This will help countries to identify existing gaps, which may hamper the management of health emergencies. The assessment of IHR capacities and health systems can be done using the IHR MEF tools, as well as the health systems frameworks and their suite of associated tools such as Health Systems Assessments.
- Second, the shortcomings identified should be rectified by developing comprehensive action plans that address gaps in HSforHS, including through action plans for IHR or health security and National Health Sector Strategic Plans. The plans should delineate actions and activities required to address essential missing components of health security, health systems and other sectors through appropriate resources, capacities and organizational systems that can work synergistically (rather than in parallel) to meet the demands imposed by health emergencies.
- Third, countries should implement planned activities for development of HSforHS capacities, resources and organizational systems, while addressing gaps identified. Activities should be prioritized based on each country's context and available resources for investment and can be gleaned from suggested actions in the WHO Benchmarks for IHR Capacities. Additionally, partner agencies and donors should be engaged to support countries in implementation including allocating funds where more investment is most needed.
- Finally, with implementation, the maturation of HSforHS over time should be continuously monitored and evaluated, aligned with the same tools as for assessment and challenges in implementation identified and addressed for ever-improving efficient and effective management of health emergencies.

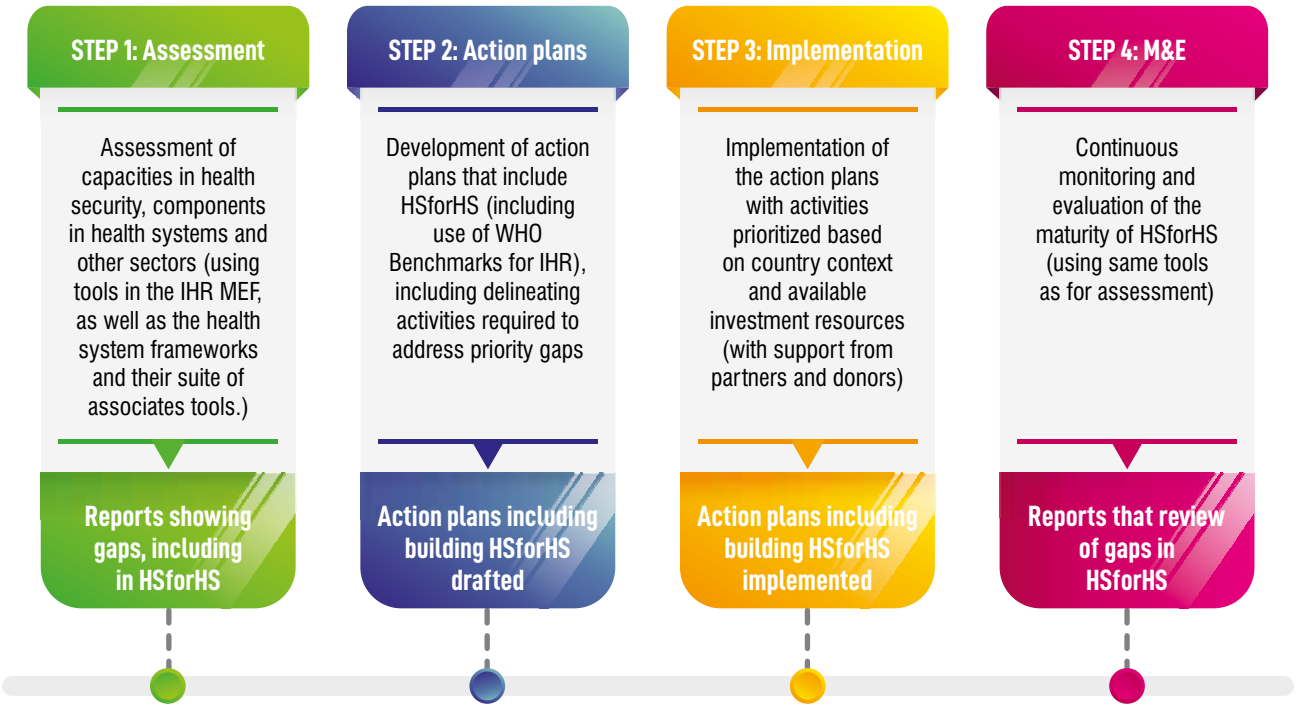


Figure 3: Four steps for building HSforHS ▲

4.2 Prioritizing investment using a maturity model in the WHO Benchmarks for IHR Capacities

The maturity model and the current WHO Benchmarks for IHR Capacities

The development of capacities for strengthening of health systems for health security, while addressing the challenges identified through assessments should be guided by a maturity model. This offers countries a conceptual representation of graduated actions to be implemented for scaling up health emergencies management capacities, starting from their current state.

The maturity model for health systems for health security is aligned with that presented in the WHO Benchmarks for IHR Capacities. This document describes benchmark actions and attributes from all 18 IHR Capacities technical areas and provides a roadmap of suggested actions that can be applied to build and strengthen IHR capacities, strong and resilient health system components (that can meet and adapt to the evolving demands generated by health emergencies while maintaining continuity of essential health services throughout) and other sector capacities

(that support management of health emergencies and ensure multisectoral and multidisciplinary management of health emergencies).

These benchmarks serve three primary purposes in terms of strengthening health systems for health security and expanding investments in them. First, they provide a definition of desirable attributes – the actions required, in health security, health systems and other sectors for health security at each level of the benchmark. Next, they provide a way of defining health systems for health security priorities for countries, development partners and the WHO. Finally, they provide a useful way of clarifying essential actions that require a more integrated response and recognize the interdependence of each action in the benchmarks.

Benchmarks are distributed in five (5) levels from no capacity to limited, developed, demonstrated and sustainable capacity. Each capacity level has standard actions which if all achieved and sustained, will increase countries' health security. This will also ensure that even when a system is very advanced, it will still have the basic capacities (described at lower levels) to manage known, emerging, re-emerging and unknown risks.

The implementation of benchmarks is supported by a digital tool. *(49)* This tool provides a database of key actions, based on the benchmarks, needed to improve IHR MEF scores by one or more steps (i.e. Joint External Evaluation (JEE) or State Parties Self-Assessment Annual Reporting Tool (SPAR)). This tool also gives opportunity for countries to create a draft plan, customize or download it, view implementation guidance, and review and analyze actions.

Updating the WHO Benchmarks for IHR Capacities

The WHO Benchmarks for IHR Capacities is being updated to reflect the revised list of capacities described above, including components of health systems and other sectors. The revised benchmarks also build on existing frameworks and associated tools for health systems and other sectors capacity building, as well as on lessons learnt from recent major health emergencies, including the COVID-19 Pandemic.

The WHO Benchmarks for IHR capacities will thus be also useful for tracking the progress of efforts to build HSforHS capacities, as the list of actions can also be used as standards and points of reference. In turn, the Benchmarks facilitate decision-making process on planning, prioritization and implementation of activities to strengthen, and focus investments, to achieve a satisfactory level of health security. As an example, Annex 3 provides a

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sample benchmark with its corresponding actions at the different levels of capacity to implement the framework for infection prevention and control (IPC).

