



Shocks, stresses and universal health coverage

Pathways to address resilience and health

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Key messages

- Universal health coverage offers the greatest policy platform for improving health and wellbeing for all, and for reducing the vulnerabilities of the most marginalised groups in society to disasters and risk drivers such as climate change.
- For health systems to be effective and sustainable, they must acknowledge current and future risks from disasters. These include both direct and indirect impacts on health and wellbeing, which may make it more challenging to deliver universal health coverage in vulnerable settings.
- Implementing universal health coverage should engage stakeholders from all sectors of society. Health and wellbeing depends on socioeconomic, geographic, demographic and political determinants. This requires integrating risk-mitigating strategies into long-term inter-sectoral development planning to improve management of shocks and stresses, while supporting broader favourable outcomes for health, resilience and sustainable development overall.
- Domestic government-led financing offers the clearest foundation to efforts towards universal health coverage, strengthened by political engagement and effective governance. Adaptive support mechanisms and financial instruments, potentially backed by international funding mechanisms, can offer incentives for preparedness and effective response to the impacts of shocks and stresses.
- Adaptive capacities ensure that health systems can support universal health coverage through the provision of services and supplies before, during and after disasters and emergencies take place. Human resources for health must be appropriately trained and retained, with structures in place to augment capacities and assist decision-making during disasters and emergencies.

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About this report

Research for this report is based on a desk-based scoping review of relevant literature and informal interviews focused on the health and wellbeing impacts of disasters and climate change and pathways to universal health coverage (UHC). The analysis explores how progress towards UHC can be achieved in spite of shocks and stresses. Tables and figures summarise findings and explain key concepts. In-depth analyses and insights are supported by case studies that show how to integrate efforts and move towards UHC in all contexts.

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Acronyms

ADB	Asian Development Bank
CHE	Catastrophic health expenditure
CREG	Centre for Research on the Epidemiology of Disasters
DoH	Department of Health
DRR	Disaster risk reduction
EM-DAT	Emergency Events Database
GOARN	Global Outbreak and Response Network
IHR	International Health Regulations
IPCC	Intergovernmental Panel on Climate Change
JEE	Joint External Evaluation
LMICs	Low- and middle-income countries
MDG	Millennium Development Goal
MERS	Middle East Respiratory Syndrome
NCDs	Non-communicable diseases
NGO	Non-governmental organisation
ODI	Overseas Development Institute
OOP	Out-of-pocket
PAHO	Pan American Health Organization
PEF	Pandemic Emergency Financing Facility
SARS	Severe Acute Respiratory Syndrome
SDG	Sustainable Development Goal
SIDS	Small island developing states
UHC	Universal health coverage
UN MGCY	United Nations Major Group for Children and Youth
WHO	World Health Organization
WHO/Europe	World Health Organization Regional Office for Europe

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Executive summary

The aim of universal health coverage (UHC) is to ensure that everyone has access to quality healthcare without enduring financial hardship. To move towards UHC is, therefore, a key priority to support global health and wellbeing along with the sustainable development and resilience of societies. However, political and economic constraints can undermine the implementation of UHC. Societies are faced with increasing health burdens related to chronic diseases, disaster risks, pandemic threats and the predicted impacts of climate change which compound existing risks and impact people's health and wellbeing in a vast number of ways. Disasters and drivers of risks seriously threaten the achievement of Sustainable Development Goal (SDG) 3 – to ensure healthy lives and promote wellbeing for all at all ages. Engaging with how disasters and climate change impact health and wellbeing differently, within and across societies, and how health systems can cope is, therefore, critical to foster equitable outcomes in line with the Sustainable Development Agenda.¹

This report identifies and explores pathways to achieving UHC that lead to sustainable and resilient lives for all, despite the shocks and stresses that people may face. The analysis explores why UHC is important for health and wellbeing, sustainable development and resilience; how disasters and drivers of risk, such as climate change, negatively impact health and wellbeing and disrupt the desired health and financial benefits of UHC; and examines the potential of UHC to offer a platform to more actively address shocks and stresses to health and wellbeing through governance, financing and the implementation of services.

Key messages

Disasters, emergencies and climate change compound health risks and aggravate existing health inequalities.

Health inequities disproportionately affect the most marginalised people because their geographical location, their socioeconomic conditions or their political contexts limit their access to resources that would otherwise help them protect their health, and provide opportunities to benefit from healthcare.

Without adequate financial protection mechanisms following disasters, impacts on health and wellbeing can lead to potentially impoverishing health expenditures in the short and long run.

Shocks disproportionately impact the poorest and most vulnerable, requiring redress through sustained access to medicines and financial support after initial response measures have lapsed.

Moving towards UHC can contribute to achieving SDG 3 and improved health and wellbeing for all – providing that efforts acknowledge the risks and vulnerabilities of societies and their health systems.

Achieving SDG 3 requires supportive governance and financing mechanisms, as well as adequate delivery of health services, that take into consideration the additional threats posed by disasters and risk drivers such as climate change. This report highlights pathways to support the attainment of UHC within and beyond the health sector, indicating where current mechanisms need to be developed, strengthened and sustained to ensure that healthcare is accessible for all in the long term.

Political will needs to support UHC.

The achievement of UHC is only feasible as a government-coordinated mechanism that distributes collectively raised funds to create public goods for the health and wellbeing of citizens. This makes it an inherently political issue, thus requiring political commitment to implement health reforms, as well as mechanisms to assess the economic efficiency of policies and to support effective activities of institutions that impact the health and wellbeing of societies.

Domestic financing needs adaptability for UHC.

Fiscal spending, out-of-pocket expenditure, public and private donations, and insurance mechanisms make up most financing streams available to support the implementation of UHC. Recent estimates point out the need for a significant increase in total public and private health expenditure if SDG 3 is to be achieved (UNSDSN, 2015; Stenberg et al., 2017). This is challenging in resource-constrained settings, especially since the estimates do not consider shifts in price dynamics or the predicted increase in direct and indirect hazard impacts posed by disasters and climate change. However, governments can acquire funding for UHC efforts through redistributing

1 <http://www.un.org/sustainabledevelopment/development-agenda/>

existing fiscal and political restrictions, while international financing can support through, for instance, lowering interest rates, assisting with payments on existing debts or through targeted impact bonds.

Health services must be implemented adaptively.

Quality health services should be delivered efficiently, taking into account and addressing potential weaknesses in the complex chain of services, supplies and infrastructure to implement UHC. Cascading effects from poor practice

augment the difficulty, and value, of delivering healthcare in disasters and emergency scenarios. A dynamic workforce, one that is effectively trained, distributed and retained among the population, is also crucial for measures such as long-term resilience, surge capacity support and prevention of chronic disease complications during shocks and stresses. Finally, access to medical supplies and support for technological innovation must serve all individuals whose health is directly or indirectly impacted by shocks and stresses.

1. Introduction

Universal health coverage (UHC) has become a leading conceptual framework for efforts to improve health and wellbeing for both domestic institutions and international bodies. UHC is a critical goal of efforts to ensure healthy lives and promote wellbeing for all at all ages (SDG 3), and is one of the six priorities of the current World Health Organization (WHO) *General Programme of Work* (2014–2019) (WHO, 2014a). These priorities focus on achieving financial risk protection and access to essential services and products for health and wellbeing. Tedros Adhanom Ghebreyesus, who took office as the new WHO Director-General in July 2017, highlights that moving towards UHC is a key priority, alongside improving global health security (Ghebreyesus, 2017a). Health and wellbeing are essential to achieving the SDGs, especially those critical for the core principle of ‘leave no one behind’ (Kieny et al., 2017). The implementation of UHC entails an inclusive framework, founded in primary healthcare approaches and systemic improvements to unify efforts for health. This is crucial in a world in which an estimated 40% of people lack adequate social protection and access to services that could prevent undue burdens on ill health (Ghebreyesus, 2017a).

In addition to the political and economic constraints, disasters and climate change risks directly and indirectly impact individuals’ health and wellbeing, as well as affecting health systems and the wider range of institutions associated with the delivery of UHC. Over 12.5 million people die each year – one in four deaths worldwide – from diseases associated with environmental hazards (Chan et al., 2017). Associated morbidity (ill health) and mortality are significant components of the estimated losses to economic output associated with disasters originating from natural hazards (more than \$520 billion annually) (Hallegatte et al., 2016). Changes in exposure and vulnerability due to the combination of climate change, demographic shifts, inequalities or political instability

exacerbate current and future challenges for population health and wellbeing, including burdens from malnutrition, chronic diseases and infectious pathogens (Tong et al., 2016). The global distribution of associated illness and death also varies greatly along geographic, socioeconomic and demographic boundaries (WHO, 2015b). Disasters and the adverse impacts of climate change can exacerbate the risk for marginalised groups to suffer from a lack of adequate access to healthcare.

The impetus to address these concerns for health and wellbeing extends the agenda to disaster risk reduction (DRR) and addressing risk drivers including climate change. The Sendai Framework for Disaster Risk Reduction 2015–2030 considers health and wellbeing as fundamental for DRR efforts, connecting economic, social and environmental concerns associated with disasters and disaster risk to UHC (UNISDR, 2015). Just as moving towards UHC brings together efforts for health, making health central to DRR under the Sendai Framework ensures that activities across sectors are engaged in improving the outcomes for individuals’ wellbeing (See Figure 1). The Paris Climate Agreement explicitly addresses impacts on health and wellbeing through ‘averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events’, looking also to enhance understanding, action and support including ‘non-economic losses’ and the ‘resilience of communities, livelihoods, and ecosystems’ (UNFCCC, 2015: Article 8). The Paris Climate Agreement also recognises the role of sustainable development in reducing the risk of loss and damage, for which investing in health and wellbeing offers a pathway that is cost effective and risk adaptive. To use the words of the 2015 *Lancet* Commission on Health and Climate Change, targeting this pathway offers ‘the greatest global health opportunity of the 21st century’ (Watts et al., 2015). This framing has

Figure 1: International DRR frameworks are paying greater attention to health



Source: Maimi et al. (2017).

carried over to the Lancet Countdown, an initiative set up to systematically track progress and to hold governments to account on health and climate change (Watts et al., 2017).

1.1. Objective and structure of this report

This report identifies and explores pathways towards UHC that lead to sustainable, fair and resilient lives for all people, despite the shocks and stresses they may face. There is little consolidated evidence and few recommendations on resilience-centred efforts in the implementation of UHC. Yet, these approaches are valuable, as integrated policies and interventions can create ‘no regret’ options to address risk drivers such as climate change, while simultaneously addressing poverty and inequity (Watts et al., 2015; Belesova et al., 2016). Support for these approaches needs to come from within and beyond health systems. The following discussion provides an accessible foundation for engagement between public, private and civil society actors – across sectors – in order to achieve resilience and UHC.

The analysis builds on recent academic and grey literature on UHC and health-related impacts from shocks and stresses due to disasters and risk drivers such as climate change. Going beyond the implicit acceptance that UHC will improve resilience through gains in health and wellbeing, the discussion examines why efforts to implement UHC need to be informed by and address current and future risks. This report is divided into three main sections:

- **Section 2 Moving towards universal health coverage** – Why UHC is important for health and wellbeing, sustainable development and resilience, and the potential constraints to achieving UHC.
- **Section 3 Shocks and stresses to health and wellbeing** – How disasters and drivers of risk, such as climate change, negatively impact health and wellbeing, and disrupt the desired health and financial benefits of UHC.
- **Section 4 Addressing disruption to strengthen health systems and move towards universal health coverage** – The potential of UHC to tackle shocks and stresses to health and wellbeing in terms of governance, financing and the implementation of services. How health systems need to, and can, incorporate adaptive and responsive characteristics in line with health emergency risk management and other practices.
- **Section 5 Conclusion** – Insights and recommendations for further activities to align efforts for resilience and UHC.

1.2. Universal health coverage

UHC can ensure healthy lives for all, based on people’s needs and regardless of their circumstances. It grounds efforts in improving primary care activities for health, including prevention measures, health promotion, long-term care and broader public health approaches, and extends to broader horizontal strengthening of health systems. Individuals and communities then engage these services without incurring costs that would lead to financial hardship (WHO and World Bank, 2015).

Pathways towards UHC, focused upon aspects of health systems strengthening, engage both state and non-state actors who can influence the needs and outcomes of population health and wellbeing (Kelsall et al., 2016). As a term, UHC is interpretable and context specific. This reflects the complex system of policies and programmes that it encompasses, meaning no single model exists for UHC, nor the health systems strengthening that can drive efforts towards it (UHC2030, 2017).

Over the past decade, there has been increased impetus in the development of inclusive and equitable health outcomes at the international level. This has led to surging support for UHC and its development within concepts including ‘Health for All’ and ‘Health in All Policies’ (WHO, 2005; 2014b; Garrett et al., 2009). Belesova et al. (2016) also examine synergies and tensions between the climate change and economic progress goals, and the opportunity of intersectoral governance mechanisms, such as health-sensitive macroeconomic progress indicators, or long-term and non-monetary values that could address climate change through accounting for health. Useful analyses of the current implementation and monitoring of UHC are available in reports including: *Tracking Universal Health Coverage: First Global Monitoring Report* (WHO and World Bank, 2015),² the *Strategy for Universal Access to Health and Universal Health Coverage* (PAHO, 2014), *UHC in Africa: A Framework for Action* (World Bank et al., 2016) and UHC2030³ publications including *Healthy Systems for Universal Health Coverage* (UHC2030, 2017).

2 The follow-up report is expected in December 2017.

3 UHC2030 is multi-stakeholder platform to promote collaborative working at global and country levels on health systems strengthening. It advocates increased political commitment to UHC and facilitates accountability and knowledge sharing (UHC2030, 2017).

Box 1: Key concepts

This report brings together information on resilience and UHC from sources within and beyond the health sector. Here, we briefly explain key concepts used throughout.

Determinants of health

The conditions in which people are born, grow, work, live and age, and the wider set of forces and systems shaping the conditions of daily life. These environmental and socioeconomic determinants cause disparities in health outcomes between and within societies (PAHO, 2017).

Disaster

A serious disruption of the functioning of a community or a society on any scale due to shocks and stresses interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts. A hazard is a process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UN General Assembly, 2016; 2017).

Global health security

Preventing disease outbreaks from becoming epidemics and pandemics that threaten the international community. The International Health Regulations (IHR), which came into force in June 2007, constitute an international framework for countries to report threatening disease outbreaks and public health events to WHO (WHO, 2008). Since then, IHR emergency committees have been set up for: Ebola, Middle East respiratory syndrome coronavirus, Polio virus, Yellow Fever and Zika (Gostin et al., 2017). National compliance with the IHR and capacity to prevent, detect, and rapidly respond to public health threats is voluntarily measured via the Joint External Evaluation (JEE) assessment (WHO, 2017a).

Health emergency risk management

A multisectoral approach that emphasises proactive management of the risks to health presented by emergencies and disasters, previously known as ‘emergency risk management for health’ (WHO et al., 2013). This involves the systematic analysis and management of health risks posed by emergencies and disasters, through a combination of (1) hazard and vulnerability reduction to prevent and mitigate risks, (2) preparedness, (3) response, and (4) recovery measures (ibid.).

Health inequality and health inequity

While measures to improve health equality focus on outcomes, those which address health inequity are concerned with equal accessibility to healthcare which creates equitable outcomes. Striving for equity is an ethical and political matter, which supports UHC being a matter requiring government backing (Braveman and Gruskin, 2003; Harlem Brundtland, 2017). Systemic disparities in health are closely associated with key social determinants such as relative wealth, power or prestige compared to others in society (Braveman and Gruskin, 2003).

Health systems strengthening

Health systems encompass ‘all organizations, people and actions whose primary intent is to promote, restore or maintain health’ and includes both state and non-state actors (WHO, 2007: p. 2). The Tallinn Charter extends this definition to include ‘all public and private organizations, institutions and resources mandated to improve, maintain or restore health’, encompassing influence in the health sector and policies to influence other sectors that address the determinants of health (WHO/Europe, 2008: p. 1). Calls to make health systems resilient to shocks and stresses are increasingly receiving domestic and international political support (Kruk et al., 2015; PAHO, 2016).

There are six core health system ‘building blocks’. These focus on health-oriented activities through: service delivery; health workforce; information; medical products, vaccines and technologies; financing; and leadership and governance (WHO, 2007). Together, health systems strengthening comprises the instruments to achieve aims such as UHC, global health security and resilience (Kutzin and Sparkes, 2016). To achieve resilience and UHC, these instruments must be accompanied by strengthening of other systems and sectors (such as emergency preparedness) to support essential activities that may directly or indirectly impact health and wellbeing (WHO, 2017b; UHC2030, 2017).

