

COVID-19 AND CLIMATE-SMART HEALTH CARE

Health Sector Opportunities for a Synergistic Response to the COVID-19 and Climate Crises



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^a Health Care Without Harm (HCWH) is an international nongovernmental organization (NGO) seeking to transform the health sector worldwide so that it becomes ecologically sustainable, as well as a leading advocate for environmental health and justice, www.noharm.org.

ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome	MDB	multilateral development banks
CCB	climate co-benefit	MPA	multiphase programmatic approach
CEEW	Council on Energy, Environment and Water	NDC	nationally determined contribution
CO₂	carbon dioxide	NGO	nongovernmental organization
CREDA	Chhattisgarh Renewable Energy Development Authority	NPI	nonpharmaceutical intervention
DFY	Doctors for You	NTCC	National Technical Coordination Committee
DIC	drop-in-center	OPD	outpatient department
DRRT	district rapid response team	PCR	polymerase chain reaction
eIDEWS	Electronic Integrated Disease Early Warning System	PHC	primary health care center
FTCF	Fast-Track COVID-19 Facility	PPE	personal protective equipment
GDP	gross domestic product	PPP	public private partnerships
GHG	greenhouse gas	PV	photovoltaic
GHSA	Global Health Security Agenda	RRT	rapid response team
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	RT-PCR	reverse transcription polymerase chain reaction
GRID	Green, Resilient and Inclusive Development	SDG	Sustainable Development Goals
GRRT	governorate rapid response team	SHiPP	Sustainable Health in Procurement Project
GWP	global warming potential	SIDA	Swedish International Development Cooperation Agency
HCWH	Health Care Without Harm	SMS	short messaging service
HECAF360	Health Environment and Climate Action Foundation	TWG	technical working group
HIV	Human Immunodeficiency Virus	UHC	universal health coverage
HWC	Health and Wellness Center	UN	United Nations
IBRD	International Bank for Reconstruction and Development	UNDP	United Nations Development Programme
IDA	International Development Association	UNFCCC	United Nations Framework Convention on Climate Change
IFC	International Finance Corporation	UNICEF	United Nations International Children's Emergency Fund
INDC	intended nationally determined contributions	V&A	Vulnerability and Adaptation
IPD	inpatient department	VOC	Volatile Organic Compounds
kWp	kilowatts peak	WASH	water, sanitation, and hygiene
		WHO	World Health Organization
		WMO	World Meteorological Organization



INTRODUCTION

Affecting almost every country in the world, the COVID-19 pandemic, driven by the SARS-CoV-2 coronavirus, has been a stark reminder of the perennial threat of emerging infectious diseases and the chronic fragilities of the world's health systems, economies, and societies. The global impacts of COVID-19 are far-reaching and diverse, including death, ill health, widespread mental distress, worsening poverty, and widening inequality within and between countries.

Like COVID-19, climate change has immediate and projected wide-ranging, long-term impacts on human health, including stressing food systems, economies, and communities as well as pushing more people into poverty, through the frequent occurrences of extreme weather events. The serious difficulties facing health systems and other institutions in tackling the ongoing pandemic underscore the likelihood that many may also be ill-equipped to protect and save lives under the stress of climate change.

It is also important to consider that these crises are occurring simultaneously, not one after another. As the world struggles to respond and recover from the COVID-19 pandemic, it must simultaneously cope with climate change. The convergence of COVID-19 and the climate crisis has compounding impacts. Climate-related disasters are complicating the COVID-19 response in several parts of the world. For example, in November 2020, the Philippines was hit by two major typhoons, displacing hundreds of thousands of people and leading to overcrowded evacuation centers. Amidst the circumstances, it was not possible to maintain the physical-distancing restrictions necessitated by the COVID-19 crisis at these centers. Similarly, when the state of California (in the United States) was ravaged by weeks of wildfires in late 2020, destroying houses and leading to the relocation of entire communities, people were faced with dual respiratory threats. Conversely, COVID-19 can exacerbate the ongoing climate change-related vulnerabilities of communities. For example, the health systems of small-island developing states, which are already challenged by sea-level rises and other climate-related hazards, must assume additional responsibilities related to the pandemic response.

The COVID-19 crisis has naturally focused global attention on the health sector. This attention and increased scrutiny need to also extend to the health sector's own contribution to the climate crisis through its carbon footprint. This contribution is a nontrivial matter, particularly in high- and middle-income countries: the sector's energy consumption, transport systems, and supply chain make up 4.4 percent of net global greenhouse gas (GHG) emissions, and so far shows little sign of shifting from current trajectories.

The serious difficulties facing health systems and other institutions in tackling the ongoing pandemic underscore the likelihood that many may also be ill-equipped to protect and save lives under the stress of climate change.