The implementation of HSforHS, using Benchmarks is not without its challenges. Countries, partners and donors should be aware of main challenges they can face in building HSforHS capacities (they are listed in annex 2). This will help countries, partners and donors identify and anticipate challenges relevant to their context to better prevent and address them.

4.3 Implementing HSforHS at different levels in a country

The maturity of the health system and its contributions to health security can vary within the same country, with health systems at different administrative, geographical or federal levels showing different levels of maturity. As such, performance at national level may not reflect that of remote communities or regions with very poor capacities to manage public health emergencies. Furthermore, urban settings, especially capital cities, often hold the highest capacities of health systems for health security in a country, supporting surrounding peri-urban and rural regions. It is thus essential to account for geographical and community disparities including through a PHC oriented lens.

Good communication and coordination between all levels is critical to ensure optimal implementation of activities for effective management of health emergencies from community to intermediate to national and supranational levels, as illustrated in Figure 4. Planning for HSforHS therefore needs to be done not just at national level, but also at subnational and supranational levels, with relevant priority actions selected to address different types of gaps at each level.

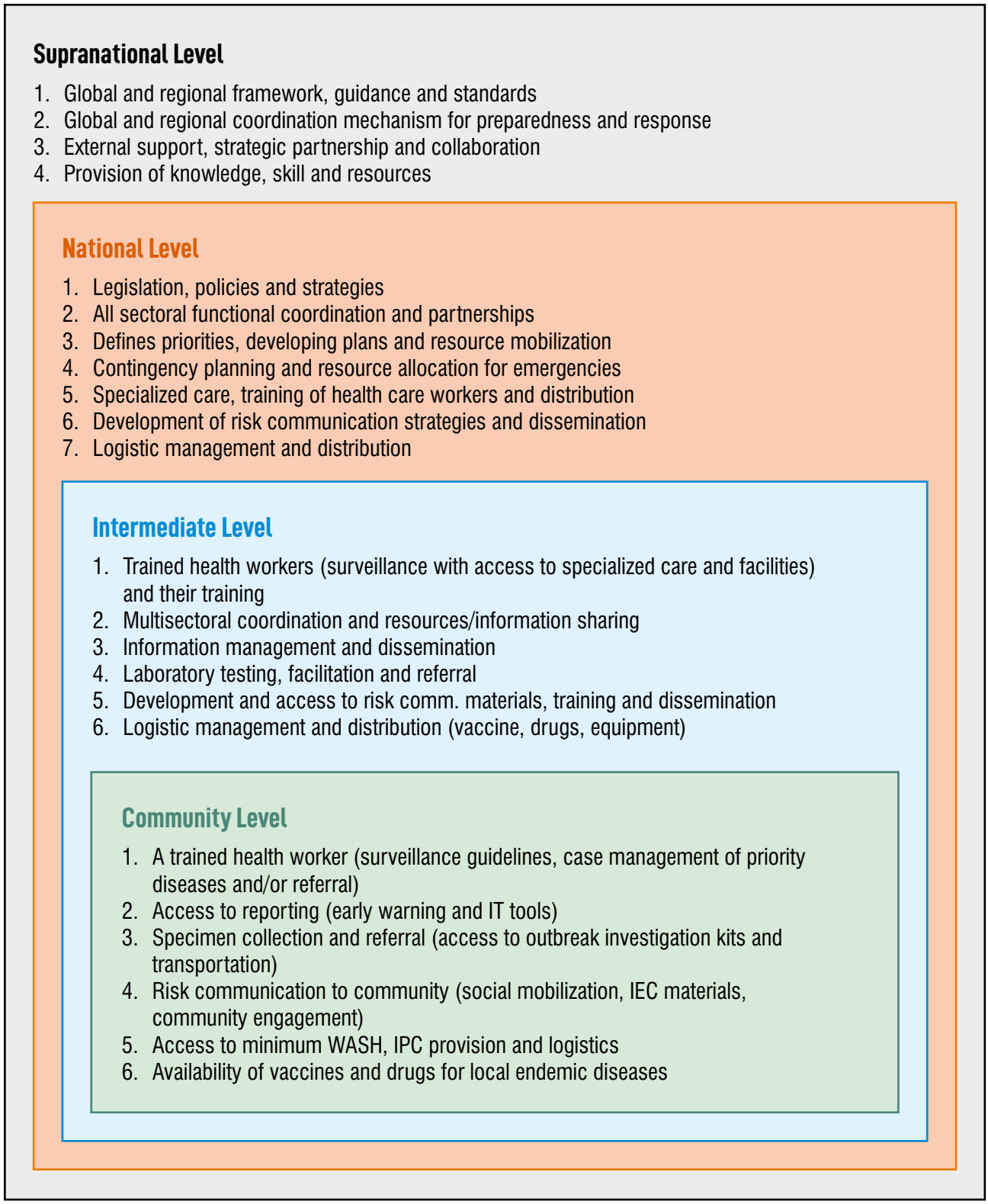

Figure 4: levels of application of health systems for health security ▲

05 WHO RESOURCES (UNDER DEVELOPMENT) FOR IMPLEMENTING HEALTH SYSTEMS FOR HEALTH SECURITY

In terms of implementation, WHO will continue to support States Parties on suggested activities for the strengthening of HSforHS, alongside partners, donors and international and national organizations. In addition to this framework and the upcoming updated WHO Benchmarks for IHR Capacities, many other materials and tools have been made available, with others in further development, for this purpose. In particular:

1. A repository of all existing tools to facilitate the implementation of benchmark actions for capacity-building. (Reference Library of WHO Benchmarks for IHR Capacities)
2. A dataset to assess and track country progress in building HSforHS. The dataset gathers available data on health systems, health security and other sectors. The output of analyses will be summarized in HSforHS country dashboards.
3. Academic and in-service training on HSforHS are being developed and will be made free of charge to target audiences worldwide.

On the longer term, HSforHS related material and tools will be regularly uploaded on the SPH portal. Other updates on health systems for health security-related activities will be regularly shared on that platform, including scientific papers, meeting and workshop reports, etc.

These will help countries integrate this framework into their ongoing activities around health security, break the siloes between health systems, health security and other sectors, and change the paradigm for better management of future health emergencies.

06 CONCLUSION

In an interconnected world, countries need to reach the highest possible level of health security and optimizing international collaboration is vital for all, regardless of their level of income or development. As a global community, there is a need to work together for building, strengthening and maintaining capacities for effective management of health emergencies. This global challenge in achieving health security demands further investment in health systems as well as in other sectors, and COVID-19 provides an opportunity for countries to do so in building back better. As Director-General of WHO, Dr Tedros said at the 73rd World Health Assembly, *"COVID-19 is not just a global health emergency, it is a vivid demonstration of the fact that there is no health security without resilient health systems, or without addressing the social, economic, commercial and environmental determinants of health." (50)* The pandemic is a pivotal moment and opportunity for the world to break the cycle of 'panic-and-forget' and secure the full commitment of global, national and subnational stakeholders for long-term investments in HSforHS through an all-of-government and all-of-society approach.