Infrastructure

Some sectors can dramatically impact health systems elements, such as hospitals and supply chains. Simultaneous failure of infrastructure sub-systems critical to health, such as roads, electricity and water, can impact people’s health and their access to care regardless of national resources (McMaster and Baber, 2012). For instance, prolonged political crisis in Venezuela in 2016 led to power cuts and disruption of labour and medical supply infrastructures, with potentially severe impacts on health (Casey, 2016). Early warning systems are critical to mitigating the health impacts of natural hazards, including extreme weather, earthquakes and infectious disease outbreaks.

Box 1: Key concepts (continued)

While rapidly expanding urban environments require planning that accounts for potential heat stress and flooding (Watts et al., 2015).

One Health/Planetary Health

The One Health approach engages biological aspects beyond human health, engaging the wider wellbeing of animals and ecology and the goals of SDG 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (UN Economic and Social Council, 2017)). Community-led responses are central to addressing ‘zoonoses’ and potential zoonotic threats – diseases of animals that can jump to humans or indirectly impact communities through issues such as malnutrition or loss of livelihood (i.e. livestock-related). One Health can also combine the political economy of disease threat prioritisation by governments in the global north while also addressing

neglected diseases causing significant localised health burdens on impoverished populations in the global south (Cunningham et al., 2017). Planetary Health broadens the scope globally to address the health of human civilisation and the state of the natural systems on which it depends (Whitmee et al., 2015).

Resilience

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management (UN General Assembly, 2016; 2017). Over the past decade the definition has become widely adopted to underpin policies and projects across sectors, with operational approaches to building resilience also growing (Tanner et al., 2017).

2. Moving towards universal health coverage

Key questions

- What problems for health and wellbeing can delivering UHC address?
- How can moving towards UHC foster sustainable development?
- Why is resilience linked to UHC?

Persistent global health challenges present an opportunity for UHC implementation, with 400 million people lacking access to essential services for health and 40% of the global population lacking adequate social protection mechanisms to prevent undue health-related burdens (Ghebreyesus, 2017a). Moving towards UHC can address healthcare access constraints and undue financial burden, with benefits for health and wellbeing, sustainable development and resilience. Yet doing so is challenging, in part due to the difficulty of monitoring the access to healthcare that moving towards UHC seeks to address⁴ (WHO and World Bank, 2015).

Using an index of indicators for UHC, the *Global Burden Of Disease Study 2016* indicates a global trend towards UHC, but further gains are hampered by financial constraints (Abajobir et al., 2017). In general, richer countries spend more on health-related activities and rely more on collectively funded mechanisms that avoid placing health costs on individuals and households (IHME, 2017). A 2017 WHO examination of 67 low- and middle-income countries (LMICs) found that improving health systems and moving towards UHC to progress towards the goals of SDG 3 will require additional annual funding of \$274 billion by 2030 (Stenberg et al., 2017). Requirements for collective financing mechanisms and engagement across sectors also mean that technical solutions alone cannot achieve UHC. It is an inherently political issue that can be impeded by governments as well as supported by them (Harlem Brundtland, 2017).

Despite constraints, the popularisation and domestic ownership of UHC and increased calls for horizontal strengthening of health systems, rather than disease-specific

vertical interventions, make UHC a useful unifying concept to improve health and wellbeing. The former Director-General of WHO, Margaret Chan, outlined the value of UHC:

as the single most powerful concept that public health has to offer. It is inclusive. It unifies services and delivers them in a comprehensive and integrated way, based on primary health care. (Chan, 2012)

The following subsections explore the potential to address challenges in health and wellbeing by moving towards UHC, and holding to account activities that could seem far removed from health systems, yet also influence the sustainable development and resilience of societies.

2.1. Universal health coverage to achieve health and wellbeing for all

Moving towards UHC can help tackle endemic challenges for health and wellbeing across all societies. This is dependent on the level of universality and engagement within those societies, particularly for marginalised groups. Potential for progress is evident in the case of addressing neglected tropical diseases,⁵ which could substantially alleviate poverty and expand productivity of the vast number of people affected by them – overwhelmingly in poorer settings (Bangert et al., 2017). UHC can also improve maternal and child health, key to the long-run socioeconomic potential of countries and established goals for health such as Millennium Development Goal

4 While it is possible to monitor use of health services, assess health outcomes and estimate risk factors through surveys and records, it is hard to measure 'access' to care due to the complex constraints which individuals and households may face (i.e. social, geographic or financial barriers).

5 A group of 17 'diseases of poverty' that affect over one billion people in LMICs annually with debilitating physical and mental health effects (Bangert et al., 2017).

(MDG) 4 and MDG 5 (Bain and Ebuonyi, 2017).⁶ While global maternal mortality ratios decreased across all countries by 44% between 1990 and 2015, many states and sub-national regions were left behind in the wake of aggregate progress, leaving an inequity gap (Lieberman, 2016). The rising burden of non-communicable diseases (NCDs) globally also threatens gains in maternal health, with the stresses caused by chronic disease expected to increase as causal factors for maternal mortality (Kruk et al., 2016). Addressing such critical health and wellbeing issues is further constrained by the estimated 12.5 million deaths that are linked annually to diseases associated with environmental hazards (Chan et al., 2017).

Calls to strengthen health and wellbeing for all are anchored in Goal 3 of the SDGs: *Ensure healthy lives and promote well-being for all at all ages* (UN Economic and Social Council, 2017). The pledge of the Global Goals – another term for the SDGs – to ‘leave no one behind’ is key to equitable outcomes for health and wellbeing. It addresses the experiences of marginalised groups who may have limited access to basic services or face undue burden in their lives due to discrimination and inequality (Kieny et al., 2017). According to the SDG Declaration, vulnerable and marginalised groups include children, youth, old persons, indigenous peoples, refugees and internally displaced peoples and migrants, and persons with disabilities and living with HIV/AIDS (UN General Assembly, 2015a).

As the goal of SDG 3.8 (see Figure 2), UHC is both an objective and a means to ensure that everyone has access to healthcare. It offers a route for country-led and context-specific efforts for health and wellbeing that has the support of the international community (Ghebreyesus, 2017a). Whereas the building blocks of health systems may primarily focus upon human health and wellbeing, moving towards UHC requires an understanding of the wider determinants of health and approaches that go beyond human health – including One Health and Planetary Health approaches. Inclusive and fair access to what is needed to protect and improve health and wellbeing under UHC thus expands accountability beyond health systems and makes all actors accountable for and engaged in the health and wellbeing of everyone. UHC also offers a platform to engage public and private stakeholders across different sectors, and to engage the benefits of cross-sectoral programmes that improve health and wellbeing, among other areas. In a similar fashion to activities that foster resilience (Peters and Tanner, 2016), UHC can reach across sectors to engage siloed efforts and foster collaboration.

Figure 2: Universal health coverage in the SDGs



Sources: UN Economic and Social Council (2017)

2.2. Universal health coverage to foster sustainable development

Improvements to health and wellbeing align with policy priorities across all countries and appear throughout the rest of the SDGs, the Paris Climate Agreement, the Sendai Framework for Disaster Risk Reduction 2015–2030, the New Urban Agenda, and Financing for Development (UN General Assembly, 2015b; Watts et al., 2015; Peters and Tanner, 2016; WHO, 2016b; Bangert et al., 2017; Maini et al., 2017). By unifying efforts for health, moving towards UHC can influence activities that may seem far removed from health systems. For instance, health and wellbeing is critical to sustaining and improving labour productivity, and overall economic development can induce broader engagement by domestic economic actors (i.e. private-sector industries).

The 2013 *Lancet* Commission on Investing in Health estimated that, between 2000 and 2011, 24% of total income growth in LMICs was attributable to additional years of healthy life (Jamison et al., 2013).⁷ Moreover, economic returns from improved health in line with the SDGs, through added quality-adjusted life years (years of good health) over 2015–2030, are expected to exceed cost by a multiple of between nine and 20 (ibid.). A 2017 WHO report on financing for health in the SDGs, using modelled estimates across 67 countries, shows that even the most fiscally constrained states can achieve some level of universality and improve the quality life years of their citizens – this, despite challenges of underdeveloped

6 MDG 4: Reduce child mortality. MDG 5: Improve maternal health.

7 In South Asia, the percentage was double this figure (Jamison et al., 2013).

clinical services and inadequate human resources for health capacity (Stenberg et al., 2017).

Domestic demand for UHC will rise further as rapid socioeconomic development across the global south occurs alongside demographic and epidemiological shifts⁸ that are expected to exacerbate challenges to health and wellbeing (Ryan et al., 2016). For instance, chronic diseases require sustained intervention over time to mitigate potential reduction in family income, savings and consumption of non-health items (Jaspers et al., 2015). Yet, preventive measures for chronic diseases are onerous and expensive compared to previously transformative interventions for health, such as vaccines. Reliable and accessible primary care, public health measures and engagement by actors beyond the health sector in the determinants of health are critical to continued improvement in outcomes (Summers, 2015).

UHC is being championed as a pro-poor pathway for development that explicitly engages the most vulnerable in society (ibid.). Health and wellbeing framed as human rights further strengthen domestic accountability for moving towards UHC. Indeed, UHC has been explicitly linked to human rights by WHO and the right to health fits as a core tenet to 'leave no one behind' (UN Stats, 2016; Ghebreyesus, 2017a). Dittrich et al. (2016) found that at least 115 countries include the right to health in their national constitutions and in accepted legal interpretations. Associated calls have been made to address the lack of accountability for health through a legally binding Framework Convention on Global Health (Gostin and Friedman, 2017). Adopting such a measure, similar to the Framework Convention on Tobacco Control (2003) or International Health Regulations (2005), requires international acceptance of the issue. However, the threat of increased and unevenly distributed impacts from disasters (outlined in Section 3), and the the potential for measures for UHC that manage and mitigate societies' vulnerabilities (outlined in Section 4), could catalyse that acceptance.

2.3. Universal health coverage to enhance resilience

The concept of resilience has become widely adopted in policy and practice over the past decade, in order to manage and mitigate hazard shocks and stresses for individuals and communities. As a concept, resilience is interpretable and context specific (Tanner et al., 2017). Improving health and wellbeing mitigates the emergence

and impact of crises, and fosters cohesive and productive societies during periods of political and economic stability (Summers, 2015). Comparatively, political instability, economic crisis and conflict can degrade and disrupt the ability of health systems to prevent disease outbreaks occurring and developing into epidemic and pandemic concerns (Jain and Alam, 2017).

Improvements for education, employment and quality of life support making people resilient to shocks and stresses from disasters, and risk drivers such as climate change. In turn, enhancing people's resilience makes UHC more feasible. Resilience lessens the direct and indirect impact of disasters on health and wellbeing. This eases the strain on capacities within and beyond health systems, creating further potential for stakeholders to support reaching UHC.

Hence, the resilience of societies to risks is a desirable outcome, but the resilience of health systems is also a prerequisite for achieving and sustaining UHC. For instance, the 2014–2016 Ebola outbreak in West Africa revealed weaknesses in national capacities, and delays in international response, as well as complacencies regarding the extent of biological risks (Gostin et al., 2015; Jain and Alam, 2017). Substantial donor funding had supported the MDG projects in Liberia, resulting in achievements including reaching MDG 4 by reducing child mortality by two thirds. Yet, under the stress of the 2014–2016 Ebola outbreak, the focus on vertical programmes was associated with failures in basic management measures for controlling a disease outbreak (Kruk et al., 2016). Outbreaks of Zika and Chikungunya in the Region of the Americas (WHO defined) have also raised concern over weaknesses in disease monitoring and surveillance (PAHO, 2016). An outbreak of cholera in Yemen that began in 2015, still ongoing at the time of writing, points to domestic and global failures in addressing health emergencies and associated crises (*Lancet*, 2017).

Contemporary efforts have arisen to improve the assessment of health system resilience (Kruk et al., 2017), align UHC with global health security (Jain and Alam, 2017) and guide the inclusion of health emergency risk management as a core component of health system strengthening (WHO, 2017b). These efforts are critical in promoting the role of resilience in achieving UHC. In other words, UHC must account for the impacts of disasters and risk drivers, such as climate change, for programmes and policies to be sustainable and responsive to the needs of populations within and across societies. Section 3 explores how impacts to health and wellbeing manifest themselves and threaten the achievement of UHC.

8 Shifts in the structure of human populations (i.e. age and migration) and the disease burden within them (i.e. increased burden of NCDs).



Key messages

UHC's role for health:

- The global challenge of 400 million people lacking access to essential services and 40% lacking adequate social protection mechanisms drives the move towards UHC.
- Achieving UHC (SDG 3.8) is an anchor for efforts carried out under SDG 3 – Ensure healthy lives and promote wellbeing for all at all ages.
- UHC is constrained by politics and funding. Financial resources enable the design and implementation of policies and services to address health and wellbeing concerns. Yet this support is contingent on political engagement and effective governance mechanisms.
- There is no one-size-fits-all approach to implementing UHC.

UHC's role for sustainable development:

- To achieve UHC, policies must work to strengthen health systems through forward-looking horizontal interventions, rather than dedicating resources to vertical interventions for specific concerns – such as an epidemic – that undermine health services and investments elsewhere.
- Countries moving towards UHC can benefit from sustainable development dividends through improved levels of productivity, workforce engagement and catalysed economic development.
- Achieving UHC requires adapting to shifting demands and challenges for health and wellbeing. Greater access to health financing through economic prosperity will occur alongside increased demand for quality health services and products, while shifts in epidemiology and changes in the share of NCD and chronic disease burdens will put a strain on resources for health.

UHC's role for resilience:

- Progress towards UHC creates a 'no regret' dividend – healthier populations with improved quality of life, who are also more resilient to the emergence and impacts of disasters and emergencies. Including the most vulnerable in society ensures that the needs of all are known and can be addressed during crises.
- Horizontal improvements to health systems are encouraged by moving towards UHC, as it improves prevention and response capacities and so mitigates outbreaks of disease caused by, or which can lead to, disasters. Dealing with health systems failures created by a focus on vertical interventions (i.e. Ebola) or concurrent crises (i.e. cholera) is closely associated with the measures required under UHC.
- Sustaining progress towards UHC requires explicit accounting of the potential shocks and stresses of disasters and risk drivers (i.e. climate change).

3. Shocks and stresses to health and wellbeing

Key questions

- How do disasters directly and indirectly impact health and wellbeing?
- Why is the health and wellbeing of some population groups disproportionately affected by shocks and stresses? How might this evolve?
- What financial constraints and stresses are associated with health and wellbeing and the impact of disasters and drivers of risk?

Disasters pose serious risks to people's health and wellbeing, particularly the most vulnerable members of society (Wisner et al., 2012; Schmitt et al., 2016). Large-scale disasters, such as those triggered by earthquakes and severe weather events, lead to complex and cascading impacts, with the potential to render entire segments of national health systems inaccessible or inoperable (Sanderson and Sharma, 2016). Catastrophic outcomes in affected areas following the 2010 earthquake in Haiti, Typhoon Hagupit in the Philippines in 2014 and the 2015 earthquake in Nepal are examples of this (Kruk et al., 2016). Shocks and stresses create context-specific impacts on individual health, wellbeing and systems of care that reveal weaknesses in resilience. Coupled with disproportionate dynamics of impact within and across societies, and the potentially impoverishing financial burdens associated with health impacts, moving towards UHC can be severely undermined if resilience for health is not targeted appropriately.

As drivers of morbidity and mortality, disasters and emergencies put UHC efforts under severe strain. The full extent of this is not currently known, as data on the attributable impacts of shocks and stresses can be difficult to obtain, and many more small-scale disasters are not adequately recorded, even though their cumulative impacts on the health and wellbeing of households and communities can be significant (Clarke et al., forthcoming). This means that the myriad ways in which people are affected and are unable to cope and recover from disasters over a long period are not acknowledged appropriately, further undermining adequate response (Lovell and Le Masson, 2015).

The following analysis splits impacts on health and wellbeing into 'direct' and 'indirect' pathways that strive to support UHC. This is supported by an examination of how health impacts differ between and within societies and how the consequences of seeking care can further aggravate the vulnerabilities of the most marginalised people.

3.1. How disasters impact health and wellbeing

The Emergency Events Database (EM-DAT) set up by the Centre for Research on the Epidemiology of Disasters (CRED) estimates that, between 1996 and 2015, natural hazards alone led to the deaths of over 1.35 million people (CRED, 2016a). As a subset of natural hazards, extreme weather events alone led to an annual average of over 200 million incidents of injury, loss of home or need for emergency assistance between 1995 and 2015, with an estimated 600,000 attributable deaths during the period (CRED, 2016b).

Climate change is expected to significantly exacerbate impacts to health and wellbeing overall, covered in detail in both the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (IPCC, 2014) and the 2015 Lancet Commission (Smith et al., 2014; Watts et al., 2015). Rising temperatures and changing rainfall patterns, giving rise also to heat stress, floods, drought, wildfires and intense storms, are expected to lead to excess morbidity and mortality (ibid.; ibid.).

Biological threats, such as disease outbreaks, also pose major challenges. Since 2000, WHO's Global Outbreak and Response Network (GOARN) has responded to over 50 events involving rapidly emerging epidemic disease threats including Avian Flu, Cholera, Ebola, Middle East Respiratory Syndrome (MERS), severe acute respiratory syndrome (SARS), yellow fever and Zika (ADB, 2017a; Ghebreyesus, 2017b; WHO, 2017c). Hazards of human origin, such as the 1998 Niger Delta oil pipeline explosion and 2013 Dhaka factory collapse in Bangladesh, also have the potential to cause thousands of incidents of mortality and morbidity (Fitch et al., 2015; Timilsina, 2017). Shocks may also be economic or political: financial crises, food price spikes or political upheaval lead to cascading impacts on the livelihoods and health of populations (Meara et al., 2015; Yamauchi and Larso, 2016).

3.1.1. Direct impacts on health

Mortality and morbidity that are directly attributable to disasters include immediate injury and trauma and contraction of epidemic disease during a public health emergency. For sudden-onset shocks and stresses, such as extreme weather, earthquakes, landslides and volcano eruptions, this implies that injury and cause of death encompass issues such as wounding, blunt force trauma or failure of respiratory functions (Doocy et al., 2013a; 2013b; Kennedy et al., 2015; Saulnier et al., 2017).

Shocks and stresses at all scales can severely impact health and wellbeing. For instance, burns cause 180,000 deaths annually, the vast majority occurring in LMICs (WHO, 2017d). However, severe shocks and stresses may also cause significant indirect effects on health. For instance, systematic review of studies on the impacts of droughts included, among the probable direct causes of ill health, diving into water bodies believed to be deeper than they were, resulting in spinal injury (Stanke et al., 2013).

Weak population health measures and health systems can be revealed by the threat of biological hazards, such as infectious disease outbreaks (Ooms et al., 2017). This is

Box 2: Terminology

Note: The language used in this report follows that developed in the DRR sphere, namely through the outputs of the Open-ended Intergovernmental Expert Working Group (OIEWG) on Terminology and Indicators Relating to Disaster Risk Reduction, accepted in February 2017 by the United Nations General Assembly through Resolution A/71/276 and outlined in its supporting report A/71/644 (UN General Assembly, 2016; 2017). Where necessary, further information on the sets of definitions (taxonomies) used is included.

Who is affected?

Affected: People who are affected, either directly or indirectly, by a hazardous event.

Directly affected: People who have suffered injury, illness or other health effects; who were evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets.

Indirectly affected: People who have suffered consequences, other than or in addition to direct effects, over time, due to disruption or changes in economy, critical infrastructure, basic services, commerce or work, or social, health and psychological consequences.

What is adaptation?

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects (from the IPCC Fifth Assessment Report (IPCC, 2014)).

What is a disaster?

Hazard: A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

Disaster: A serious disruption of the functioning of a community or a society at any scale due to shocks and stresses interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

Slow-onset disaster: A disaster that emerges gradually over time. For instance, those associated with drought, desertification, sea-level rise or epidemic disease.

Sudden-onset disaster: A disaster triggered by a hazardous event that emerges quickly or unexpectedly. For instance, those associated with earthquakes, volcanic eruptions, flash floods, chemical explosions, critical infrastructure failures or transport accidents.

Shocks and stresses: A phenomenon that causes adverse effects, suddenly or gradually. This report uses the terms ‘shocks and stresses’ throughout the report to refer to hazards and the longer-term impacts of climate change.

What is exposure?

Exposure: The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.

What is vulnerability?

Vulnerability: The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

What is resilience?

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, which includes the preservation and restoration of its essential basic structures and functions through risk management.

Sources: IPCC (2014); UN General Assembly (2016; 2017).

evidenced by epidemics occurring in settings where health systems have been unable to perform effective public health functions. The 2014–2016 Ebola outbreak in West Africa resulted in 28,616 confirmed, probable and suspected cases, and 11,310 deaths attributed to the epidemic that was centred in Sierra Leone, Guinea and Liberia (WHO, 2016c). In each case, failures in health emergency risk management at the local, national and international level catalysed the initial spread of an epidemic of Ebola virus disease in 2014 (Moon et al., 2015; Jones et al., 2016).

Disease epidemics and pandemics give great cause for national and international concern (Ghebreyesus, 2017b). Novel diseases can lead to outbreaks, such as those derived from diseases that previously only affected vertebrate animals but mutate to infect humans as well, becoming ‘zoonoses’ (Cunningham et al., 2017). Outbreaks of this origin have recently caused pandemic concerns over avian and swine flu, Ebola, MERS, SARS and Zika (ibid.). Zika, for instance, raised wide transnational alarm due to its disease vector – the *Aedes* genus of mosquito. During the initial response period to the 2015–2016 Zika epidemic, there was concern at the possibility of international spread in the Americas, Europe, and Asia by travellers (Lucey and Gostin, 2016). This mosquito’s transmitting role extends beyond the Zika virus, and raises another point of concern for biological hazards through its carrying of Dengue and Chikungunya (WHO, 2017e). Coordinated measures within and beyond health systems, such as those carried out by Health Emergency Risk Management, One Health and other integrating efforts to DRR and climate change adaptation approaches, are critical to mitigating outbreak risks and effectively responding to outbreaks to minimise impacts on health and wellbeing and disruption to UHC efforts.

3.1.2. Indirect impacts on health

Indirect impacts on health and wellbeing arise through processes caused by shocks and stresses that lead to new risks for individuals or disrupt previously managed health and wellbeing concerns for individuals or wider society (Watts et al., 2015). The shocks and stresses of disasters, emergencies and climate change generate direct or indirect negative impacts on people’s health, but they also have the potential to damage or destroy the provision of healthcare (i.e. where and how healthcare is provided), further undermining people’s wellbeing (Anthamatten and Hazen, 2012; Kutzin and Sparkes, 2016).

New risks can arise long after the initial impacts of disasters, straining health systems and requiring active management across sectors to prevent and remove risks to health. Floods, the most frequent natural hazard, create standing water pools that give rise to vector-borne infectious disease, such as malaria through mosquitos (Smith et al., 2014). In a systematic review of the effects of disasters caused by floods and storms, Saulnier et al. (2017) observed, over the four weeks following disasters, the related increases in poisonings, wounds, gastrointestinal infections, and skin or soft tissue infections. For floods, the

frequency of gastrointestinal infections is higher, joined by higher leptospirosis and diabetes-related complications. In heatwaves, excess health burden can occur from cardiovascular and respiratory disease (Smith et al., 2014). With droughts, food production dips in regions without capability or assistance to supplement losses, can cause malnutrition and a host of associated health risks – particularly for children and mothers (ibid.; Requejo and Bhutta, 2015).

Large population displacements, such as those caused by floods, drought induced famines or conflicts, can disrupt previously stable health management operations not directly affected by disaster. Forced migration from disasters leaves people in jurisdictions potentially unable or unwilling to provide services to meet their needs (McMichael, 2016; Tulloch et al., 2016). In 2011, famine in multiple countries in the Horn of Africa impacted an estimated 10 million people and led to massive population displacement (Bayntun et al., 2012). Resulting challenges to manage health concerns of displaced peoples included: provision of water, sanitation, and shelter; deployment of trained staff to address widespread acute malnutrition; implementation surveillance for outbreaks; vaccine programmes for preventable diseases; funding; and interagency coordination (ibid.). Even in resource-rich settings, evacuation mechanisms can exacerbate health concerns. Following the 2011 triple disaster in Japan, a country that has invested extensively in disaster management, 400,000 people were evacuated in cold areas in shelters that had no heating, compounding several health risks, including the threat of respiratory tract infections such as pneumonia, Legionnaires’ disease and influenza (Matsumoto and Inoue, 2011; Takahashi et al., 2012).

Following disasters, and in fragile (i.e. conflict-affected) settings, breakdowns in fiscal spending and infrastructure, and more specific failures in surveillance and basic sanitation, leave populations susceptible to health emergencies from outbreaks of water-borne diseases, such as cholera (a ‘barometer of public health’), as well as dysentery, cholera, typhoid, schistosomiasis and intestinal worms (Sparrow et al., 2016; Bangert et al., 2017; Chen et al., 2017). More specifically, direct impacts from hazards on hospitals and healthcare settings can have severe consequences on the most vulnerable and the ability of affected persons to access care (WHO, 2015a). In Syria, cholera outbreaks in 2009 in the governorates of Deir Ezzor and Raqqa were mishandled due to conflict scenarios. Over 1,000 people are believed to have been infected, leading to a number of deaths in vulnerable populations (Sparrow et al., 2016). As of July 2017, persistent conflict in Yemen has led to 330,000 cases of cholera since 2015, with 14.5 million people left without access to clean water and sanitation (*Lancet*, 2017). A large vaccination programme was planned for mid-June 2017, but scrapped due to security issues, challenges in distribution and administration, and the scale of the epidemic at that point (*Lancet Gastroenterology and Hepatology*, 2017).

Box 3: Case study – Salinisation of drinking water and chronic disease, adaptive interventions for the impact of sea-level rise in the Mekong Delta, Vietnam and coastal Bangladesh

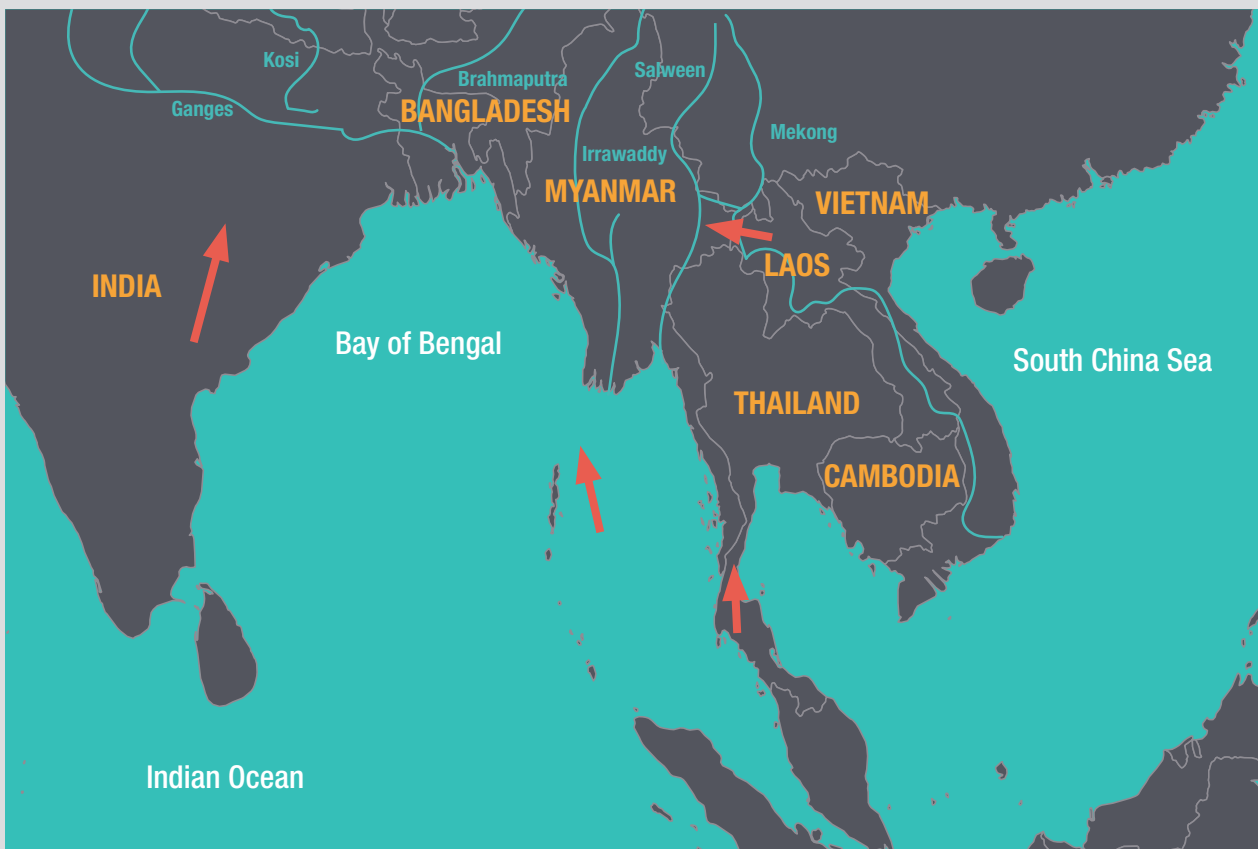
Water resources in the 11 Asian mega-deltas, such as the Ganges-Brahmaputra Delta, the Mekong Delta and the Red River Delta, are vulnerable to saltwater intrusion, exacerbating the existing challenges associated with the availability and quality of freshwater resources (Nicholls et al., 2007). A further decline in the quality and quantity of freshwater due to salinisation will have a serious impact on the health and livelihoods of the large populations living in these areas.

Research indicates chronic health risks in coastal populations due to high salt consumption and elevated blood pressure, beginning at early age (Talukder et al., 2017). A study of young adults (aged 19–25) in coastal Bangladesh found that the average salinity level of both surface and groundwater sources during the dry season in the study area was 819mg/L. More than 50% of people in these areas consumed levels of salt above the WHO recommended daily limit (< 2 grams of sodium, equivalent to < 5 grams of salt) (Talukder et al., 2016). Their consumption was strongly associated with the drinking water source (ibid.). Evidence

demonstrated that elevated salinity in drinking water, above the Bangladesh standard (i.e. above 600mg/L), led to an elevated blood pressure in study participants (ibid.). Elevated blood pressure has been linked to chronic health conditions such as hypertension and cardiovascular and kidney disease. Early onset of elevated blood pressure in this age group implies significant challenges for public health systems now and in the future. Limited research in the Mekong Delta region also demonstrated an increased risk of hospital admission for hypertension in the salinity-exposed areas (Talukder et al., 2017). Additionally, other research in similar settings indicates that high saline water is also associated with hypertension in pregnant women (Khan et al., 2014).

This research clearly demonstrates the need for cross-sectoral (health, water, agriculture) policy action across all levels of government in order to reduce the future health burden on communities and to protect the environment and the resources that these large populations depend upon, and to develop and promote alternative water supply strategies.

Figure 3: Asian Deltas identified as highly vulnerable to saltwater intrusion



Research by Mohammad Radwanur Rahman Talukder, Griffith University, Australia.

Crises and displacements also impact mental wellbeing. Within conflict-affected populations, increased prevalence of depression and post-traumatic stress disorder adds to the ongoing needs of those with pre-existing mental health issues (e.g. schizophrenia), and of those with pre-existing alcohol and drug-use disorders (Lo et al., 2017). Psychological distress can arise due to family separation, lack of safety, loss of livelihood and the loss of the social fabric of everyday life (WHO, 2013). Emergency response measures can further aggravate issues due to overcrowding in evacuation centres, lack of privacy in camps, or even abuse from peacekeepers (WHO, 2017f).

In states with sustained political and economic instability, health service providers can fail to provide sufficient access to care, due to financial and other failures, causing increased morbidity and mortality rates (PAHO, 2016). Insufficiencies originate from breakdowns in services, surveillance and supply-chain management, as well as workforce migration (UNDP, 2011; PAHO, 2016). Broader provider failures, coupled with overwhelmed capacities, have been correlated with impacts on maternal health during the 2014 Ebola outbreak, where strains on services combatting the disease were compounded by its being almost universally fatal in pregnant women and new-born babies (Kruk et al., 2016). During the first year, rates of maternal mortality doubled in Guinea and Liberia to projections of more than 1,000 per 100,000 livebirths, and to over 2,000 in Sierra Leone – the same as during the country’s civil war 15 years before (Hayden, 2015). These increases were caused by a failure in utility of key services including antenatal and postnatal care, skilled birth attendance, and emergency obstetric care (required by c.15% of women, due to complications) (Jones et al., 2016).

Through direct or indirect pathways, impacts can last and continue to arise for weeks, months and years following shocks and stresses. However, the consequences for health vary across societies, depending on contextual factors that define the vulnerability of societies to disasters. For example, low-lying coastal regions of the world are home to more than a billion people (Bollmann et al., 2010). Many of these regions experience loss and damage to infrastructure and livelihoods associated with flooding, storm surges, saltwater intrusion into fresh water aquifers, and loss of biodiversity as a consequence of climate change and sea-level rise (Lwasa, 2015). This can impact negatively not only on people’s health and wellbeing, but also on the economic development of their communities (see Box 3 and Figure 3). Such impact dynamics, within and across societies, illustrate the need for health systems to be resilient to disasters and evolving risks, such as climate change (WHO, 2015b; PAHO, 2016).