Efficient and effective emergency prevention, preparedness and response must be based on strong and resilient health systems and the support of other sectors in surging to meet the increased demands, flexibly adapting to evolving needs, and mitigate their impact on the provision of essential health services so as to quickly recover or transition to a new stable state, especially in the event of protracted crises. This must be done through a primary health care approach. As recent and ongoing major public health events have shown, there are major gaps in health systems worldwide, and the world remains as strong as its most vulnerable setting. Anticipated challenges for efficient implementation of health systems for health security in countries need to be addressed.

By identifying components in health systems and other sectors that contribute to health security, this framework and its subsequent products would help countries and other stakeholders to better understand and more effectively invest in health systems for health security. The returns on investment of adopting this all-hazards, multisectoral and multidisciplinary prevention and preparedness approach will have wide benefits across all sectors of society and help make the world a safer place.

Credit: © WHO / Christopher Black

Annex 1:

Case Studies illustrating the interdependencies of Health Systems, IHR capacities and other sectors capacities

For each health system building block there are interventions which can help developing strong, agile and resilient health systems that can meet and adapt to evolving demands of health emergencies, while maintaining continuity of essential health services throughout. To illustrate this, below are examples of country experiences that make the case of how investing in each of the six building blocks contributes to better health security.

- ### Governance and Leadership

Indonesia has made considerable steps to improve their emergency preparedness in compliance with the IHR 2005. Since the Avian Influenza A(H5N1) outbreaks in 2005, the country has established a series of plans, guidelines, and committees to control avian influenza and prepare for future pandemics. These processes were developed using a whole-of-society and whole-of-government approach, involving multisectoral stakeholders at all levels and clear distribution of roles and responsibilities for all sectors and agencies. A high political commitment to health security underwrote these activities and outcomes, including compliance with IHR implementation since 2007 and the organisation of a voluntary Joint external evaluation in 2017. The momentum created by this evaluation resulted in the *National action plan for health security 2020-2024* (launched in January 2020). This plan integrates its *National medium-term development plan 2020-2024* to include a focus on health system strengthening based on primary health care. As part of its governance enhancement, communication between all administrative levels was also strengthened, with the inclusion of minimum service standards for emergency preparedness at district and municipality levels. *(51)*

At local levels, governance and leadership initiatives also played a crucial role in how **Mexico City and New York City** responded to Influenza AH1N1 in 2009. In both cases, pre-existing emergency plans were specifically designed to facilitate intersectoral linkages and decision-making alongside enhanced surveillance protocols and training. These plans included previously developed programs and communication tools to sustain clear and transparent communication campaigns, which were found to be effective in maintaining coordination between sectors as well as fostering public trust. In addition, the ability of political leadership to learn and adapt to health system weaknesses, mobilize resources quickly, and provide

consistent management and oversight proved to be important in controlling the outbreak. *(52)*

• Financing

Thailand is pursuing a health investment strategy that combines health system building and universal health coverage policy as part of a larger national health security agenda. In doing so, the Universal Health Coverage Scheme (2001) and the Health Security Act (2002) ensure continued investments in local health system strengthening as a requisite infrastructure for universal health coverage as well as more sustainable and cost-effective health security measures. These reforms were achieved through the elevation of health as a means through which broader national development and security could be achieved, demonstrating that financial investments in the health sector towards universal health coverage will have positive ripple-effects across all sectors in the promotion of long-term national interests**.** *(53)*

Similar links between strengthening investment in health system building blocks, universal health coverage and health security have been recognised at global and national levels in response to the Ebola outbreak. At the global level, communiques from the G7 and G20 in 2015 stressed the important relationship between health systems strengthening and security. It was argued that Ebola had been 'a wake-up call' and that further investments in health systems were crucial to ensure that global health security was enhanced through a focus on national health securities. *(54)* In the West African context, there have been renewed efforts for health system investments. (55) Again, links between the delivery of universal health coverage and long-term security prevention and preparedness have been deemed essential, with particular attention paid to the development of healthcare workforces. **Guinea and Liberia** are two specific examples where investment plans and health worker-to-population density targets were set. However, an important component of delivering on these commitments is reliable financing and a steady growth in health budgets, where initial reluctance to these investments need to be framed as providing future cost-savings and recognition of the longer time-horizons for population health outcomes. *(13)*

• Health Workforce

There can be no health security without a skilled health workforce. Global health security depends on many factors but without skilled health professionals to act as the first line of defense of individual health security, efforts will be in vain. *(56)*

A programme in **Uganda** offers one example of health workforce development that can have an immediate return on investment to improve health security. Public Health and Field Epidemiology training programmes were rolled out nationally resulting in improved workforce capacity to identify, investigate, and control disease outbreaks at the source. These programmes have resulted in improvements in disease control and surveillance systems, which have strengthened Uganda's internal disease control capacities as well as contributing to broader global health security efforts. *(57)*

Country case studies from some **other Sub-Saharan countries** describe the great added value of investing in HWF through in-service workforce capacity improvement programs that are aimed at enhancing knowledge. The articles also highlight challenges such as the need for training of more doctors, nurses and midwives for achieving international targets (threshold) of health workforce ratios, the need for more efficient geographical distribution of the health workforce and more consideration to the mix of cadres to be scaled-up *(58) (55)*

- ## Service Delivery

Small or focused improvements in service delivery can have important impacts on health security. As an example, interventions made by **Saudi Arabia** have helped public officials to prevent and mitigate the outbreak of infectious diseases during the Hajj. These interventions included increased attention to vaccination programmes and travel medicine protocols, free medical care to pilgrims in hospitals (including for critical care), and increased diseases monitoring as well as surveillance at points of entry. In addition, health officials instituted multi-sectoral actions to provide safe water, food supplies, sanitation and to provide public conduct information as part of an education campaign. These interlinking and multisectoral improvements in services, for both citizens and travelers, have resulted in no occurrence of a major outbreak at the Hajj over the past decade, despite the emergence of several new coronavirus and influenza viruses. *(59)*

Similarly, improvements to health system resilience can help mitigate service delivery shocks associated with acute health emergencies. In **Lebanon**, the country was able to maintain the continuity of services both for citizens and refugees during the Syrian refugee crisis (2011 to 2013) thanks to previous reforms to reduce out-of-pocket expenditures and ensure uninterrupted financial coverage, as well as financial commitments to increase the number of primary health centres in the national network. During the refugee

crisis, routine care activities continued and beneficiaries of primary health care rose; community health workers were involved; epidemiological surveillance and measures were implemented at airports and seaports to detect and contain diseases outbreaks; in addition to the national primary care centres, hospitals were contracted by UNHCR for refugees' secondary care services, highlighting the role global health partnerships can play. Findings show improvement in service utilization, quality of service and vaccination coverage, and effective management of several outbreaks, including for measles. *(60)*

- ## Health Information Systems

The recent experience of the Ebola outbreak in **Uganda** reveals that investments in community-based surveillance systems were important to ensure country preparedness and health security. In particular, a commitment to sustained health system capacities in surveillance and integrated information systems is key to improving health security and should be seen as foundational to the health system and not just an exceptional measure used during health emergencies. *(61)*

As a result, there is strong evidence that small to medium health information and surveillance improvements can significantly underwrite health security. For example, in the **Democratic Republic of the Congo**, low-tech improvements in data management and training resulted in more rapid and effective Ebola response *(62) (63)*; while in **Cyprus**, streamlining information sharing and the use of information technologies improved emergency preparedness as well as delivery of routine services. *(64)* Evidence also supports the health security benefits of building better networks and shared learnings between national and regional laboratory and information systems, in both LMIC *(65) (66) (67) (68) (69) (70)* and HIC settings *(71)*. Improvements in these capacities in addition to more routine surveillance can have long-term benefits for population health and security.