3.2. Risks to health – who is impacted, and why?

Impacts from shocks and stresses vary within and across societies, due to marginalisation and inequity beyond health systems. Individuals and communities who are socially, economically and politically marginalised are more likely to be exposed and vulnerable to the impacts of shocks and stresses because healthcare might not be available where they live, they might not have access to requisite services (due to transportation or cost issues) and overall, they might not have the capacities to deal with the impacts of disasters, particularly in the absence of social support from the state, such as UHC. This ultimately undermines people’s resilience and further exacerbates their vulnerability to future disaster risks.

The impacts of disasters often reveal and exacerbate the dysfunction of societies’ core systems, in the form of health system failures and the wider determinants of health (see figure 4). These disproportionately expose and make people vulnerable to risks. Such inequities are driven by interconnected socioeconomic, geographic, demographic and political factors which constrain the most marginalised members of societies in their access to and use of healthcare.

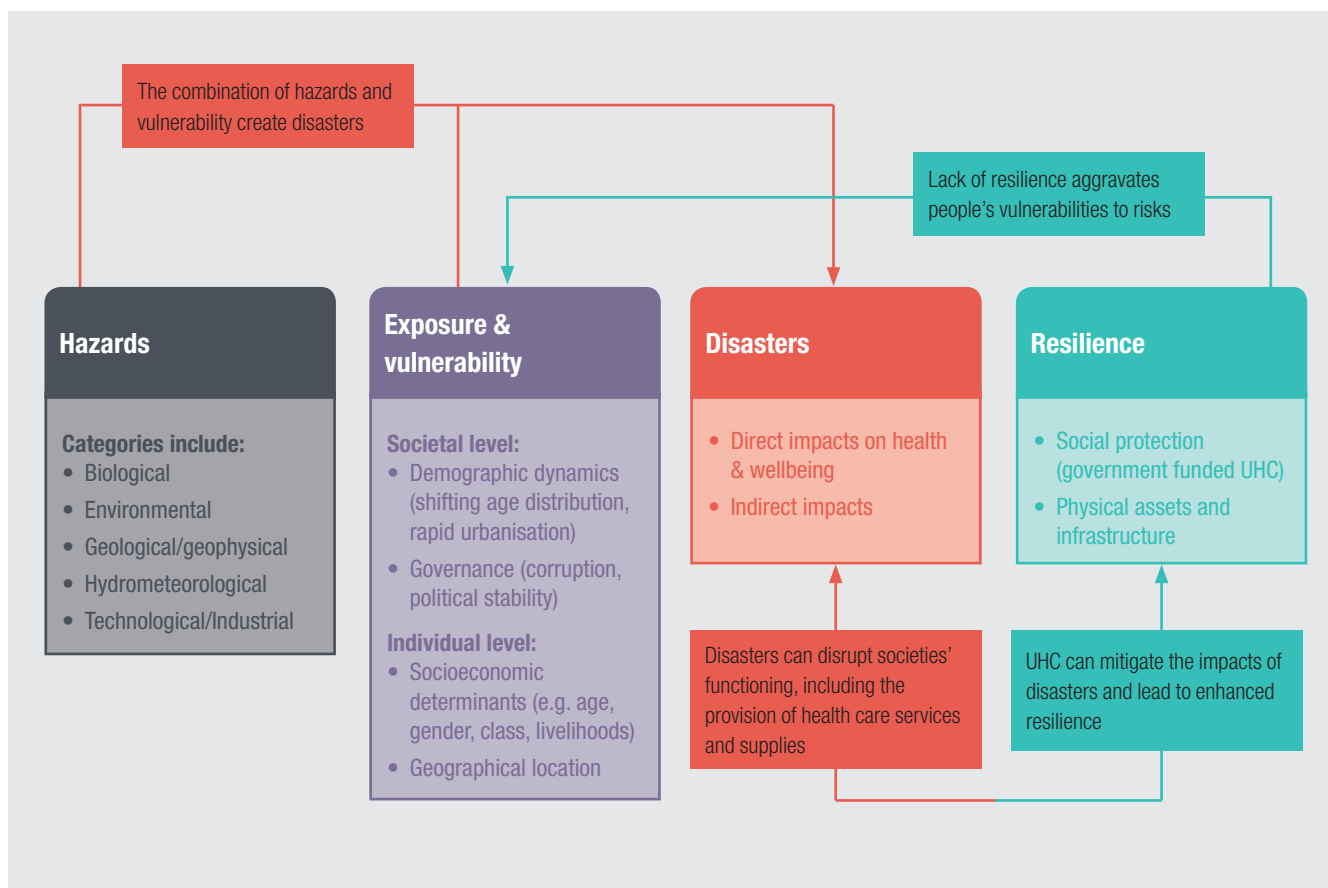
The following analysis draws on a combination of frameworks that have conceptualised health inequality (Diderichsen et al., 2001) and the social determinants of health (Solar and Irwin, 2010). It also builds on the DRR literature (e.g. Wisner et al., 2012; Ebi et al., 2016) to examine how hazards, combined with exposure and vulnerability, generate disasters with negative outcomes for health, wellbeing and resilience.

3.2.1. Socioeconomic determinants

A strong body of evidence exists on health inequities and social determinants of health and overall wellbeing, revealing significant disparity in outcomes between and within countries (PAHO, 2017). In India, Dhanaraj (2014) found that those living in rural and poor areas were the worst affected by health shocks (i.e. individual ill health creates a welfare loss for a household), and also are more likely to use costly strategies, such as indebtedness or sale of assets, to cope with health expenditures. National-level studies across several LMICs, including Bangladesh, Kenya and Nigeria, have found that underfunded health systems lead to significant barriers and disproportionate burdens upon the poor that can lead to financial impoverishment and a cycle of lifetime health insecurity (Islam et al., 2017).

The private sector can substitute the provision of healthcare, but at the potential cost of inequitable outcomes and excess financial burden (Basu et al., 2012). This may even occur in emergency scenarios where the public scope of services is narrow. Gizelis et al. (2017) found, when studying maternal healthcare access in Monrovia, Liberia, during the 2014–2016 Ebola outbreak, that a ‘substitution effect’ occurred as mothers moved to private facilities following the closure of public ones.

Figure 4: Pathway of inequitable impact on health



Overall, disasters already disproportionately affect the poorest in real terms of assets, income and expenditure (Hallegatte et al., 2016a), so impacts on health further compound these effects on individuals and disrupt efforts for UHC at the societal level.

Collated analysis of findings on extreme weather events by Schmitt et al. (2016) reveals that overarching differences impact on health and wellbeing by income, age and gender, with older people, single mothers, patients with chronic conditions and impoverished communities experiencing disproportionate burdens.

In an overarching examination of climate change impacts on poverty, Hallegatte et al. (2016a) note that research findings show correlation between higher health impacts and marginalised member societies, with poorer persons suffering higher incidence of disease following heat waves and floods. Across a sample of 52 countries, the study also found that 85% of the total sample population lived in countries where the poor were more adversely affected by droughts (ibid.). Examining this link with greater granularity, due to available data in the United States, Zahran et al. (2013) found that mortality risk from tornadoes reduces by 6% to 8% for every increase in income of \$1,000/per capita at the county level. Access to early warning systems is also critical to mitigate the direct health impacts of shocks and stresses. However, wealth and gender gaps mean that marginalised communities

remain disproportionately underserved by such systems (Lumbroso et al., 2017; WHO, 2017b).

The health and wellbeing of pregnant women and children is affected disproportionately by disasters (Kruk et al., 2016). Following a 7.0 Mw earthquake in 2010 in Haiti, Harville and Do (2016) found that the earthquake experience was associated with worse reproductive and birth outcomes. In regions affected by conflict, maternal mortality rates have been recorded across several countries as almost 50% higher than in comparable countries without recent conflict (Kruk et al., 2016). Investigations into the impacts of earthquakes also note increased incidence of gender-based violence and domestic abuse, while overall morbidity and limited health access appears to be disproportionately burdensome for women over men (UNDP, 2011; True, 2016).

The existing stress and disease burden is also exacerbated where chronic diseases are prevalent, such as following Hurricane Katrina in 2005, where existing health disparities generated lifetime health impacts. Due to individuals' disrupted care, the estimated lifetime cost for diabetes-related complications alone was estimated to be \$500 million (Fonseca et al., 2009). In the same event, single mothers had x3.5 incidence of mental health impacts compared to the total population, as well as x5 more absence from work following the disaster (Zahran et al., 2011). Non-functioning health systems

that disproportionately affect vulnerable populations in disasters can also be associated with poor governance measures, as shown in cases where vulnerability to extreme events is exacerbated by inadequate government priorities (Schmitt et al., 2016; Wilkinson et al., 2016).

Hence, political barriers can also undermine efforts for health and reinforce risk exposure and vulnerability. These include corruption activities that erode the efficiency of government initiatives, including health systems strengthening and infrastructural development critical for UHC. Examining the impact of the Heavily Indebted Poor Countries Initiative on the MDGs for health – a sovereign debt relief scheme aligned with governments engaging in favourable development policies – Ondoa (2017) found that three corruption channels were associated with adverse mortality rate effects: decreased supply of services, reduced human capital investment and reductions in government revenues (i.e. taxes). As a result, the poor services provided would lead to decreased usage and further cyclical augmentation of vulnerability. Centralised financing of health services, supported by a national contribution or universal insurance scheme, also require appropriate oversight to mitigate the possibility of corruption (Pisani et al., 2017).

3.2.2. Geographic exposure and demographic drivers

Climate change drives existing and specific risks, and compounds the geographical nature of differential exposure and vulnerability to disasters. Though average global temperatures are projected to rise by 2°C to 4°C globally by 2100, this will vary greatly across the globe, as will the increase of disease burden due to warmer temperatures and the incidence of extreme temperatures that degrade environments and can lead to disasters. At one extreme, temperatures may rise by as much as 11°C in parts of the Arctic due to the phenomena of ‘polar amplification’ (Watts et al., 2015). In Asia, while the average temperatures are expected to shift over 4°C, mean summer temperatures could rise by more than 6°C and in some higher latitude areas by 8°C (ADB, 2017b). This lack of straightforward changes in exposure increases the difficulty of predicting and preparing for expected tipping points past which established environments, populations and health infrastructures can reasonably cope with temperature rise (Watts et al., 2015).

Nevertheless, shocks and stresses already manifest with significant variety by geography between and within countries, resulting in different distributions and weightings of health impacts. Countries and sub-national regions clustered around the Pacific Rim, for example, are disproportionately exposed to geological hazards, with 81% of the world’s largest recorded earthquakes taking place in the region (Doocy et al., 2013b). Arid and semi-arid regions are particularly at risk of climate change and associated higher temperatures, which will shorten the crop cycle and reduce crop yields (Collins et al., 2013). Meanwhile, more than 90% of dryland inhabitants are found in developing countries including

sub-Saharan Africa, Southern Africa and Central Asia, and are characterised by the highest population growth rates, the lowest levels of human wellbeing, the lowest per capita income and the highest infant mortality rates (Anderson et al., 2009).

Inhabitants of atolls and small island developing states (SIDS), such as those in the Caribbean and Pacific Communities, are highly exposed to hazards of hydro-meteorological origin (World Bank and OECD, 2016). Under predicted climate change scenarios, populations inhabiting areas close to sea level, such as coastal areas, will be subject to rising sea levels and more damaging storm surges with potentially severe implications for health and wellbeing beyond direct impacts, including mental health impacts due to forced migration (ibid.).

Changes in the incidence of malaria, a vector-borne disease, exemplify where previously ‘safe’ systems face duress. Rising average temperatures are expected to extend transmission season length and the geographic area of impact (Caminade et al., 2014). Previously safe high-altitude zones which offered natural protection from malaria have already been associated with increased incidence during warmer than average years. Rising temperatures encroaching further on the densely populated highland regions of Africa and South America are likely to put previously safe populations at risk (Siraj et al., 2014). Nonetheless, human activities, including migration and alterations to the natural environment, may far outweigh the influence of climate change in augmenting vector-borne disease risks (Onyango et al., 2016).

Demographic shifts towards more condensed and older societies raise further concerns about managing necessary evacuation once shocks and stresses take place (Liang et al., 2017). Chronic diseases in emergencies also require active management, as noted in Box 4 – Chronic disease and emergencies. The continued global trend of rural to urban migration is expected to create ever denser metropolitan settings, where environmental conditions (i.e. poor water and air quality), hydro-meteorological hazards (i.e. storm surges) and biological hazards (i.e. neglected tropical diseases) pose significant health risks (Watts et al., 2015; Bangert et al., 2017). High concentrations of particulate matter were responsible for an estimated 428,000 premature deaths in 41 European countries in 2014 (European Environment Agency, 2017). Over half the world’s population resides in urban areas – 54% is the estimate of the *World Cities Report 2016* (UN-Habitat, 2016). Despite the progress made in improving urban housing, approximately 881 million people in developing countries live in informal settlements – areas defined as lacking one or more of: access to clean water, access to improved sanitation, living area that is not overcrowded, durable housing and secure tenure (ibid.). Households in these scenarios are then exposed to higher risks of flooding, storm damage and a broader range of underlying public health risks, such as water-borne and vector-borne disease outbreaks (UNDP, 2011; Bangert et al., 2017).

Elements of exposure and vulnerability, such as geographic and economic concerns, can combine to add

further elements of risk to health. Where risk of shocks and stresses taking place is relatively high (e.g. flood plains), land prices are comparatively lower, opening inhabitants up to greater potential impacts on health from disasters if appropriate adaptation measures are not made (Smith et al., 2014). The examination by Rumbach and Shirgaokar (2017) of predictors of household exposure to monsoon rain hazards in Kolkata, India, found, within informal settings, an uneven spread of extensive risk correlated with lowest-income households, lack of infrastructure and insecurity of tenure. There are concerns over care in maternal health, subject to substantial efforts in rural settings, but increasingly prevalent in urban settings (i.e. service gaps and security concerns), which are further required to deal with the stresses caused by extreme weather events exacerbated by climate change (ibid.). Programmes charged with capturing information on

health and available services for those living in informal settlements, such as the Nairobi Urban Health and Demographic Surveillance System, will need adaptive capacity to deal with existing and future shocks and stresses (ibid.).

Overall, analogous to indirect impacts from contemporary shocks and stresses, existing difficulties in dealing with hazards will be put under further strain, and systems which can currently cope with hazard impacts will be subjected to previously unexperienced levels of stress – all undermining the feasibility of UHC.

Existing inequitable health burdens are expected beyond borders, particularly for populations in LMICs (WHO, 2015b). Within all countries, socioeconomic dimensions affect the distribution of excess health risk. The most severe impacts fall upon already vulnerable groups, including the poor, children, the elderly and those with pre-existing medical conditions (ibid.). This comes down not only to access to care and underlying health status, but also to the determinants of health – such as sources of nutrition. Crop failures and spikes in food prices which follow extreme events will impact the livelihoods and cascade upon the health of those producing food, as well as those hoping to consume it (Hallegatte et al., 2016a). In areas hit severely by augmented hazard impacts, macroeconomic contractions will constrain the budgets to fund health and other systems to manage increased hazard exposure and vulnerability and sustain UHC (Watts et al., 2015). Changes in exposure to climate change will exacerbate vulnerabilities already associated with factors such as age, giving rise to increased respiratory admission (Schmitt et al., 2016). The effects of this will also further exacerbate inequalities which exist between income groups, if not appropriately addressed by policy and planning within and beyond the health sector (ibid.)

Box 4: Chronic diseases and emergencies

Epidemiological shifts in populations across the global south have severe implications for the resilience of populations to stresses and shocks. Mortality and morbidity due to NCDs is increasingly outpacing the impact of infectious diseases (Jaspers et al., 2015). There are various reasons for this, including population ageing, increased obesity, decreased physical activity, environmental changes and a reduction in communicable diseases (Ryan et al., 2016). The rise of NCDs led former UN Secretary General Ban Ki-Moon to speak of a public health emergency, in line with increased concern in recent years over NCD risks to health (Demaio et al., 2013). The increased incidence of such diseases is both a result of, and a threat to, prosperity and must be proactively treated as such.

Just as the aftermath of shocks and stresses increase the risks of the spread of biological hazards, shocks and stresses on population health will also exacerbate the burden of NCDs and will do so inequitably (Gnanapragasam et al., 2016; Slama et al., 2017). In 2016, WHO published guidance, as part of the UN Interagency Task Force initiative, on the state of NCDs in emergencies (UN Interagency Task Force on NCDs and WHO, 2016). This brief, along with research mapping efforts on the issue, acknowledge that current efforts are below the requisite level for addressing the concerns around NCDs in the context of disasters and emergencies, particularly in LMICs (ibid.; Blanchet et al., 2017). This lack of information on experiences in resource-constrained settings, combined with evidence on complications following shocks and stresses in high-income countries, and the rising expected burden from NCDs in coming years, require pointed address (Ryan et al., 2016).

3.3. Economic consequences from health impacts

At a macroeconomic level, health impacts attributed to current and future shocks and stresses pose a significant threat to sustainable and equitable development (Hallegatte et al., 2016b). To manage and contain the after-effects of disasters and emergencies, governments redistribute fiscal expenditures and manage contractionary effects in economic outputs. However if not done effectively, this creates further societal instability, due to exacerbated exposure and vulnerability, particularly for health and wellbeing spending (Sands and Chawla, 2017).

Cascading effects on regional economies were a prominent indirect impact of the 2014–2016 Ebola outbreak in West Africa, resulting in associated economic losses of \$600 million for Guinea, \$300 million for Liberia and \$1.9 billion for Sierra Leone (World Bank, 2016). Such impacts, from all types of disasters, limit the funds available to sustain UHC, leading to cascading effects from decreased access to services and increased potential financial burden for individuals and governments.

Box 5: Case study – Climate change and health impacts in the Mekong Delta region

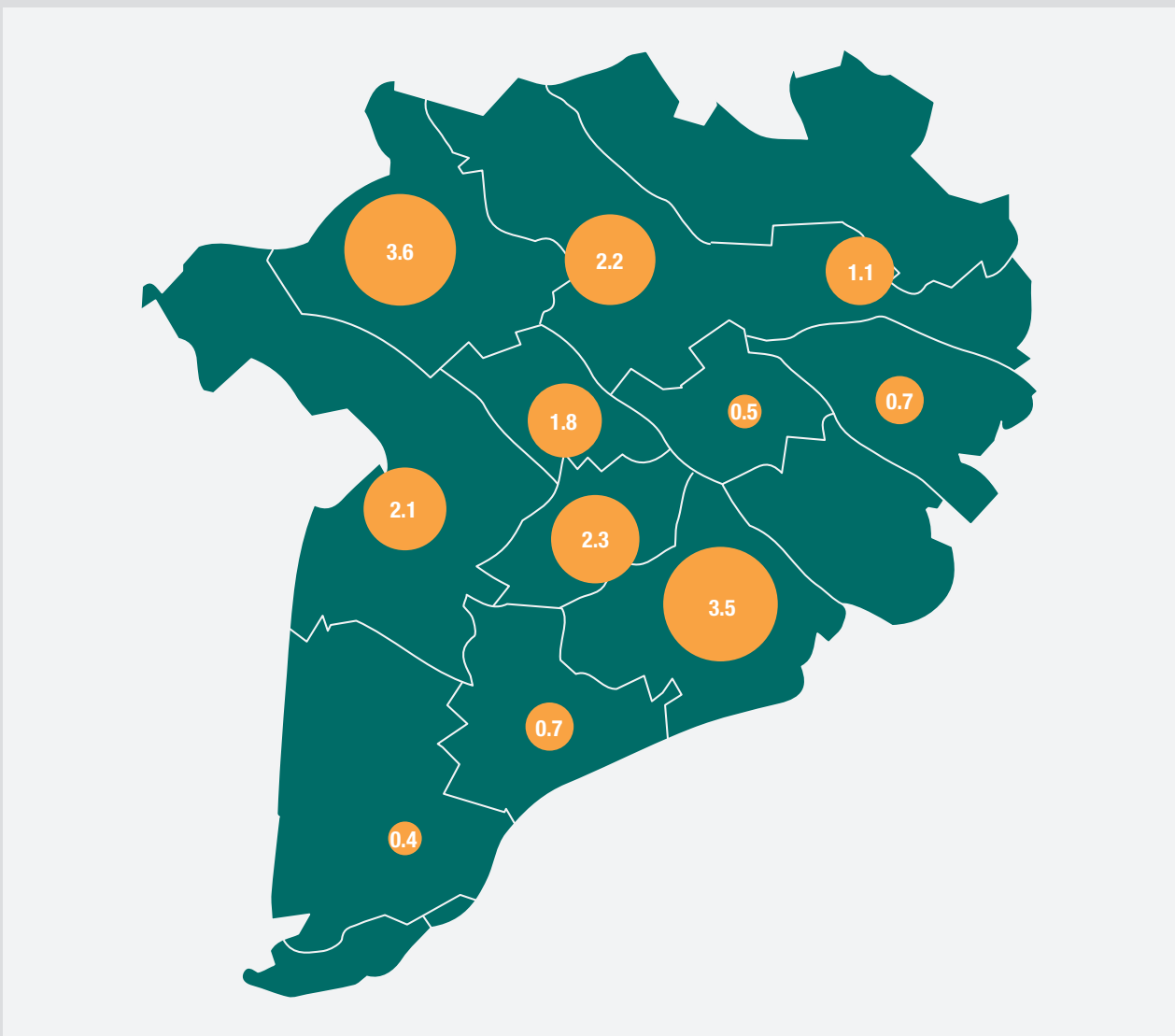
The Mekong Delta region is among the most vulnerable areas in South-East Asia to shocks and stresses augmented by climate change. However, local adaptation capacity is limited by geographic and social factors, such as ground surface deformation, environmental pollution, rapid urbanisation, unsustainable development, low socioeconomic status and limited resources (Phung et al., 2016).

The Griffith University Centre for Environment and Population Health carried out research into the association between ambient temperature, risk of hospitalisation and modifying socioeconomic factors, using hospital records of 13 provincial/city hospitals between January 2002 and December 2014. The study found that extreme weather events are significantly correlated with health in the region. A 1°C average rise in temperature increased hospital admissions by 1.3% for all causes, 2.2% for infectious diseases and 1.1%

for respiratory diseases. Incidence rose in line with density of poverty and rates of household illiteracy, and fell with greater household income and safe water hygienic toilet use (ibid.). After river water reached ‘extreme levels’ for a 15-day period afterwards, cumulative risk of disease increased by 24% for all causes and 18% for communicable diseases (Phung et al., 2014). Sea-level rise is associated with a 9% increase in risk of hypertensive diseases among individuals living in exposed locations (Talukder et al., 2017). The geographic differences in impact across this region highlight the need to minimise exposure and vulnerability in a proactive and targeted fashion through adaptation for health, community education, early warning systems and establishing temperature shelters in residential hot spots.

Research by Tri Dung Phung, Griffith University, Australia

Figure 5: Increased percentage of hospitalisations associated with 1°C increase in temperature – Mekong Delta region, Vietnam



At an individual level, financial consequences from ill health are potentially catastrophic. While implications for impact on human capital are significant (i.e. lost days of work), the available literature on this topic in the context of disasters is currently sparse, particularly with respect to studies which have been carried out in low- and middle-income countries (Schmitt et al., 2016). Financial shocks due to impacts on health and wellbeing leave households with two options: ex-ante ‘risk management’ (building resilience to impacts) and ex-post ‘risk-coping’ (dealing with shocks after they occur). Ex-post health expenditure can be funded through constricting financial outlays or expanding sources of finance (i.e. loans, sale of assets, increased household labour) (ibid.; Bangert et al., 2017).

While observational studies are limited on the incurrance of health costs during disasters and emergencies, evidence is even scarcer on how to manage them (Schmitt et al., 2016; De Alwis and Noy, 2017). Though financing sources to mitigate some or all public or healthcare costs appear following disaster scenarios, through special government programmes or non-governmental organisations (NGOs), they may not cover all expenses incurred and will not last forever (Espallardo et al., 2015). The resulting financial stresses upon households

can be substantial, and have serious implications for long-run health and wellbeing, both for individuals and for communities. Box 6 – Health expenses outlines the different types of health expenditure which households may face. These impacts are pervasive, with particular incidence in LMICs (Meara et al., 2015). However, a lack of regular surveys of household health expenditures and modelling approaches hinders reporting of accurate and up to date data (Boerma et al., 2014).

General assessments of financial consequences from health shocks have found an inequitable incidence in the occurrence and effect of shocks. A 2017 assessment of health shocks in Bangladesh found significant disparity in the likelihood of occurrence, with the poorest quintile of households more often incurring catastrophic payment, impoverishment and distress financing than the richest quintile (Islam et al., 2017). A range of factors cause this differential, including the susceptibility of the poorest in society to hazards and underlying weaker health dynamics. The breadth of determinants is wider than wealth, however, with established associations between Catastrophic Health Expenditure (CHE) and age, gender, income, chronic disease presence, education, service access, usage and provider (Dhanaraj, 2014).

Box 6: Health expenses

Out-of-pocket (OOP) payments

Direct payments by individuals to healthcare providers at the time of service use, representing an estimated 32% of each country’s health expenditure (WHO, 2016d). This excludes prepayment mechanisms, such as taxes, contributions or insurance premiums, as well as any reimbursements of payment given to the individual. This includes consultation, treatment and medicine expenses. It is a component of total health expenditure, but does not include indirect costs for use of services such as transportation, accommodation or food costs. For all of which it is difficult to acquire reliable statistics (WHO and World Bank, 2015).

Catastrophic health expenditure (CHE)

OOP payments for health services which exceed a defined proportion of total household expenditure for a given period. The idea being that a CHE can add a further significant burden due to health impacts through economic loss. Thresholds to calculate CHE vary widely, from as a low as 10% up to 40% (WHO and World Bank, 2015; Islam et al., 2017). The 2015 *Tracking Universal Health Coverage: First Global Monitoring Report* uses 25%, and examines the variance of calculations in its analyses, including the potential for different thresholds based on wealth and socioeconomic status (WHO and World Bank, 2015). An influential study by Xu et al. (2003) identified three determinants for ‘catastrophic’ household health

expenses: (1) available health services requiring payment, (2) households’ low ability to pay, and (3) inadequate or absent health insurance.

Financial distress

Caused by funding OOP through undesirable or burdensome sources. For instance, the sale of household assets or borrowing money from relatives or a financial institution (bank or other) (Islam et al., 2017). It can also extend to the promotion of child labour within households to expand potential sources of income (Dhanaraj, 2014), or even early child marriage to benefit from the dowry or bride price (Mostafa Kamal et al., 2015). Given the potential for shocks and stresses to damage and destroy assets (Hallegatte et al., 2016a), those most vulnerable to climate change are likely to face increased risk of financial distress.

Impoverishing health expenditure

Payments which push households, or compound their status, below a defined poverty line (WHO and World Bank, 2015). Unlike a general assessment of CHE, this offers scope for more specific impacts on the most vulnerable in society. If impoverishing health expenditure is effectively monitored and addressed, insights can present pathways to prevent poverty and better manage the poverty-line turbulence experienced by some households.

CHEs do not need to be large one-off payments. Chronic disease payments can lead to repeated occurrences of distressing out-of-pocket (OOP) expenditure. A 2006 study in Burkina Faso found that households with higher illness episodes, and family members suffering chronic disease, faced a higher probability of impoverishing health expenditures (Su et al., 2016). Such expenses result from a lack of accessible cheap medication, as well as the absence of measures to receive government assistance (Jaspers et al., 2015). For households already under financial strain, this creates unfavourable trade-offs, which can lead to further distress or coping strategies that undermine resilience and raise the possibility and magnitude of future shocks to health (Wirtz et al., 2017). These coping strategies can include using decision heuristics (i.e. default choices) for shocks to minimise the mental burden, in turn potentially leading to unwise decisions at individual and household level that could cause further distress in time (Kruk et al., 2016).

Directly and indirectly, disasters and drivers of risk seriously threaten achievement of SDG 3, ensuring healthy lives and promotion of wellbeing for all at all ages. Explicitly engaging with how disasters and climate change impact health and wellbeing differently, within and across societies, is critical to fostering equitable outcomes in line with the Sustainable Development Agenda. This will

require better coordination of efforts across sectors than currently, as noted at the 22nd Conference of the Parties under the United Nations Framework Convention on Climate Change:

We, the Ministers and high-level representatives, note that there is currently no global high-level alliance which addresses the comprehensive set of linkages between health, environment and climate change. UNFCCC COP22 (2016)

This review of current and future risks associated with disasters and longer-term environmental changes, and their cascading consequences on the wellbeing of people and the economic development of their communities, highlights the need for horizontal collaboration and interventions. This requires supportive governance and financing mechanisms, as well as adequate delivery of health services that take into consideration the additional threats posed by increased risks. This also means addressing the determinants of health, and targeting efforts to support the most vulnerable. However, improving resilience for health and moving towards UHC will require domestic stakeholders and institutions to act according to the needs of their populations and the potential hazard risks that they face.

Box 7: Case study – Examining transitional-stage recovery processes in the Philippines

A longitudinal study of the experience of 155 households was carried out in Leyte in the Philippines to examine the longer-term impacts of the 2013 Super Typhoon Haiyan (known locally as Yolanda). By October 2016 many affected people remained in temporary housing conditions, and 34% had still not completed the permanent rebuild of their homes following their destruction in 2013. In Tacloban, the worst affected city in terms of physical damage, 21% of respondents resided in a ‘no build zone’ (a 40-metre boundary along the coastline) before the disaster and were still living there in 2016, having rebuilt in the same location. Housing in those zones typically resembled those shown below, with exceptionally poor urban hygiene and sanitation provisions, frequently built over the ocean water and critically vulnerable to repeated hazards. These residents received little recognition and no post-disaster assistance from the government, which declared these areas as illegal building zones.

People who reported injuries were not all receiving medical care, appropriate medications or support for disabilities that caused chronic pain and prevented the

continuation of gainful work or employment. Some healthcare services were provided by NGOs for short periods following the super typhoon, while post-disaster assistance was centred around relief goods, housing materials and cash grants.

The difficulties of households in dealing with the after-effects of health-related financial expenditures was also revealed. 75% reported not receiving any family support via loans, grants or remittances, 87% did not have any savings, 85% had no form of bank account, and 49% had to partially pay for the rebuilding of their homes, with help from government and/or NGOs. Longer-term financial burdens were also apparent through constraints and external financing measures: 16% of respondents had taken out a loan for post-typhoon repairs, 15% took one to two months off work following Yolanda (often men who were frequently a household’s sole or primary income source) and 15% remained unemployed following Yolanda. Risk transfer and financial protection mechanisms, such as insurance, were possessed by respondents (18% either had insurance with a current loan, or had had it with credit in the past), were most frequently in

Box 7: Case study – Examining transitional-stage recovery processes in the Philippines (continued)

the form of obligatory credit life/accident and injury policies attached to small loans. 28% knew nothing about insurance as a financial protection/risk transfer mechanism, and 29% knew something about insurance as a financial protection/risk transfer mechanism, but did not have it.

Research by Rebekah Yore, University College London, United Kingdom. Case study – Examining transitional-stage recovery processes in the Philippines



Clockwise from top: low-income housing rebuilt over the ocean in post-Yolanda Tacloban (2016); toilet facility through which human waste falls into the ocean, Tacloban (2016); a Tacloban home, three years after Yolanda (2016). Image credit: Rebekah Yore.



Key messages

Direct and indirect impacts to health and wellbeing:

- Disasters create a vast global burden of morbidity and mortality each year that is difficult to quantify, and can occur through a variety of direct and indirect pathways. Extreme weather events alone lead to an annual average of over 200 million people losing their home or needing emergency assistance due to health related and other impacts.
- Mortality and morbidity directly attributable to disasters include immediate injury and trauma and the contraction of epidemic disease during a public health emergency.
- Indirect impacts can arise months and years after a disaster due to new risks created and disruption to the health systems and infrastructure that had previously managed health and wellbeing concerns.

Differential risks to health and wellbeing:

- Socioeconomic determinants of health and wellbeing create inequities among populations, which are exacerbated and further exposed by disasters. Impacts differ significantly across income, age and gender groups, with older persons, pregnant women, the chronically ill and impoverished communities among those at disproportionate risk.
- Shifts in geographic and demographic drivers of risk will alter how population health and wellbeing can be impacted by disasters and emergencies. These include changes in weather extremes, climate conditions, age dynamics and patterns of urbanisation.

Economic consequences associated with impacts on health and wellbeing:

- Financial and economic shocks caused by disasters and risk drivers, such as climate change, contract funding resources for improving health systems and moving towards UHC.
- Without adequate financial protection mechanisms following disasters, impacts to health and wellbeing can lead to potentially impoverishing health expenditures in the short and long run. These shocks disproportionately impact the poorest and most vulnerable in societies, requiring redress through sustained access to medicines and financial support after initial response measures have lapsed.
- Mitigating losses of livelihoods (i.e. sources of income) lowers the potential adverse financial consequences of impacts to health and wellbeing at household and community level.

4. Address disruption to strengthen health systems and move towards universal health coverage

Key questions

- How can governance ensure effective implementation programmes and policies for UHC?
- How can financing for UHC be adaptive and responsive to risks?
- What should implementation measures for UHC take into account to be resilient and responsive?