- ## Access to Essential Medicine

Since 2014 the development of **Indonesia's** health system and universal health coverage policy has been inextricably framed as both a health security and national security priority, where population health is seen as connected to all aspects of its social and economic development. A central component of Indonesia's system is the decentralized and contextualized application of universal health coverage that recognises affordable access to essential medicines as a key priority within its National Health Insurance System. *(72)* Significant changes to the health system were deemed necessary

to better reflect diverse population (300 ethnic and 750 language groups) and geographical demands (across 17,744 islands). Like with any system, issues of inequities remain and continued reforms are underway. Yet, Indonesia has become the world's largest single-payer scheme creating a more flexible system that seeks to accommodate and adapt to variable and heterogeneous conditions and access needs, strengthening system resilience and rapid response capacities at both the national and local levels.

Annex 2:

Challenges for the implementation of HSforHS

All countries have to cope with public health emergencies that require strong and sustainable response capacities. However, the implementation of health systems for health security is compromised by several challenges in areas such as:

1. **Leadership, coordination and governance, including strategies and policies**
   - Health security preparedness is not a prevailing priority for most governments worldwide, and they tend to adopt a reactive approach to emergencies as a default, especially since the outcomes of good preparedness is better mitigation and management of health emergencies
   - Coordination of management of health systems and health security activities is weak whether at International, National and Sub-national levels (in particular, coordination and information management were observed to have been weak in COVID-19);
   - Coordination across various sectors and agencies in supporting the Ministry of Health is weak in many countries.
   - Lack of understanding (even among stakeholders) on how strengthened health systems ensures health system resiliency and better health security.
   - Gaps in interactions and cooperation between public health services and health care delivery impacts overall coverage, hamper early detection and warning mechanisms, and lead to ineffective response and late recovery.
   - Health security and health system structures often function as disconnected vertical silos within ministries of health (verticalization).
   - Most national health systems policies, strategies, plans, monitoring and evaluation tools do not, or only rudimentarily, address health security aspects, and vice versa.
   - There are challenges and high transaction costs in working with other sectors and thus difficulties in addressing upstream health security determinants and risk factors and strengthening their supportive roles in emergency preparedness and response.
2. **Monitoring and evaluation**
   - Lack of data collection mechanisms and/or data sources for the

monitoring and evaluation of Health Systems and of Health Security performance

- Limited research capacities leading to slow generation of scientific evidence for innovative solutions to identified gaps.

3. Finance

- Financial gaps in health systems for health security capacity building as well as for common goods for health at subnational, national and global levels. This is sometimes because health security is seen as a cost instead of an investment by governments.
- There is a need to refine health systems for health security costing methodologies to capture the costs (and cost-effectiveness) of meeting IHR (2005) requirements, of broader health system contributions to health security, and of non-health system components of health security.

4. Human resources and advocacy

- Shortage of experts, leaders and policymakers who can master both health systems and health security aspects and bring both together. This makes the effective implementation of activities for the strengthening of health systems for health security difficult at subnational, national and global levels.
- Lack of awareness and communication about the importance of health systems for health security among decision-makers, policy-makers, communities and beyond (e.g. media).

Annex 3:

The updated IHR benchmarks for capacity building

The WHO Benchmarks for IHR Capacities is a tool to guide States Parties, partners, donors and international and national organizations on suggested actions (from the IHR benchmarks, health systems and other sectors) they should plan, prioritize and support for strengthening country health security capacity following an all of society, all of government approach. Practically speaking, the actions define at each level the steps to be taken to move from one capacity level to the next. If all achieved and sustained, these Benchmarks can bring countries to the optimum level of health security. For example, if a country wants to move from level 3 to level 4 it should achieve all actions listed both in level 2 (limited capacity) and level 3 (developed capacity) to progress to level 4 (demonstrated capacity) for the given benchmarks.

Here is an example for illustration of sample benchmark with its corresponding actions at the different levels of capacity to implement the framework for **Infection prevention and control (IPC)**

Benchmark 3.3:	Infection prevention and control is in place
Objective:	To develop a functioning infection prevention and control system for healthcare facilities and farms

CAPACITY LEVEL	WHO BENCHMARKS FOR IHR	HEALTH SYSTEMS CAPACITIES	OTHER SECTORS CAPACITIES
02 LIMITED CAPACITY	• Review WHO recommendations on core components for effective IPC programmes and the national and facility practical manuals supporting their implementation. • Use IPC assessment tools (IPCAT) to assess the core components of IPC programmes at the national (IPCAT2; tool 2) and facility (IPCAF; facility level) levels and identify precise areas/core components requiring action. • Develop and implement an action plan, informed by assessment results and following the five-step cycle described in the practical manuals, that addresses the identified priority core components at the national and facility levels (at least at major hospital centres), core component one (IPC programme) and core component eight (WASH), according to the WHO requirements/action checklists. • Establish a National IPC Committee and develop National IPC Committee terms of reference and local IPC committees at district and/or facility level, if an action plan is not in place.	• IPC committee / at least one competent person appointed to plan, coordinate, and facilitate implementation of IPC activities • Review the legal framework for implementation of IPC programmes at the national, subnational and facility levels. • Draft evidence-based strategic documents (policies, laws, strategies and codified approaches, etc.) to reinforce responsibility and commitment of health sector in IPC management at national, subnational and facility levels • Disseminate the strategic documents on IPC management with all relevant stakeholders and potential domestic and external sources of funding • Appointed technical team of dedicated, trained infection preventionists (medical and nursing professionals) with a defined scope of responsibility • Good quality microbiological laboratory support, with at least one national reference laboratory for surveillance. • Patient care activities conducted in a clean and/or hygienic environment; Existence of functioning WASH infrastructures and services, and appropriate IPC materials and equipment; Adequate number and appropriate position of hand hygiene facilities. • Standards for drinking water, sanitation and environmental health in health care facilities	• An official multidisciplinary group, committee or equivalent structure to interact with IPC technical teams. • Cost all the country action plan for IPC considering routine and potential special circumstances like public health emergency that will require some adjustments. • Maintain linkages to other national programmes and professional organisations