Moving towards UHC can contribute to achieving SDG 3 and to improved health and wellbeing for all – providing that it manages the threats from disasters of all types and acknowledges drivers of risk, such as climate change. Ultimately a universally accepted framework for implementing UHC cannot exist. Each country and community is different, requiring context-specific pathways for planning and funding policies for health and wellbeing that can ensure sustainability and equity (UHC2030, 2017). Under SDG 3.8, the measurement of the achievement of UHC involves two indicators – essential service access and relative health expenditures – the former of which is informed by 16 component tracer interventions (see Figure 2 – Universal health coverage in the SDGs). These indicators offer a snapshot of UHC, but have limited scope for identifying comprehensive pathways to achieve it.

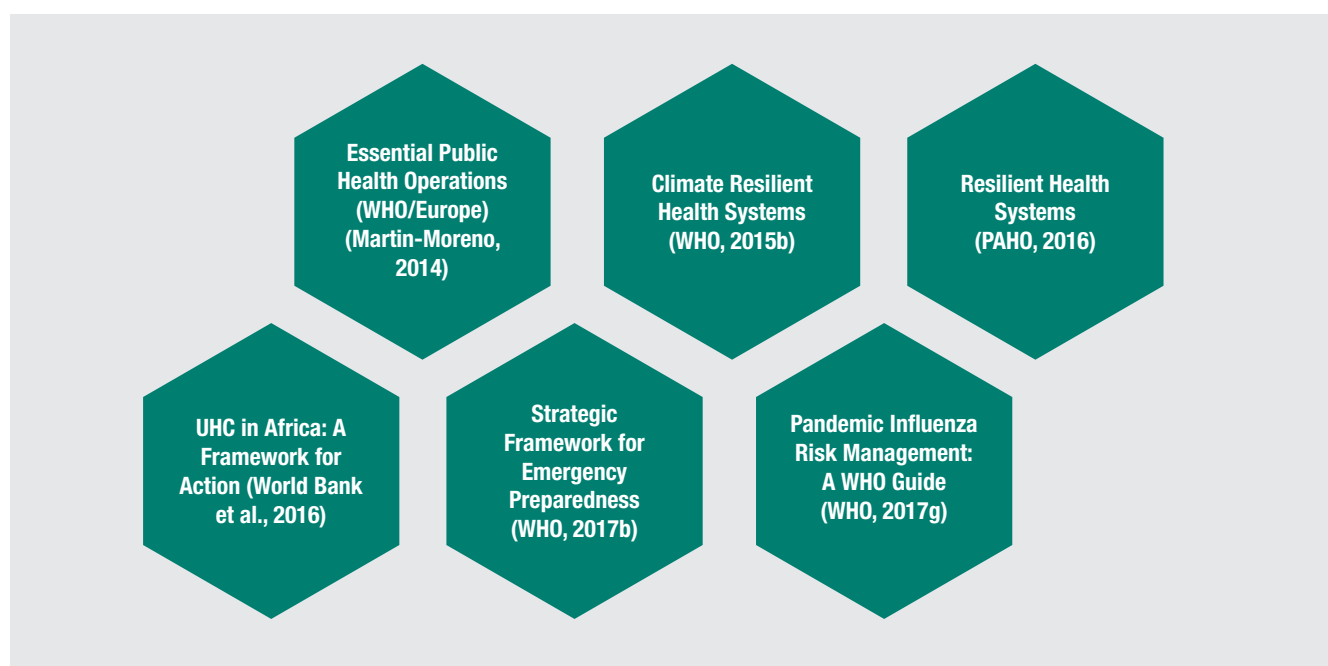
Pragmatic measures for resource-constrained countries are lacking, and adaptive approaches are required. Among the challenges faced by governments implementing UHC are the lack of policy coordination for disease-oriented funding, absence or neglect of long-term sustainable investments in health systems, rigidities in workforce development and implementation, and vested interests being present in the management of health services (Kieny

et al., 2017). A WHO and World Bank (2015) report, *Tracking Universal Health Coverage*, advocates the role of pathways to UHC as a foundation for health systems that can deal with disasters. However, the report does not cover the requisite mechanisms to implement this, nor the interactions between shocks and impacts on the health status of individuals and communities.

The frameworks and outlines of activities depicted in Figure 6 offer elements of what is necessary to achieve resilience alongside UHC, but lack a synthesis of the necessary actions to explicitly achieve both goals. Efforts towards health systems strengthening, including key components such as health emergency risk management, can adapt to address the issues at hand – but are narrow compared to the broad intersectoral context necessary for implementing UHC.

As a result, this analysis examines how the implementation of UHC can be informed by the dynamics of health impacts from disaster and climate change in order to anticipate risks and better strengthen health and wellbeing. The following section explores the pathways to strengthen the resilience of health systems to achieve UHC in three successive key areas: governance, financing and the delivery of health services.

Figure 6: Frameworks to support resilience while moving towards universal health coverage



4.1. Governing resilient pathways to universal health coverage

4.1.1. International governance and global health security

IHR require core capacity development and, while legally binding in theory (WHO, 2008), in reality, many countries have failed to meet the requisite international standards (Lucey and Gostin, 2016). The JEE process is effective at assessing national preparedness in line with IHR, but plans tend to be left on the shelf without necessary financing (Sands and Chawla, 2017). To address these issues, Gostin et al. (2015) recommended that the IHR should have a direct capacity-building fund to support necessary measures, though the likelihood of such a fund being adequately supplied and distributed is uncertain. However, there is a major risk that efforts for improving health become skewed towards dealing with pandemic threats rather than systemically tackling health concerns and wider determinants, i.e. addressing underlying vulnerabilities to health impacts and inequities of access to healthcare, which is the aim of UHC.

Following the 2014–2016 Ebola crisis in West Africa, international efforts by governments, multilateral organisations and financial donors have supported the alignment of global health security and health system strengthening (Ghebreyesus, 2017b; Ooms et al., 2017). Within the health sector there is also increasing impetus to integrate health emergency risk management into wider health system strengthening efforts (WHO, 2017b). Climate-sensitive approaches to population health and wellbeing are now at the centre of efforts by

intergovernmental bodies concerned with health and economic development, including the World Bank and Pan American Health Organization (PAHO) (Hallegatte et al., 2016a).

International financial instruments, technical measures or rapid response capacities cannot replace local improvements in the prevention, detection, containment and response to pandemic threats (Sands and Chawla, 2017). Resource-constrained LMICs, facing trade-offs among underdeveloped health systems and wider sectoral issues, may have skewed priorities away from a holistic approach to health and wellbeing as a result of global health security mechanisms which focus on avoiding communicable disease outbreaks (Gostin and Friedman, 2017; Ooms et al., 2017).

4.1.2. Domestic political economy

UHC is only feasible as a government-coordinated mechanism that distributes collectively raised funds to creative public goods for the health and wellbeing of citizens. This makes it an inherently political issue requiring political commitment and health reforms, not ‘just’ technical solutions (Harlem Brundtland, 2017; Ghebreyesus, 2017c). Li et al. (2016) offer insight into priority setting across 17 LMICs, highlighting the need for common vision between political stakeholders on public financing and provision of healthcare, as well as mechanisms to assess the economic efficiency of policies.

Governance for resilient pathways to UHC encompasses the management of activities of institutions that impact the health and wellbeing of civil society (WHO, 2014c). Equitable outcomes for health rely heavily on domestic capacity to guide policy and planning within and beyond

the health system (Chalkidou and Culyer, 2016). This requires engagement by intersectoral stakeholders and, if applicable, commitment from the head of state (Beattie et al., 2016). Key efforts to engage with domestic political economy and health information mechanisms can tie together the sources of decision-making for implementing UHC and the broader concerns which will support it, and the understanding of population health required to effectively implement policies for UHC. This could also prevent a process of ad hoc decision-making that undermines proactive efforts to reduce vulnerabilities and to strengthen health systems and foster resilience.

Impediments to policy implementation for health and resilience include: competing policy priorities, distorted incentives, widespread poverty, lack of data, weak institutions, lack of capital and weak governance. These constitute unmet needs for inter-institutional collaboration, finance and awareness-building (Watts et al., 2015).

4.1.3. Information systems to support universal health coverage

Effective information systems and health statistics can support governance as foundations for coherent service provision for health, identifying health concerns and assessing effective intervention methods. They offer the information critical to reporting on global measures of resilience in Global Targets A and B⁹ of the Sendai Framework, as well as a slew of health indicators in the SDGs (Lo and Horton, 2015; Bangert et al., 2017; Maini et al., 2017). For UHC specifically, efforts such as the UHC2030, the Health Data Collaborative and World Bank/WHO monitoring reports offer pointed insights to progress. Information allows policy-makers to focus on key issues and to clarify whether efforts are making a difference (WHO and World Bank, 2015; Health Data Collaborative, 2016; UHC2030, 2017). It will be critical to reporting on progress towards the SDGs and under the Sendai Framework, while also driving domestic capacity to publish findings on disasters and risks to health and wellbeing in accessible databases and academic journals. Capacity and access issues to scientific research can severely constrain the ability of actors in the global south to carry out context-specific research for health however (PAHO, 2017).

There are also other limitations – without effective disaggregation, data can obscure or even mislead decision-makers on risk factors and outcomes for health and wellbeing (Tu et al., 2008). Better information on impacts and interventions for risks from disasters and climate change is sorely needed, particularly for countries in the global south (Clarke et al., forthcoming). The foundations for this information, and health information systems for resilient pathways to UHC, include registration, monitoring and surveillance and health technology assessments.

Registration for health

Civil registration and vital statistics systems coordinate formal reporting of birth, death, cause of death, marriage and divorce. This information is closely tied to individuals' rights and their ability to access health services over their lifetime (Lo and Horton, 2015). Without administrative records for health, routes to individual access to UHC are severed. Even basic indicators, such as under-five mortality, require two separate statistical counts – complete registries of live births and child deaths by precise age, which is certainly not available everywhere (Serajuddin et al., 2017).

There are initiatives, including the International Commission on Information and Accountability for Women's and Children's Health, that support the improvement of these systems (Lo and Horton, 2015). Administrative health systems for patient records and household surveys (i.e. departmental and health surveys programmes) then build upon these by providing health ministries with the essential information for reporting on national outcomes (WHO and World Bank, 2015). Similarly, the Health Data Collaborative, a joint effort by multiple global health partners, work alongside countries to improve the availability, quality and use of data for local decision-making and tracking progress towards the health-related SDGs (Health Data Collaborative, 2016).

Implementing resilient UHC must act to strengthen monitoring processes to better understand the impacts of shocks and stresses. Increasing digitisation of healthcare systems in resource-constrained settings is a potential avenue for rapid increases in efficiency. For example, innovations in mobile health (mHealth) systems, built upon mobile and wireless technology, are an avenue for rapid collection of information about disasters (Kruk et al., 2016; Doocy et al., 2017). In contrast, the value in understanding the dynamics of events is lost if data collection and disaggregation do not take place (Clarke et al., forthcoming). Blanchet et al. (2017) highlight concerns for dealing with humanitarian emergencies – where a lack of evidence hinders effective decision-making, in particular for managing chronic disease burdens.

Monitoring and surveillance

Disease monitoring and surveillance relies on effective basic health information systems and due record of activities being carried out by health services. Yet ultimately, data coverage is limited, evidenced by gaps in the World Bank Millennium Data Catalogue and WHO Global Health Observatory (Clarke et al., forthcoming). Demographic and health surveys (DHS) address missing data but they remain a method based on using population sampling and have limitations (Corsi et al., 2012). Advanced modelling approaches can address these gaps (e.g. Global Burden of Disease Study), but limitations remain with such methods also (ADB, 2017b; Lim et al., 2017). Modelling cannot replace effective civil registration

9 Global Target A: Substantially reduce global disaster mortality by 2030; Global Target B: Substantially reduce the number of affected people globally by 2030 (UN General Assembly, 2016).

and information systems, making their implementation a core component of UHC and sustainable development (Lo and Horton, 2015).

Established tracking challenges for UHC include data reliability, data disaggregation and monitoring effective coverage (WHO and World Bank, 2015). Though countries such as Mexico, Thailand and Singapore have succeeded in the use of specific national surveys and facility data to sharpen focus on chronic conditions caused by NCDs, significant issues remain in creating indicators and standardised measurements for tracking interventions – particularly in the context of disasters and emergencies (WHO and World Bank, 2015).

Monitoring and surveillance mitigates potential disease outbreaks following shocks and stresses (Bangert et al., 2017). Community monitoring can engage and improve local capacities to deal with shocks and stresses, providing better contextual information on health status (Keim, 2008). For disease outbreaks, shifting from top-down response to activities based on local knowledge mobilisation addresses the uncertainty of what the next pathogen of outbreak concern may be, or where and when it will arise (Cori et al., 2017). This is core to One Health approaches, i.e. engaging in zoonotic threats and the complex dynamics of environment–human–disease interactions (Cunningham et al., 2017).

Such community-level engagement was critical in mitigating the 2014–2016 Ebola outbreak in West Africa (ibid.). Though more effective community health structures would probably have prevented Ebola from reaching the scale it did. For instance, Koch (2016) highlights a Guinean village where infected individuals were mobile, and necessary outbreak containment measures could have been implemented had better community health capacity been in place. In the Philippines, Surveillance in Post Extreme Emergencies and Disasters (SPEED) monitors 21 disease syndromes through mobile or internet reporting, and was developed and deployed with success following Typhoon Haiyan in 2013 to mitigate disease outbreaks (Salazar et al., 2016).

Monitoring and evaluating the outcomes of disaster response is critical to understanding what happened, how it happened and how to mitigate future risk. This is especially relevant in the context of predicted increases in the prevalence and potential impact of shocks and stresses as a consequence of climate change. However there is a lack of evidence for practices carried out in resource-constrained settings faced by LMICs (Gossip et al., 2017). This is consistent with evidence that disasters occurring in low-income countries are less documented than those in high-income countries (Gocotano et al., 2015). Moreover, Gossip et al. (2017) found a tendency across all scenarios of failure to act upon lessons learned from previous disasters. For instance a stocktake by the Philippines Department of Health and UNICEF following

Typhoon Haiyan revealed that though evaluations had been carried out following previous disasters, the findings had not necessarily led to improved disaster response procedures (ibid.). This may be symptomatic of failures to account for disasters in a systematic fashion, especially for smaller-scale events. Indeed, it has been noted in some SIDS, as elsewhere, that policy-makers are left without accurate information on (potentially compounding) occurrences of small disease outbreaks, local flash floods and land degradation, which have depressing impacts on those facing poverty (World Bank and OECD, 2016).

Priority setting and evaluation

While moving towards UHC and managing concerns which arise from shocks and stresses, it is critical for health systems strengthening that there is capacity for priority setting and addressing trade-offs for financial and other resources (Terwindt et al., 2016).

Measures to evaluate the economic efficiency of interventions through health technology assessments have been set up across numerous high-income countries and several LMICs, including Thailand's Health Interventions and Technology Assessment Program (HITAP7) and Brazil's National Committee for Technology Incorporation (CONITEC) (Chalkidou and Culyer, 2016; Chalkidou et al., 2017). These assessments are a step up for health information systems, built upon effective registration and monitoring of health processes.

Facing increasing pressure both domestically and from international agencies to implement programmes that support UHC, LMIC governments are turning to health technology assessments to distribute constrained resources for health (Dittrich et al., 2016; Chalkidou et al., 2017). These will offer the critical information necessary to define what is essential, cost effective and can be provided for all (Summers, 2015). The medicines and services chosen constitute a 'benefits package', a flexible term which could also be applied to UHC (Chalkidou and Culyer, 2016).

While international recommendations are a starting point, local capacity is critical to empower accurate decisions based on disease prevalence, resource constraints and other considerations, such as the roles of vested interests (Persad, 2015; Wirtz et al., 2017).¹⁰ However, economic evaluations of health impacts of disasters and climate change are extremely limited for countries in the global south and require support (Schmidt et al., 2016), which hampers decision-making processes for the implementation of UHC.

The longitudinal methods required to economically value health outcomes, such as repeated surveys and modelling expertise to estimate long-term consequences, are resource intensive (ibid.). Emerging efforts include findings from De Alwis and Noy (2017) that examine the impact of droughts and floods on healthcare costs in Sri Lanka. Assessments of health infrastructure are more

10 Initiatives to support this include the WHO's CHOICE (Choosing interventions that are cost-effective), Generalised cost-effectiveness analysis (CEA) and Disease Control Priorities (DCP), as well as Rethinking the Valuation of Interventions to Improve Priority Setting (REVISE 2020) and the International Decision Support Initiative (iDSI).

established, such as the cost-benefit analysis tool present in the PAHO Smart Hospitals Toolkit that ensures facilities are built and run in a risk-informed manner (Balbus et al., 2016). Though building the foundations of information systems for health should be the first priority, these analyses offer a valuable catalyst to another critical aspect of resilient pathways to UHC – financing.

4.2. Financing for universal health coverage

Fiscal spending, OOP expenditure, public and private donations, and insurance mechanisms make up the majority of financing streams available for programmes to ensure access to UHC (Wirtz et al., 2017). UHC measures that foster resilience to disasters and climate change occur at national and household level, each comprising challenges and opportunities to the improvement of services accessible to all.

4.2.1. National-level measures

Domestic financing

In 2015, the Sustainable Development Solutions Network estimated that LMICs would need to increase total public and private health expenditure by \$69 to \$89 billion per year over 2015–2030 to address public health needs and move towards UHC (UNSDSN, 2015). However, the 2017 WHO report on financing health for the SDGs found that, for a sample of 67 LMICs, the average costs will be \$271 per person per year to achieve UHC by 2030 (Stenberg et al., 2017). The report also acknowledges predicted resource constraints due to increasing reliance on domestic financing, and the associated need for strategic and cost-effective planning by countries to achieve SDG 3 and UHC (ibid.). However, these estimates do not consider shifts in price dynamics or the potential (increasing) direct and indirect hazard impacts posed by disasters and climate change, though they do acknowledge the threat posed by biological hazards based on calls from four post-Ebola commissions (ibid.).¹¹

Box 8: Case study – Developing governance and safe health facilities in the Philippines

In the face of the intense and recurrent disasters in the Philippines, the resilience of hospitals and health facilities is essential for achieving and sustaining UHC, also referred to as ‘Kalusugan Pangkalahatan’. The Philippine national climate and disaster policies and the 2016–2022 Philippine Health Agenda are complementary for achieving UHC, as they all hold resilience to stressors and shocks as a central pillar. The Health Agenda of the Philippines emphasises strengthening the health service delivery network and its resilience (Department of Health, 2010; 2016a). For instance, the 2015–2028 National Disaster Preparedness Plan supports UHC by strengthening resilience of health facilities and working towards ensuring uninterrupted health service delivery during disasters (Government of the Philippines, 2015). Finally, the national climate change plan prioritises the responsiveness of health delivery systems to climate change risks (Climate Change Commission, 2011).

The Philippine Department of Health (DoH) has been working to build the resilience of hospitals to disasters since 2005 with the start of the DoH hospital preparedness programme. Through a collaborative approach, the DoH developed the first Safe Hospitals tool in 2009 after the experiences of Typhoon Reming in 2006, Typhoon Frank in 2008 and Tropical Storm Ondoy in 2009 (Department of Health, 2012a). This was then continued as part of the World Disaster Reduction Campaign on Hospitals Safe from Disasters (2008–2009) which, through the consideration of

structural, non-structural and functional indicators, aimed to increase the structural resilience of health facilities and their functional capacity in times of disaster (Department of Health, 2009). Both of these aims have been integrated into current national disaster and climate policy, continuing the drive for resilience of healthcare facilities as a central pillar for reducing climate and disaster risk (Department of Health, 2010; 2012b; 2013; 2016b; Government of the Philippines, 2015).

The latest Safe Hospitals tool, developed at the end of 2016, is the fifth revision. It adopts the Hospital Safety Index and builds on the experiences of the Philippine DoH (Department of Health, 2016b). It aims to cover all hospital facilities, including public and private hospitals at national, regional and local levels, in line with the increasing community focus of the DoH in its Disaster Risk Reduction and Management approach (ibid.).

The next step in building the resilience of health facilities, highlighted by national climate change and health policy, is to integrate climate change adaptation into the existing resilience criteria for hospitals and health facilities (Department of Health, 2012a; 2013). A critical component of this will be the incorporation of long-term risks related to climate variability and change in the risk assessment, and the subsequent development or relocation of critical health facilities through long-term probabilistic risk assessment.

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11 The commissions were hosted by WHO, Harvard University and the London School of Hygiene & Tropical Medicine, the US National Academy of Medicine and the United Nations.

Yet, domestic financing for UHC is ultimately a matter of political will and the political economy of specific contexts. The acquisition of the necessary funding requires that the healthiest and wealthiest in society subsidise, through effective taxation, the provision of UHC as required by the sick and poor in society (Harlem Brundtland, 2017). However, even with funding, trade-offs can undermine the effectiveness of UHC when it comes to enhancing population resilience. Pandemic preparedness, a trade-off between building resilience and response measures, may not direct funding to long-term initiatives, despite extraordinarily high returns in terms of mitigating risk through strengthening existing health systems (Sands and Chawla, 2017). Health spending may simply rise in line with economic expansion, stability and other aspects of government (fiscal) expenditure. If so, this requires putting in place expansionary fiscal plans which work in line with predicted medium- and long-run economic trajectories (Summers, 2015). These plans must effectively distribute funding, be responsive and account for potential fiscal restrictions due to shocks and stresses and climate change.

Governments can acquire funding for UHC efforts through redistribution within existing fiscal and political restrictions. One method, entwined with climate change mitigation strategies, involves reallocating fossil fuel subsidies directly into UHC funding, such as subsidies for medicines (Gupta et al., 2015). The UN Special Envoy for Health in Agenda 2030 has also signalled increased interest for policy-makers to take inspiration from different sectors to make use of social impact bonds and blended financing for UHC (Politzer, 2017). One example is sin taxes, or ‘pigouvian taxes’, that target the consumption of substances which can lead to chronic disease if overconsumed (Cousins, 2017; Stenberg et al., 2017). These could be critical in managing risk dynamics, such as the epidemiological shift towards chronic disease, that increase the burden on health systems and aggravate people’s health status and, therefore, their vulnerability. Disruption of care due to disasters is evidenced by the single-event \$500 million lifetime healthcare cost impact upon diabetes sufferers affected by Hurricane Katrina in the United States (Fonseca et al., 2009).

Financing resilient pathways to UHC requires flexibility to augment capacities for health following disasters and prevent undue burden. Retrofitting or adapting existing funding systems can mitigate household financial consequences. Following Super Typhoon Yolanda in 2013, the Philippines’ national insurance agency, PhilHealth, opened up hospital services to all affected persons whether or not they were insured by it (PhilHealth, 2013). Once surge capacity has ended and international assistance has receded, though, UHC will require direct financing to mitigate long-run impacts, especially for marginalised

groups, and to ensure recovery for all (Espallardo et al., 2015).

Less rapid changes in circumstances, including the effects of higher and more variable temperatures due to climate change, must be accounted for in investment planning for health (Watts et al., 2015). This means implementing default policies for beyond responsive measures and engaging more costly, but vastly more effective, preventive intersectoral approaches (WHO, 2015b). Harnessing domestic resources effectively will require pointed monitoring and evaluation, though research tends to disproportionately examine the impact of international transfers and official development assistance rather than domestic measures (Bishai and Cardona, 2017).

International financing

Even in the most difficult contexts, the international community cannot sustain the financing required to provide adequate health coverage. Among fragile states and least developed countries, domestic resources supply about 75% of total health spending (Kieny et al., 2017). With international donor assistance for health expected to decline in coming years, the burden will be further placed on countries to use domestic financing methods (Kruk et al., 2016).¹² The World Bank’s International Working Group on Financing Preparedness noted that tracks for international donor expenditure included: (1) in-country capital investments and one-off spend, (2) multi-country regional initiatives, and (3) failed and fragile states where domestic resourcing is not a realistic option (World Bank, 2017a). As a result, international mechanisms become as much about directing health priorities and exploring effective initiatives as improving baseline population resilience.

The aims of international funders, capital implementation and efforts to improve day to day health services are subject to the skew of recent catastrophic events (Persad, 2015). For example, there has been rapid growth in engagement with IHR since the 2014–2016 Ebola outbreak in West Africa because of fears of similar outbreaks and disasters erupting elsewhere in the world. However, the political window for financing related to health security has apparently been closing since 2015 – before the international health emergency had even been declared to be over (Gostin et al., 2015; Kruk et al., 2017).

Trade-offs can lead to certain sectors taking priority. For resilience-building in SIDS, public infrastructure works have dominated the distribution of funding commitments, even with development requiring action across almost all sectors, including health, agriculture, water and fisheries. Between 2011 and 2014, 43% (\$1.34bn) of climate and disaster resilience funds went to infrastructure financing, defined as projects in the water sector, transport and storage, communications, energy and urban development

12 The range of actors engaged in international financing includes: international financial institutions (multilateral development banks, multilateral financing institutions, regional investment banks), government-backed official development assistance organisations and scientific bodies (such as the US National Institutes of Health), NGOs (such as Médecins Sans Frontières) and private foundations (such as the Bill & Melinda Gates Foundation or The Rockefeller Foundation).

(World Bank and OECD, 2016). Addressing how these trade-offs fit with pathways to UHC is key to the leverage and use of this financing, and the support of wider sustainable development.

Beyond active management of the spending of donor funds domestically, there is precedent for direction of domestic policy through international financing for implementing resilient pathways to UHC. In the 1990s, a consortium of countries and international institutions led to the 'Highly-Indebted Poor Countries Initiative', which sought to remove the 'debt overhang' of interest payments on the national debts of lower-income countries. This debt relief addressed constrictions in fiscal space and development potential through being tied to the achievement of a series of mandated policy reforms across social policy issues such as health and education. The double dividend of improved development planning and expanded fiscal space led to positive health impacts measured in the MDGs – including reduction in infant and neonatal mortality rates, tuberculosis incidence and the prevalence of HIV/AIDS (Ondo, 2017). International support through lower interest rates on new financing or assisting with payments on existing debts could encourage resilience-building through efforts that support UHC. Targeted impact bonds offer one example of international financing to support UHC and its maintenance under shocks and stresses (see Box 9).

4.2.2. Household and community financing

A central concern of UHC is managing OOP expenditure to cover basic access to healthcare and minimise the

negative effects of avoiding care due to cost, indebtedness or lack of primary health services. Such avoidance of care is disproportionately experienced by the poorest in society, and is a potential indirect effect of health impacts due to disasters and stresses exacerbated by climate change. SDG 3.8.2 explicitly focuses on mitigating burdensome household expenditure on health (UN Economic and Social Council, 2017). Yet in the lowest-income groups, any expenditure at all on health may be out of reach. The WHO and World Bank (2015) *Tracking Universal Health Coverage* found that self-reporting of zero health expenditure was most common among the poorest, at a country median of 41.2% – compared to 22.1% for the richest quintile. While moving towards zero OOP health-related expenditures is desirable, low or non-existent expenditure could also indicate significant lack of access to services, as statistics can directly assess health service usage, but not health service need.

Incorrect pricing of medicines, lack of service coverage or failure to achieve community engagement can exacerbate financial risk from health shocks (Dhanaraj, 2014; Islam et al., 2017). An ODI report by Babajanian et al. (2014) looking at Afghanistan, Bangladesh, India and Nepal found that social protection and labour programmes positively impacted nutrition outcomes and access to health and education. However, the report also found a potential lack of any substantial reduction in the overall financial cost of healthcare, with insurance only partially covering expenses and marginalised groups facing greater difficulties with enrolment. Discrimination of this nature would further compound inequitable health outcomes already associated with hazard risks (ibid.). Though

Box 9: Impact bonds for resilient pathways to universal health coverage

Impact bonds

Financial vehicles for private investment to achieve outcomes on specified interventions, ranging across social development, environmental, health and other sectors. Desired outcomes are set by the bond issuer, which may be a government agency, development bank or philanthropic foundation. Within a given time limit, the investor has its principal investment returned plus interest from the bond purchases – if there is enough evidence that outcomes have been met. Benefits of impact bonds as development tools include: expanding the issuer's fiscal space, engaging private funding, focusing on outcomes and prioritising preventive interventions (Gustafsson-Wright et al., 2015; Jack, 2016). Two relevant examples are:

1) Health bonds, Asian Development Bank (ADB)

In March 2017, the ADB released a 'health bond' valued at \$100 million as part of its commitment to double total health investments by 2020. Unlike the pandemic bonds (see below), the funding goes towards investments in strengthening resilience. This will build

upon existing activities to support UHC in India, Kazakhstan, Papua New Guinea and Uzbekistan. This work includes 'primary and secondary care infrastructure, supporting an enabling environment for public private partnerships, basic medical equipment, digital health infrastructure, staff capacity development, and skills development' (Roth, 2017).

2) Pandemic bonds, World Bank Group

Whereas other impact bonds are similar to loans, the World Bank Group's 'pandemic bonds' are more like an insurance policy. In June 2017, the World Bank Group launched bonds valued at a total of \$400 million for its Pandemic Emergency Financing Facility (PEF). The PEF was created in 2016, following the Ebola crisis in West Africa, to rapidly collect and disperse finance in response to a pandemic threat from a disease outbreak (World Bank, 2017b). The five-year bonds offer cover for two sets of infectious diseases, with lower interest rates (6.5%) for flu and coronavirus and higher rates (11.1%) for a set of diseases including filoviruses (i.e. Ebola) and Lassa fever (World Bank, 2017c).

private-sector institutions that offer insurance cover and health services can increase efficiencies in quality and quick access to care, there is little real incentive to ensure that the entire population is covered at a fair price. This makes government-backed initiatives the only real option for the comprehensive population coverage required for UHC (Cotlear et al., 2015).

Identifying those at risk of impacts to health and wellbeing and requiring services is critical to local-level prevention of catastrophic and impoverishing health expenditures. This challenge is exacerbated by the disproportionate impacts of disasters and climate change, based on different exposure and vulnerability within and across societies.

Household surveys can offer useful data on health, but only panel household surveys can depict the longitudinal changes caused by emergency health expenditures and the experiences of specific households (Sturge et al., 2017). Regular implementation of surveys is possible, but at significant cost. Examples include the Indonesian Family Life Survey and the Russian Longitudinal Monitoring Survey, but such programmes are the exception rather than the rule with respect to national survey implementation (Sakkena et al., 2014).

Failure to account for avoidance of health services due to unaffordability also undermines directing an effective response (WHO and World Bank, 2015). Without knowing what is causing significant health expenses or prevention under normal conditions, the implementation of resilient UHC will be undermined by the failure to distribute funding, expertise or necessary medicines and medical technologies.

4.3. Implementing services for resilient health systems

Converting effective governance and finance measures into sustainable health and wellbeing outcomes requires adaptive implementation of services. The following section analyses three key aspects of implementing services for health – workforce, medicines and delivery – necessary to support pathways to UHC in the context of disaster and climate risks.

4.3.1. Delivery

Delivery of health services, or the ‘experience’ of using health services, encompasses the patient-centred activities that are the final stage for implementing and sustaining UHC. It ensures activities go as planned and quality interventions for health take place and, overall, that proclamations of moving towards UHC can be trusted (Beattie et al., 2016). In the highly difficult conditions brought about by disasters and emergencies, ineffective delivery can undermine all other efforts to make health coverage ‘universal’ if prevention and response for health do not reach the people who need them the most. Hospitals can lose power, roads can be blocked and bridges

can collapse. Hence, accounting and addressing potential weaknesses in the complex chain of services, supplies and infrastructure is crucial to UHC.

Focusing on health services, WHO guidelines for improving service delivery and safety encompass: services organisation and clinical interventions; patient safety and quality improvement; traditional and complementary medicine; quality in UHC; infection prevention and control; innovation in service delivery (WHO, 2017h; 2017i). Failure of quality delivery mechanisms can lead to unnecessary treatments and healthcare-associated infections, which are a common problem. Two thirds of all adverse events in care occur in LMICs, affecting roughly one in ten patients (WHO, 2017j). Failure to provide safe healthcare disproportionately impacts high-risk populations, such as those admitted to neonatal or intensive care units (Storr et al., 2017). Furthermore, it has been estimated that 40% of healthcare investments are lost through inefficiencies (WHO, 2017h).

The potential for cascading effects from ineffective practice augments the difficulty, and value, of delivering safe measures for UHC in disasters and emergency scenarios (Clarke, 2008). Simple interventions, such as using checklists, are part of addressing problems within and beyond the health sector. Thomassen et al. (2014), through systematic review, found that checklists led to improved patient safety through strengthening compliance with guidelines, improving human factors, reducing the incidence of adverse events and decreasing mortality and morbidity.

Risk factors in disasters and emergency scenarios include: population displacement from non-endemic to endemic areas, overcrowding, poor sanitation/water conditions, high exposure to and proliferation of disease vectors, malnutrition, low vaccination coverage and injuries (Kouadio et al., 2012). Dealing with this range of threats, as identified by Bayntun et al. (2012), involves actions including: disaster preparedness, acute response, continuing service requirements, community preparedness strategies to increase community resilience, surge capacity development within and beyond healthcare facilities, adjusting to crisis standards of care and maintaining priorities, safeguarding patient medical records and medication needs. It is critical to ensure that these efforts do not apply only in the health sector, but are integrated into wider efforts to restore access to energy and food supplies as required.