CAPACITY LEVEL	WHO BENCHMARKS FOR IHR	HEALTH SYSTEMS CAPACITIES	OTHER SECTORS CAPACITIES
03 DEVELOPED CAPACITY	• Develop national IPC guidelines for human and animal health sectors (IPC in animal production). • Identify and allocate adequate resources to support selected healthcare facilities/ farms to implement IPC action plans, including IPC guidelines. • Use IPC assessment tools at national (IPCAT2) and facility (IPCAF) levels to identify precise areas requiring additional activities to improve or put in place additional IPC core components and to guide the development of a detailed improvement plan of action. • Implement the action plan, informed by assessment results and following the five-step cycle described in the practical manuals, according to the WHO requirements/action checklists for the priority core components identified. • Refer to the recommendations and requirements for IPC guidelines, and train adequate healthcare workers on issued guidelines. • Monitor IPC and WASH implementation in selected healthcare facilities using IPCAF, hand hygiene self-assessment framework, hand hygiene compliance observation tools WASH FIT tool.	• Develop necessary infrastructure and supplies to enable implementation of IPC guidelines • Allocated human and financial resources; Health care worker staffing adequately assigned according to patient workload; Technical teams have a protected and dedicated budget • Develop national IPC curricula (pre- and post-graduate), new employee orientation and in-service continuous training and national training programme for those performing surveillance. • Recruit skilled and knowledgeable health workforce; Allotted time, education and training of technical teams / health workforce; • Bed occupancy does not exceed standard capacity of facilities • IPC integration with other quality improvement, safety and accreditation programmes. • Make available a sufficient quantity of personal protective equipment, hygiene and disinfection products and other IPC related supplies for personnel in special settings such as hospitals, Point of entry, Plants, waste management company, sewage system, etc.	• Develop mechanisms to fund the implementation of IPC and WASH programs in routine and mobilize additional resources either domestically or internationally for special circumstances like public health emergency • Include IPC related norms and standards in framework documents for management of special settings such as hospitals, Point of entry, Plants, waste management company, sewage system, etc. • Develop tools for follow-up and financial audit of the implementation of IPC and WASH programs and ensure efficient and timely implementation, and transparent and accountable management at the national, subnational and facility levels.

CAPACITY LEVEL	WHO BENCHMARKS FOR IHR	HEALTH SYSTEMS CAPACITIES	OTHER SECTORS CAPACITIES
04 DEMONSTRATED CAPACITY	• Use the national IPC assessment tool (IPCAT2) to identify precise areas still requiring action and update the plan of action. • Mandate and support IPC improvement at all healthcare facilities, recommending the use of the infection prevention and control assessment framework (IPCAF) and the WASH fit tool and antibiotic stewardship programs. • Update and implement action plans, informed by assessment results and following the five-step cycle described in the practical manuals, that progressively cover all recommended IPC priority core components at the national and facility levels according to the WHO requirements/action checklists for the priority core components identified. • Include specific interventions for AMR prevention tailored to the local epidemiological situation in these plans. • Share the plans with national, subnational and local IPC committees and incorporate guidance from them.	• Full support, engagement and funding by governments, including Ministry of Health, and respective authorities, for policies, regulations and tools for coordination. • Use of vaccination as a way of preventing infections. • System for regular monitoring and periodic evaluation of IPC programmes; including timely feedback of hand hygiene, IPC practices, WASH services, and structure of health care facilities • System for regular monitoring, evaluation of IPC outcomes; including standards met, goals accomplished, aspects that need improvement identified, including compliance with regulations and clinical practice standards • Measure antibiotic use and assess appropriateness • System of ensuring that regular audits and feedback are carried out. • A quality assurance system to ensure reliability and reproducibility of laboratory data • Train a sufficient number of experts at the national, subnational and facility levels on IPC and WASH. • Ensure that all IPC programs/ projects include components that foster surveillance of IPC for most vulnerable groups including elderly, immunocompromised patient, drug addicts, etc.	• Good sanitation, hand washing, food and water safety. • IPC integration with other quality improvement, safety and accreditation programmes • Adequate WASH outside of health care facilities • Good hygiene and infection prevention measures to limit spread, including efforts to prevent infections transmitted through sex or drug injections. • Had the opportunity to use (real life) or test (simulation exercise) the implementation of IPC programs and confirm they are functional into routine systems as well as during special circumstances like public health emergency. • Regularly update IPC related norms and standards in framework documents for management of special settings such as hospitals, Point of entry, Plants, waste management company, sewage system, etc. based on normal and special health developments in the country or globally. • Draft and update regularly the mapping of stakeholders involved in IPC and WASH at the national, subnational and facility levels. • Conduct regular financial audits to control effective resource utilization and financial transparency in the implementation of IPC projects. • Organize and support fundraising activities for implementation of IPC programs, including drafting of donor alert documents

CAPACITY LEVEL	WHO BENCHMARKS FOR IHR	HEALTH SYSTEMS CAPACITIES	OTHER SECTORS CAPACITIES
05 SUSTAINABLE CAPACITY	• Provide effective support to healthcare facility IPC programmes nationwide. • Ensure that healthcare facilities undertake annual IPCAF and WASH fit assessments as part of their review cycle to address long-term sustainability. • Establish a national system for continuous monitoring of progress in fulfilling the IPC core components (i.e. repeat assessments at least annually) and keep track of changes and scores and develop a long-term improvement plan. • Analyse and regularly report national IPC and WASH data and support discussions on actions to incorporate lessons learned in the long-term improvement plan. • Document the incidence of patient and healthcare worker infections, including M. tuberculosis, and the effectiveness of measures to reduce their occurrence.	• Regular monitoring and periodic evaluation of IPC programmes; including timely feedback of hand hygiene, IPC practices, WASH services, and structure of health care facilities • Share country experience in IPC and WASH with other countries and play a mentoring role with other countries	• Fund entirely or adequately IPC and WASH programs/projects at the national, subnational and facility levels. • Support research programs to generate evidence on IPC and WASH for planning, prioritization and decision-making processes .

BIBLIOGRAPHY

1. World Health Organization. Global Health Emergencies. [Online] [Cited: May 28, 2021.] https://www.who.int/emergencies/overview.

2. *The Case for Public Financing of Environmental Common Goods for Health.* Lo, S., Gaudin, S., Corvalan, C., Earle, A. J., Hanssen, O., Prüss-Ustun, A., Neira, M., & Soucat, A. [ed.] 366-381. 4, 2019, Health Systems and Reform, Vol. 5.

3. *Health as a "global public good": creating a market for pandemic risk.* Stein, F., & Sridhar, D. 2017, BMJ, Vol. 358.

4. *Public Health Emergencies of International Concern: Global, Regional, and Local Responses to Risk.* Bennett, B., & Carney, T. 2, Medical Law Review, Vol. 25, pp. 223-239.

5. *Health security capacities in the context of COVID-19 outbreak: an analysis of International Health Regulations annual report data from 182 countries.* Kandel, N., Chungong, S., Omaar, A., & Xing, J**.** 10229, s.l. : The Lancet, 2020, The Lancet, Vol. 395, pp. 1047-1053.

6. Guterres, António. UN Secretary-General opening remarks at Launch of report on Socio-economic impact of COVID-19 Pandemic. [Online] March 31, 2020. https://www.un.org/en/un-coronavirus-communications-team/launch-report-socio-economic-impacts-covid-19?fbclid=IwAR2Kuwvl0e4kCfFKghVyYN0jUu8Ja6FzZ60TrZUmhV5zR2EIG_nbz5LckkM.

7. Wiedenmayer. *Access and Availability of Pharmaceuticals in International Health. In: Managing Pharmaceuticals in International Health.* BAssel : s.n., 2004. pp. 19-31.

8. *Pandemic preparedness: implementation of infection prevention emergency plans.* Rebmann T. Suppl 1, 2010, Infection control and hospital epidemiology, Vol. 31, pp. S63–S65.

9. *Potential demand for respirators and surgical masks during a hypothetical influenza pandemic in the United States.* Carias, C., Rainisch, G., Shankar, M., Adhikari, B. B., Swerdlow, D. L., Bower, W. A., Pillai, S. K., Meltzer, M. I., & Koonin, L. M. Suppl 1, 2015, Clinical infectious diseases : an official publication of the Infectious Diseases Society of America, Vol. 60, pp. S42–S51.

10. *Access to medicines from a health system perspective.* Bigdeli, M., Jacobs, B., Tomson, G., Laing, R., Ghaffar, A., Dujardin, B., & Van Damme, W. 7, 2013, Health policy and planning, Vol. 28, pp. 692–704.

11. *Access to medicines through health systems in low- and middle-income countries.* Ozawa, S., Shankar, R., Leopold, C., & Orubu, S. Supplement_3, 2019, Health policy and planning, Vol. 34, pp. iii1–iii3.

12. *Strengthening Health Systems Through International Blood Product Sharing Agreements.* Ravi, S. J. 1, 2017, Health Secur, Vol. 15, pp. 110-117.

13. *Strengthening global health security by embedding the International Health Regulations requirements into national health systems.* Kluge, H., Martin-Moreno, J. M., Emiroglu, N., Rodier, G., Kelley, E., Vujnovic, M., & Permanand, G. Suppl 1, 2018, BMJ Glob Health, Vol. 3.

14. *Global health security: the wider lessons from the west African Ebola virus disease epidemic.* Heymann, D.,

Chen, L., Takemi, K., Fidler, D., Tappero, J., Thomas, M., Kenyon, T., Frieden, T., Yach, D., Nishtar, S., Kalache, A., Olliaro, P., Horby, P., Torreele, E., Gostin, L., Ndomondo-Sigonda, M., Carpenter, D., Rushton, S., Lillywhite, L., & Devk. 9980, The Lancet (British edition), Vol. 380, pp. 1884–1901.

15. *Towards Resilient Health Systems in Sub-Saharan Africa: A Systematic Review of the English Language Literature on Health Workforce, Surveillance, and Health Governance Issues for Health Systems Strengthening*. Ayanore, M. A., Amuna, N., Aviisah, M., Awolu, A., Kipo-Sunyehzi, D. D., Mogre, V., Ofori-Asenso, R., Gmanyami, J. M., Kugbey, N., & Gyapong, M. 1, 2019, Ann Glob Health, Vol. 85.

16. *uilding the case for embedding global health security into universal health coverage: a proposal for a unified health system that includes public health.* Erondu, N. A., Martin, J., Marten, R., Ooms, G., Yates, R., & Heymann, D. L. 10156, 2018, The Lancet, Vol. 392, pp. 1482-1486.

17. *Opportunities to finance pandemic preparedness*. Katz, R., & Seifman, R. 11, 2016, The Lancet Global Health, Vol. 4.

18. World Health Organization. *Health Emergency and Disaster Risk Management Framework.* Geneva : s.n., 2019. CC BY-NC-SA 3.0 IGO.

19. Everyone's business: whole-of-society action to manage health risks and reduce socio-economic impacts of emergencies and disasters: operational guidance. [Online] 2020. https://apps.who.int/iris/handle/10665/339421. CC BY-NC-SA 3.0 IGO.

20. *Multisectoral Preparedness Coordination Framework: best practices, case studies and key elements of advancing multisectoral coordination for health emergency preparedness and health security.* Geneva : s.n., 2020. CC BY-NC-SA 3.0 IGO.

21. *Community participation and private sector engagement are fundamental to achieving universal health coverage and health security in Africa: Reflections from the second Africa health forum [Conference Paper].* Olu, O., Drameh-Avognon, P., Asamoah-Odei, E., Kasolo, F., Valdez, T., Kabaniha, G., Karamagi, H., Good, S., O'Malley, H., Yoti, Z., Razakazoa, N., Minkoulou, E., Dangou, J. M., Mbola Mbassi, S., Castellon, M. S., Cabore, J., & Moeti, M. (2019). 2019, BMC Proceedings, p. 13.

22. *The need for health diplomacy in health security operations. Health Promot Perspect*. Chattu, V. K., & Kevany, S. 3, 2019, Health Promot Perspect, Vol. 9, pp. 161-163.

23. *Preparedness as a technology of (in)security: Pandemic influenza planning and the global biopolitics of emerging infectious disease*. Sanford S., Polzer J. & Mcdonough P. 1, 2015, Social Theory & Health, Vol. 14, pp. 18–43.

24. *Stewardship of health security: The challenges of applying the One Health approach.* Hort, K., Sommanustweechai, A., Adisasmito, W., & Gleeson, L. 1, 2019, Public Administration and Development, Vol. 39, pp. 23-33.

25. World Health Organization. International health regulations (2005) 3rd edition. *World Health Organization.* [Online] 2016. [Cited:

Oct. 22, 2020.] https://apps.who.int/iris/rest/bitstreams/1031116/retrieve.

26. *World Health Assembly, 69. Implementation of the International Health Regulations (2005): report of the Review Committee on the Role of the International Health Regulations (2005) in the Ebola Outbreak and Response: report by the Director-General.* Geneva : s.n., 2016. A69/21.

27. World Health Organiozation. A Strategic Framework for Emergency Preparedness. [Online] 2017. https://apps.who.int/iris/bitstream/handle/10665/254883/9789241511827-eng.pdf?sequence=1.

28. World Health Organization. *WHO Benchmarks for International Health Regulations (IHR) Capacities.* Geneva : s.n., 2019. CC BY-NC-SA 3.0 IGO.

29. *Pandemics, regional outbreaks, and sudden-onset disasters.* Gully, P. R. 4, 2020, Healthcare Management Forum, Vol. 33, pp. 164-169.

30. World Health Organization. International health regulations (2005) 2nd ed. [Online] 2008. https://apps.who.int/iris/bitstream/handle/10665/43883/9789241580410_eng.pdf?sequence=1.

31. International Health Regulations (2005) IHR MONITORING AND EVALUATION. [Online] 2018. https://apps.who.int/iris/bitstream/handle/10665/276651/WHO-WHE-CPI-2018.51-eng.pdf?sequence=1. CC BY-NC-SA 3.0 IGO.

32. NAPHS for all: a country implementation guide for national action plan for health. [Online] 2019. https://www.who.int/iris/bitstream/10665/312220/1/WHO-WHE-CPI-19.5-eng.pdf?ua=1. CC BY-NC-SA 3.0 IGO.

33. IHR-PVS National Bridging Workshop. [Online] 2021. https://extranet.who.int/sph/ihr-pvs-bridging-workshop.

34. Strategic Partnership for Health Security and Emergency Preparedness (SPH) Portal. [Online] 2021. https://extranet.who.int/sph/#.

35. Organization, World Health. Everybody business : strengthening health systems to improve health outcomes : WHO's framework. [Online] 2007. https://www.who.int/healthsystems/strategy/everybodys_business.pdf. 978 92 4 159607 7.

36. World Health Organization. *Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies.* Geneva : s.n., 2010. 978 92 4 156405 2.