4.3.2. Workforce

Supporting the development and retainment of a health workforce, or ‘human resources for health’, is critical for delivering accessible care – a cornerstone of UHC. This is achieved by workforce presence and quality. The presence of a health workforce requires aggregate training rates, retainment of professionals and integration of foreign workforce capacity (WHO, 2016a). To achieve UHC, human resources for health need to be equitably distributed among the population and across all urban

and rural settings. Rural capacity-building might require additional incentives for health workers to move to rural areas, or capacity-building in the vein of the ‘Barefoot Doctors’ who, in part, inspired the Alma-Ata Declaration’s call for primary care (WHO, 1978; 2017k). Workforce quality is a matter of adequate training and continued professional development to maintain workforce assets – including effectively run health systems and encouraging health workers to engage with research for health.

Surge capacity planning and implementation assists in managing the short-term impacts of disasters and emergencies, but for resilient pathways to UHC, managing local capacity is critical for more reliable and sustained recovery efforts (Colombo and Pavignani, 2017). Long-term workforce presence can be undermined by the difficult scenarios that come with disasters and emergencies. Outward migration and mortality can be significant, particularly where health workforce become political targets. Moreover, prolonged weak governance and regulation mechanisms can lead to poorly trained medical doctors and shortages in care providers, such as nurses and midwives (ibid.).

Roughly 500 health workers died during the response efforts to the 2014–2016 Ebola outbreak in West Africa (Mulinge and Soyemi, 2016). In regions facing conflict and recurrent disasters, emigration of health workers can further undermine provision of adequate health services. In Zimbabwe, between 1999 and 2007, an estimated 60% of registered nurses and 50% of registered doctors emigrated due to instability and issues associated with drought and food insecurity. Though money transferred from new homes in Botswana and South Africa offered coping strategies for households, the moves severely limited the capacity of the national health system (UNDP, 2011). Protracted emigration of human resources for health from countries in the global south can be stemmed not only by supporting domestic training and retention programmes, but also through better health workforce structures in stable, resource-rich scenarios in the global north (WHO, 2016a). Indeed, demand for doctors, nurses and other key members of the health workforce to plug skills gaps in richer countries can deepen gaps in poorer countries (WHO, 2016a). This undermines domestic and internationally supported programmes which aim to support the domestic workforce in these countries, undermining the resilience of health systems and the long-term feasibility of UHC (ibid.).

Ensuring an adequate and adaptive workforce for resilient UHC involves providing evidence-based training for potential response scenarios, communications and necessary monitoring procedures (Bayntun et al., 2012; WHO, 2015b). These efforts extend to engaging with the needs of communities and providing credentials and recognition for volunteer roles taken up by health workers during disaster scenarios (Bernard et al., 2017; Holland, 2017). Community engagement in implementing resilience

can strengthen local capacities, increase the scope of available information and improve the understanding of local dynamics of vulnerability (WHO, 2015b).

4.3.3. Medicines

Access, innovation and regulation are key in improving the utility of essential medicine and health products for UHC (WHO, 2017f; Wirtz et al., 2017). Practical elements of improvement include: supply-chain management, local production of pharmaceuticals, falsified medicines, promoting adherence to rules and prevention of medication errors (ibid.). Addressing workforce crises is not sufficient if medicine and medical technology supply chains are decrepit (Requejo and Bhutta, 2015). Failure to address the gap in investment in health research, from innovation to adoption of interventions, between rich and poor countries has been an entrenched issue for decades (Commission on Health Research for Development, 1990; Wirtz et al., 2017). This is evidenced by failures in recent years to address the growing burden and the concerns raised by the global health community about the impact of neglected tropical diseases (Wirtz et al., 2017).¹¹

A quarter of global health expenditure goes on medicines, primarily from OOP payments (ibid.). Across a 2007–2014 sample of low-income and lower-middle-income countries, Wirtz et al. (2017) note that an average of 58% public health facilities carried generic (low-cost) medicines – ranging from full national coverage to as little as 17% of facilities. This is critical to address divergence in treatment recommendations due to cost and access between high- and lower-income countries, especially diseases such as for HIV and epilepsy (Persad, 2015). Measures to address this include expedited prequalification measures, which ease the approval process of new drugs and are key to getting lower-priced and more effective treatments where they are needed (Cunningham et al., 2017). Developing methods to monitor access issues is critical to put measures in place, though, and capacity is severely lacking. Poor data on medicines is prevalent in most developing countries, but overall there is a lack of accessible usage information. According to the *World Health Statistics Report, 2016*, under 30% of countries had national data on access to essential medicines since 2010 (WHO, 2016e).

Stockpiles of accessible and distributable medicines are critical to communicable and NCD control for responding to disasters and maintaining UHC during difficult scenarios (Bayntun et al., 2012). For those facing loss of livelihood due to indirect impacts of disasters and climate change, the implementation of domestic fiscal measures, insurance access and, where applicable, assistance from international bodies on funding gaps, are critical in preventing long-term consequences on health (Wirtz et al., 2017). In the wake of Typhoon Haiyan in 2013, once emergency funding and international assistance for supplying free medicines

11 Major actors working to address these needs include: the United States President’s Emergency Plan for AIDS Relief (PEPFAR), the Global Fund, the Global Drug Facility from the StopTB Partnership, and Gavi the Vaccine Alliance (Wirtz et al., 2017).

provision ended, institutional mechanisms were still needed to ensure financial protection and mitigation of longer-term health impacts, especially for the poorest in society (Espallardo et al., 2015).

Due to population movements and shifts in the patterns of disease vectors (i.e. mosquitos) caused by disasters and climate change, neglected tropical diseases and emerging diseases require address that is currently undermined by inaccessible, high-cost patented medicines (Wirtz et al., 2017). Pandemic influenza threats from H5N1 and H1N1 – the first pandemic influenza strains to emerge for 40 years – raised further concerns on crowding out from vaccine access of LMICs by rich countries, an issue which operates at the subnational level as well (Fidler, 2010; Chalkidou and Culyer, 2016). Addressing the increasing threat of NCD complications associated with disasters and climate change will also require medicine supplies overall to be implemented effectively in post-disaster scenarios and kept sustainable (Tonelli et al., 2016; Wirtz et al., 2017).

The adaptability of UHC relies on supporting and actively engaging innovation in medicines and medical technologies (Kieny and Rågo, 2016). Innovation includes, for example, targeting preventive vaccination programmes that engage One Health approaches. Cunningham et al. (2017) document the model's success in managing

Rift Valley fever threats in Kenya. Without effective management, this necessity for innovation can raise questions about the viability of responses, particularly during crises.

During the 2014-2016 Ebola crisis in West Africa, hoarding of data, and a lack of data collection altogether, hampered innovative response efforts (Davies et al., 2016). Ethical concerns surrounding some pieces of research carried out during the outbreak highlight the need for support for ethical approval capacities in rapid response to crises (Richardson et al., 2017). The Coalition for Epidemic Preparedness Innovation, launched in 2017, aims to address barriers to innovation by rationalising and accelerating outbreak response through coordination of the resources of industry, governments, philanthropic organisations and NGOs (Coalition for Epidemic Preparedness Innovations, 2017). Effective regulatory measures are also important, for medicine safety as well as promptly ensuring access to effective new treatments, such as cases of direct-acting antiviral medicines to treat Hep C where the primary patent only expires in 2024 (Kieny and Rågo, 2016; Wirtz et al., 2017). Regulatory efforts define the quality of medicines provided and whether they reach those who need them.



Key messages

Governance

- Engaging stakeholders is critical. The support of the electorate and tax-payers, as well as other interest groups, can be engaged beyond health improvements through the benefits of resilience-building, health security and climate change adaptation. Trade-offs will emerge, and efforts must be distributed with fair weighting where possible.
- Robust information measures support effectively targeted and monitored approaches to UHC. Infrastructure for patient records and epidemiological surveillance must be robust and have built-in redundancy to deal with shocks and stresses. Context-specific scientific evidence is critical to informed decision-making throughout implementation. Ad hoc, inefficient and siloed measures can arise if information is not created that is useful, usable and used.
- Cost-effectiveness capacities create sustainability and open fiscal space. Assessments can catalyse financing for resilient pathways to UHC. Building domestic capacity and applicable assessments for impacts of shocks and stresses offers a pathway to evidence-based sustainability, but can be intensive and requires further methodological innovation.

Finance

- Rethinking fiscal space will open up funds for pathways to manage shocks and stresses that constrain UHC. Methods include cutting subsidies or raising taxes for unfavourable activities to offer double dividends, as well as harnessing blended-financing methods such as impact bonds.
- Engaging with long-run impacts is critical to financing for health and wellbeing. Risk transfer and financial response measures are not sustainable management tools for mitigating the risk of shocks and stresses to health. Aligning financing for resilience and financing for health in government development plans can support greater investments and should be incentivised by international bodies.
- Identifying at-risk households is key to mitigating undue financial burden. Cases of households impoverished by or financially locked-out from necessary health coverage measures before, during and after stresses and shocks should be a monitoring priority.

Implementing services

- Quality and efficient delivery of health services must be sustainable and responsive in disasters and emergencies. Taking stock of and addressing potential weaknesses in the complex chain of services, supplies and infrastructure is crucial to implementing UHC. Cascading effects from ineffective practice augments the difficulty, and value, of delivering healthcare in disaster and emergency scenarios.
- Creating a dynamic workforce that can adapt to required capacity and expertise, and is effectively trained and distributed among the population, will mitigate constraints to health systems in disasters and emergencies. This extends to providing the necessary credentials and recognition for volunteers who can support measures such as surge capacity support and prevention of chronic disease during shocks and stresses. Domestically and internationally, governments also have a responsibility to address potential skills gaps appearing due to migration of human resources for health.
- Medicine requirements for all scenarios should be accounted for in planning towards UHC. Access to and innovation for medicines must serve all patients impacted by shocks and stresses. Within and across borders, this requires monitoring, distribution mechanisms and ethical innovation to manage novel biological hazards.

5. Conclusions

Disasters and climate change compound health risks and aggravate existing health inequalities. Meanwhile, health inequities disproportionately affect the most marginalised people, because their geographical location, their socioeconomic conditions or their political contexts limit their access to resources that would otherwise help them protect their health, and offer opportunities to benefit from healthcare.

UHC aims to ensure that everyone has access to quality healthcare without enduring financial hardship. Progress towards UHC creates a ‘no regret’ dividend whereby healthier populations with improved quality of life are also more resilient to the emergence and impacts of disasters and emergencies. Targeting the inclusion of the most vulnerable in society ensures that the needs of all are known and can be addressed during crises.

Horizontal improvements to health systems are favoured by moving towards UHC, which will improve prevention and response capacities to mitigate outbreaks of disease which can lead to, or be caused by, disasters. Dealing with health systems failures created by a focus on vertical interventions (i.e. Ebola) or concurrent crises (i.e. Cholera) are closely associated with the measures required under UHC.

5.1. Summary of impacts to health and wellbeing: what needs to be considered

Disasters create a vast global burden of morbidity and mortality each year that is difficult to quantify and can occur through a variety of direct and indirect pathways. Mortality and morbidity directly attributable to disasters include immediate injury and trauma and contraction of epidemic disease during a public health emergency. Indirect impacts can arise months and years following a disaster due to new risks created and disruption to the health systems and infrastructure which had previously managed health and wellbeing concerns adequately.

Socioeconomic determinants of health and wellbeing create inequities among populations that are exacerbated and further exposed by disasters. Impacts differ significantly across income, age and gender groups, with older persons, pregnant women, chronically ill persons and impoverished communities among those at significant risk compared to the rest of the population. Shifts in geographic and demographic drivers of risks (e.g. urbanisation, ageing populations, climate shifting conditions, etc.) will further alter how population health and wellbeing can be impacted by disasters.

In terms of economic consequences of disasters and risk drivers such as climate change, mitigating losses of livelihoods (i.e. sources of income) lowers the adverse financial consequences of impacts to health and wellbeing at the household and community level. However, without adequate financial protection mechanisms following disasters, impacts to health and wellbeing can lead to potentially impoverishing health expenditures in the short and long run. These shocks disproportionately impact the poorest and most vulnerable in societies, requiring redress through sustained access to medicines and financial support after initial response measures have lapsed. Improving health systems and moving towards UHC, informed by the risks posed by disasters and climate change, represent an opportunity to foster equitable health and development outcomes.

5.2. Summary of risk-informed measures to move towards universal health coverage

Risk-informed measures are critical to managing impacts to health and wellbeing and to sustaining efforts towards UHC under shocks and stresses. Governing approaches are critical to obtaining the necessary overall support. This means engaging all stakeholders in the potential benefits of UHC and improvements to their resilience. Doing so requires robust information systems that are useful, usable and used during times of shock and stress. More advanced measures to build upon these include assessments of cost-effectiveness across elements of health systems to ensure limited funding is best allocated before, during and after disasters and emergencies.

With governance and buy-in for UHC in place, fiscal space opens up – though adaptive mechanisms are key to ensure that funding streams can address the impacts of shocks and stresses. Integrating support for resilience-building into horizontal health system improvements will need to be tied to long-run funding plans, which could be supported in LMICs by adapting financing instruments to create incentives. At the household level, financing measures will rely significantly on information systems and governance to ensure that marginalised groups at risk of significant impacts from shocks and stresses are not missed and are targeted by measures to alleviate financial burden.

Support through governing and financing measures will augment the capacities of health systems and their ability to move towards UHC, with implementation of services ensuring that these capacities lead to better health outcomes. Service delivery during times of shock and stress needs to be based on plans that are understood and

accepted and protocols that are continually improved to mitigate future strains on health systems. An engaged, adaptable and retainable workforce, that can be augmented during disasters and emergencies, needs to have the knowledge and support structures in place to

manage direct and indirect health impacts before and after they arise. These workers need to be further supported through innovation mechanisms and ways to receive necessary medical supplies when access by patients is lost or inadequate.

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Annex 1: Principles for resilient pathways to universal health coverage

UHC in Africa: a framework for action	Essential Public Health Operations (EPHOS)	Principles of emergency risk management for health	Components of climate resilient health systems	Actions to create resilient health systems	Elements of emergency preparedness
<ul style="list-style-type: none"> • Governance – Political and institutional foundations for the UHC Agenda • Preparedness – Strengthening health security 	<ul style="list-style-type: none"> • Assuring governance for health and wellbeing • Surveillance of population health and wellbeing • Monitoring and response to health hazards and emergencies • Advancing public health research to inform policy and practice 	<ul style="list-style-type: none"> • Policy and resource management • Planning and coordination • Information and knowledge management 	<ul style="list-style-type: none"> • Leadership and governance • Vulnerability, capacity and adaptive assessment • Integrated risk monitoring and early warning • Emergency preparedness and management • Health and climate research 	<ul style="list-style-type: none"> • A whole-of-society commitment to achieving the SDGs. • Universal access to health and UHC • Health information systems that support identification and isolation of public health risks and delivery of appropriate responses • Disaster and other risk reduction strategies • Research on resilience and health system performance 	<ul style="list-style-type: none"> • National policies and legislation that integrate emergency preparedness • Coordination mechanisms • Assessments of risks and capacities to determine priorities for emergency preparedness • Surveillance and early warning, information management • Access to diagnostic services during emergencies • Research development and evaluations to inform and accelerate emergency preparedness
<ul style="list-style-type: none"> • Financing – More and better spending and effective financial protection 	<ul style="list-style-type: none"> • Assuring sustainable organisational structures and financing 	<ul style="list-style-type: none"> • Planning and coordination • Health infrastructure and logistics 	<ul style="list-style-type: none"> • Climate and health financing 	<ul style="list-style-type: none"> • Investing in health system resilience, in particular the organisation of adaptive networks of healthcare institutions 	<ul style="list-style-type: none"> • Financial resources for emergency preparedness and contingency funding for response
<ul style="list-style-type: none"> • Services – People-centred services, quality and multisectoral action • Equity – Targeting the poor and marginalised and leaving no one behind 	<ul style="list-style-type: none"> • Disease prevention, including early detection of illness • Assuring a sufficient and competent public health workforce • Health protection, including environmental, occupational, food safety and others • Health promotion including action to address social determinants and health inequity • Advocacy, communication and social mobilisation for health 	<ul style="list-style-type: none"> • Health and related services • Health infrastructure and logistics • Community health-emergency disaster risk management capacities 	<ul style="list-style-type: none"> • Climate-informed health programmes • Climate resilient and sustainable technologies and infrastructure • Health workforce • Management of environmental determinants of health 	<ul style="list-style-type: none"> • Application of IHR through strengthening of national core capacities as part of essential public health functions • Health information systems that support identification and isolation of public health risks and delivery of appropriate responses 	<ul style="list-style-type: none"> • Plans for emergency preparedness, response and recovery • Basic and safe health and emergency services • Risk communications • Logistics mechanisms and essential supplies for health • Dedicated, trained and equipped human resources for emergencies



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