37. Adam, Don de Savigny and Taghreed. *Systems thinking for health systems strengthening. Alliance for Health Policy and SYstems Research.* 2009. 978 92 4 156389 5.

38. *Financing Common Goods for Health: Fundamental for Health, the Foundation for UHC.* Soucat, A. 4, 2019, Health Syst Reform, Vol. 5, pp. 263-267.

39. *Common Goods for Health: Economic Rationale and Tools for Prioritization.* Sylvestre Gaudin, Peter C. Smith, Agnès Soucat & Abdo S. Yazbeck. 4, 2019, Health Systems & Reform, Vol. 5, pp. 280-292.

40. World Health Organization. *Essential public health functions, health systems and health security. Developing conceptual clarity and a WHO roadmap for action.* Geneva : s.n., 2018. 9789241514088.

41. *Primary health care and health emergencies.* Geneva : s.n., 2018.

42. *Primary health care as a route to health security.* Chan, M. 9675, 2009, The Lancet, Vol. 373, pp. 1586-1587.

43. *Converging Health Systems Frameworks: Towards A Concepts-to-Actions Roadmap for Health Systems Strengthening in Low and Middle Income Countries.* Shakarishvili, George & Atun, Rifat & Berman, Peter & Hsiao, William & Burgess, Craig & Lansang, Mary Ann. May 2010, Global Health Governance, Vol. 3.

44. *actors associated with COVID-19-related death using OpenSAFELY.* Williamson EJ, Walker AJ, Bhaskaran K, et al. JUly 8, 2020, Nature, Vol. 584, pp. 430–436.

45. *COVID-19 – how a pandemic reveals that everything is connected to everything else.* Sturmberg JP, Martin CM. 5, July 6, 2020, Journal of Evaluation in Clinical Practice, Vol. 6, pp. 1361-1367.

46. World Health Organization. *Global public goods for health: the report of Working Group 2 of the Commission on Macroeconomics and Health.* Geneva : s.n., 2002.

47. *Building Global Epidemiology and Response Capacity with Field Epidemiology Training Programs.* Jones, D. S., Dicker, R. C., Fontaine, R. E., Boore, A. L., Omolo, J. O., Ashgar, R. J., & Baggett, H. C. 13, 2017, Emerging infectious diseases, Vol. 23, pp. S158–S165.

48. *Global Health Security Agenda Implementation: A Case for Community Engagement.* Armstrong-Mensah, E., & Ndiaye, S. 4, 2018, Health Security, Vol. 16, pp. 217–223.

49. World Health Organization & Partners. STEP UP TO PREPAREDNESS. [Online] https://rtsl-benchmarks-production.herokuapp.com/.

50. Ghebreyesus, Dr Tedros Adhanom. WHO Director-General's opening remarks at the seventy-third World Health Assembly. [Online] May 18, 2020. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-world-health-assembly.

51. *Strengthening emergency preparedness and response systems: experience from Indonesia.* Rai, N. K., Rim, K. I., Wulandari, E. W., Subrata, F., Sugihantono, A., & Sitohang, V. 1, Apr 2020, WHO South East Asia J Public Health, Vol. 9, pp. 26-31.

52. *Pandemic influenza as 21st century urban public health crisis.* Bell, D. M., Weisfuse, I. B., Hernandez-Avila, M., Del Rio, C., Bustamante, X., & Rodier, G. 12, 2009, Emerging Infectious Diseases, Vol. 15, pp. 1963-1969.

53. *Health systems development in Thailand: a solid platform for successful implementation of universal health coverage.* Tangcharoensathien, V., Witthayapipopsakul, W., Panichkriangkrai, W., Patcharanarumol, W., & Mills, A. 10126, The Lancet (British Edition), Vol. 391, pp. 1205–1223.

54. Brown, GW., Held, D. *Health: New Leadership for Devastating Challenges in Beyond Gridlock.* s.l. : Policy Press, 2017.

55. *Never again? Challenges in transforming the health workforce landscape in post-Ebola West Africa. (Report).* McPake, B., Dayal, P., &

Herbst, C. 1, March 7, 2019, Human Resources for Health, Vol. 17.

56. *No health workforce, no global health security.* 10033, May 21, 2016, The LAncet, Vol. 387, p. 2063.

57. *Strengthening Global Health Security Through Africa's First Absolute Post-Master's Fellowship Program in Field Epidemiology in Uganda.* Ario, A. R., Wanyenze, R. K., Opio, A., Tusiime, P., Kadobera, D., Kwesiga, B., Bulage, L., Kihembo, C., Kabwama, S. N., Matovu, J., Becknell, S., & Zhu, B. P. S1, 2018, Health security, Vol. 16, pp. S87–S97.

58. *Training Ghanaian frontline healthcare workers in public health surveillance and disease outbreak investigation and response.* Ameme, D. K., Nyarko, K. M., Afari, E. A., Antara, S., Sackey, S. O., & Wurapa, F. 2016, The Pan African medical journal, Vol. 25(Suppl 1), p. 2.

59. *Hajj: infectious disease surveillance and control.* Memish, Z. A., Zumla, A., Alhakeem, R. F., Assiri, A., Turkestani, A., Al Harby, K. D., Alyemni, M., Dhafar, K., Gautret, P., Barbeschi, M., McCloskey, B., Heymann, D., Al Rabeeah, A. A., & Al-Tawfiq, J. A. 9934, June 14, 2014, The LAncet, Vol. 383, pp. 2073-2082.

60. *Health system resilience: Lebanon and the Syrian refugee crisis.* Ammar, W., Kdouh, O., Hammoud, R., Hamadeh, R., Harb, H., Ammar, Z., Atun, R., Christiani, D., & Zalloua, P. A. 2, Dec 2016, J Glob Health, Vol. 6, p. 020704.

61. *Uganda's experience in Ebola virus disease outbreak preparedness, 2018–2019.* Aceng, J.R., Ario, A.R., Muruta, A.N. et al. 24, 2020, Global Health, Vol. 16.

62. *Assessing the Surveillance System for Priority Zoonotic Diseases in the Democratic Republic of the Congo, 2017.* Kristen B. Stolka, Bonaventure Fuamba Ngoyi, Kathyrn E. L. Grimes, Jennifer J. Hemingway-Foday, Leopold Lubula, Alain Nzanzu Magazani, Joseph Bikuku, Mathias Mossoko, Leonie Manya Kitoto, Sylvie Mpangi Bashilebo, Dieudonné Lufwa Maya, Benoit Kebela Ilunga. S1, Dec 2018, Health Security, Vol. 16, pp. S-44-S-53.

63. *Lessons Learned from Reinforcing Epidemiologic Surveillance During the 2017 Ebola Outbreak in the Likati District, Democratic Republic of the Congo.* Hemingway-Foday, J. J., Ngoyi, B. F., Tunda, C., Stolka, K. B., Grimes, K., Lubula, L., Mossoko, M., Kebela, B. I., Brown, L. M., & MacDonald, P. S1, 2020, Health security, Vol. 18, pp. S81–S91.

64. *Information intermediaries for emergency preparedness and response: A case study from public health.* Ipe, M., Raghu, T., & Vinze, A. 2010, Inf Syst Front, Vol. 12, pp. 67-79.

65. *Building Laboratory-Based Arbovirus Sentinel Surveillance Capacity During an Ongoing Dengue Outbreak, Burkina Faso, 2017.* Sanou, A. S., Dirlikov, E., Sondo, K. A., Kagoné, T. S., Yameogo, I., Sow, H. E., Adjami, A. G., Traore, S. M., Dicko, A., Tinto, B., Diendere, E. A., Ouedraogo-Konate, S., Kiemtore, T., Kangoye, D. T., Sangare, L., Dama, E., Fuller, J. A., Major, C. G.,. S1, 2018, Health security, Vol. 16, pp. S103–S110.

66. *Ebola Surveillance — Guinea, Liberia, and Sierra Leone.* McNamara LA, Schafer IJ, Nolen LD, et al. 2016, MMWR Suppl., Vol. 25, pp. 35-43.

67. *Practical recommendations for strengthening national and regional laboratory networks in Africa in the Global Health Security era.* Best, M., & Sakande, J. 3, 2016, African journal of laboratory medicine, Vol. 5, p. 471.

68. *Towards Resilient Health Systems in Sub-Saharan Africa: A Systematic Review of the English Language Literature on Health Workforce, Surveillance, and Health Governance Issues for Health Systems Strengthening.* Ayanore, M. A., Amuna, N., Aviisah, M., Awolu, A., Kipo-Sunyehzi, D. D., Mogre, V., Ofori-Asenso, R., Gmanyami, J. M., Kugbey, N., & Gyapong, M. 1, 2019, Annals of global health, Vol. 85, p. 113.

69. *Leveraging Partnerships to Maximize Global Health Security Improvements in Guinea, 2015-2019 Martel.* Claire J. Standley, Pia D. M. MacDonald, Aurelia Attal-Juncqua, Alpha Mahmoud Barry, Ebi Celestin Bile, Doreen L. Collins, Salomon Corvil, Diallo Boubabar Ibrahima, et Al. Jan 2020, Health Security, pp. S-34-S-42.

70. *Surveillance system assessment in Guinea: Training needed to strengthen data quality and analysis, 2016.* Collins, D., Rhea, S., Diallo, B. I., Bah, M. B., Yattara, F., Keleba, R. G., & MacDonald, P. 6, 2020, PloS one, Vol. 15, p. e0234796.

71. *Health Security and Disease Detection in the European Union.* M., Ciotti. s.l. : Springer, Dordrecht, 2012. pp. 55-73. 978-94-007-5273-3.

72. *Universal health coverage in Indonesia: concept, progress, and challenges.* Agustina, R., Dartanto, T., Sitompul, R., Susiloretni, K., Suparmi, Achadi, E., Taher, A., Wirawan, F., Sungkar, S., Sudarmono, P., Shankar, A., Thabrany, H., Susiloretni, K. 10166, 2019, The Lancet (BritishEdition), Vol. 393, pp. 75–102.

73. *Never again? Challenges in transforming the health workforce landscape in post-Ebola West Africa. (Report).* McPake, B., Dayal, P., & Herbst, C. 1, 2019, Human Resources for Health, Vol. 17, p. 19.

75. *Assessing health systems' responsiveness in tackling COVID-19 pandemic.* Neogi, S. B., & Preetha, G. S. 2020, Indian Journal of Public Health, Vol. 64, pp. S211-S216.

76. *Shifting the paradigm: using disease outbreaks to build resilient health systems.* Durski KN, Osterholm M, Majumdar SS, et al. 2020, BMJ Global Health.

77. Insights Country preparedness and COVID-19. *Prevent Epidemics.* [Online] May 5, 2020. https://preventepidemics.org/covid19/science/insights/country-preparedness-and-covid-19/.

78. World Health Organization. Global strategy on human resources for health: workforce 2030. *http://www.who.int/.* [Online] 2016. [Cited: October 07, 2020.] https://www.who.int/hrh/resources/global_strategy_workforce2030_14_print.pdf. 978 92 4 151113 1 .

79. *COVID-19: time for paradigm shift in the nexus between local, national and global health.* Paul, E., Brown, G. W., & Ridde, V. 4, 2020, BMJ global health, Vol. 5.

80. *Strengthening health security at the Hajj mass gatherings: characteristics of the infectious diseases surveillance systems operational during the 2015 Hajj.* Alotaibi, B. M., Yezli, S., Bin Saeed, A. A., Turkestani, A., Alawam, A. H.,

& Bieh, K. L. 3, 2017, Journal of travel medicine, Vol. 24.

81. *Resilient Information Networks for Coordination of Foodborne Disease Outbreaks.* Hossain, L., Hassan, M., & Wigand, R. 2, 2015, Disaster Medicine and Public Health Preparedness, Vol. 9, pp. 186-198.

82. *Our Shared Vulnerability to Dangerous Pathogens.* Gostin, L. O. 2, May 1, 2017, Medical Law Review, Vol. 25, pp. 185-199.

83. *When Both Markets and Governments Fail Health.* Yazbeck, A. S., & Soucat, A. 4, 2019, Health Syst Reform, Vol. 5, pp. 268-279.

84. *Strengthening global health security by embedding the International Health Regulations requirements into national health systems.* Kluge, H., Martín-Moreno, J. M., Emiroglu, N., Rodier, G., Kelley, E., Vujnovic, M., & Permanand, G. (Suppl 1), Jan 20, 2018, BMJ global health, Vol. 3, p. e000656.

85. *Barriers to supportive care during the Ebola virus disease outbreak in West Africa: Results of a qualitative study.* Loignon, C., Nouvet, E., Couturier, F., Benhadj, L., Adhikari, N., Murthy, S., Fowler, R. A., & Lamontagne, F. 9, 2018, PloS one, Vol. 13, p. e0201091.

86. *What is a resilient health system? Lessons from Ebola.* Kruk ME, Myers M, Varpilah ST, et al. 2015, LAncet, Vol. 385, pp. 1910–1912.

87. *Global Health Security: The Lessons from the West African Ebola Virus Disease Epidemic and MERS Outbreak in the Republic of Korea.* GPTF, Team. 2015, Osong Public Health and Research Perspectives, Vol. 6, pp. S25–S27.

88. *Quality improvement and emerging global health priorities.* Mensah Abrampah, N., Syed, S. B., Hirschhorn, L. R., Nambiar, B., Iqbal, U., Garcia-Elorrio, E., Chattu, V. K., Devnani, M., & Kelley, E. Suppl 1, April 20, 2018, International Journal for Quality in Health Care, Vol. 30, pp. 5-9.

89. United Nations. General Assembly resolution 66/2 Political Declaration of the High-level Meeting of the. [Online] January 24, 2012. https://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf.

90. UNISDR (United Nations International Strategy for Disaster Reduction). *Sendai Framework for Disaster Risk Reduction 2015-2030.* Geneva : s.n., 2015.

91. World Health Organization. *WHO Glossary of Health Emergency and Disaster Risk Management Terminology.* Geneva : s.n., 2020. CC BY-NC-SA 3.0 IGO.

92. *Redefining the scope of public health beyond the year 2000.* D, Yach. 2, 1996, Current Issues in Public Health, pp. 247–252.

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