Growing health care waste from personal protective equipment (PPE) has overwhelmed many hospital waste-management systems, posing significant threats to human health and the environment. As COVID-19 vaccine campaigns scale up around the world, the challenges of managing vaccine waste in a broad diversity of settings are also a concern. Investments in cold-chain technologies and infrastructure risk locking many countries into carbon-intensive vaccine systems for decades to come. Concomitantly, investments in climate-smart, energy-efficient cold chains offer the possibility of transformation. The pandemic, therefore, adds a layer of sustainability challenges, but also presents opportunities for the health sector.

Today, there exists a unique opportunity, indeed a necessity, to take on the pandemic and the climate crisis in tandem. Response to and recovery from COVID-19 creates a moment for accelerating climate action worldwide. It makes sense for this action to begin with the health sector. The objective of this report is to describe some of the actions that the health sector can take during the COVID-19 response and recovery efforts to tackle both the COVID-19 pandemic and enhance resilience to climate change threats, including limiting carbon dioxide (CO₂) emissions.

The report begins with a description of the links between COVID-19, climate change, and human health. Building on the World Bank's climate-smart health care approach (World Bank 2017) and integrating the World Bank's Multiphase Programmatic Approach (MPA) into the global COVID-19 response (World Bank 2020), this report suggests a series of areas to be addressed, with corresponding interventions to guide ongoing as well as pipeline activities and investments targeted at the pandemic. These interventions are suggested because they would enable the health sector to

Building on the World Bank's climate-smart health care approach and integrating its Multiphase Programmatic Approach (MPA) into the global COVID-19 response, this report suggests a series of areas to be addressed, with corresponding interventions to guide ongoing as well as pipeline activities and investments targeted at the pandemic.

leapfrog toward climate-smart universal health coverage (UHC). The report is also illustrated by case studies showcasing where low- and middle-income countries have incorporated sustainable interventions in their health sectors to strengthen their COVID-19 emergency responses, while also assisting with climate adaptation or mitigation.

This report is targeted at leaders and operational teams in multilateral development banks (MDBs) and other development finance institutions, particularly those working in the areas of health, nutrition, and population. It can guide the ongoing design of health investments that address the global COVID-19 health emergency response and recovery efforts as well as help prepare for the next pandemic and potential future social or environmental crises. The messages of this report will also be useful for other development agencies, nongovernmental organizations (NGOs), ministries of health, and health agencies, as well as policy makers committed to building enduring, resilient, and sustainable health systems.

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SECTION 2.

LINKS BETWEEN COVID-19, CLIMATE, AND HUMAN HEALTH

The emergence of the COVID-19 pandemic has brought with it a sharp focus on public health services and health systems as well as shed light on the chronic lack of capacity to manage emerging public health risks. Climate change further exacerbates this challenge. In combination with COVID-19, the climate crisis presents a clear and present risk of disrupting and overwhelming health systems, health care facilities, and the health care staff upon which these systems rely. This risk is of particular concern in those settings with already weak health systems, leadership challenges, insufficient resources, and limited capacities. Despite these concerns, the collective global effort to respond to COVID-19 and recover from it also presents important opportunities for implementing profound cross-cutting efforts within the health sector to tackle both the pandemic and the climate crisis (box 2.1).

BOX 2.1

WORLD BANK'S HEALTH EMERGENCY COVID-19 RESPONSE

As the magnitude of the COVID-19 pandemic became evident, the World Bank made a strong commitment to provide exceptional support in speed, scale, and selectivity to countries, as they tackled the unprecedented threats posed by the crisis. It launched the Fast-Track COVID-19 Facility (FTCF) to provide immediate support to help countries respond to COVID-19. This facility supported the fast tracking of USD14 billion in financing, complemented by policy advice and technical assistance. The financial package, drawn from the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), and the International Finance Corporation (IFC), was globally coordinated to support country-based responses. The original FTCF that committed to providing USD2.7 billion from IBRD, USD1.3 billion from IDA, and USD8 billion from IFC (including USD2 billion from existing trade facilities), was further complemented by a reprioritization of USD2 billion from the World Bank Group's existing portfolio. This funding envelope was further expanded in October 2020 with the approval of the additional financing of USD12 billion for developing countries to finance the purchase and distribution of COVID-19 vaccines, tests, and treatments for their citizens.

Source: World Bank 2020c.



The COVID-19 pandemic has caused tremendous disruption at a scale not seen for at least a century; it is a stark reminder of the ongoing challenge of emerging and reemerging infectious diseases. This exceptional challenge to public health, food systems, global economies, and social norms is not only leading to millions of deaths and ill health, but also pushing tens of millions more back into extreme poverty, substantially increasing the prevalence of undernutrition, and likely contributing to significant future chronic disease and mental health burdens. Combined with the ever-growing number of deaths and strain on global systems, the pandemic is having profound socioeconomic impacts. For the first time in over 20 years, global extreme poverty is expected to rise in 2020, and it is estimated that the COVID-19 pandemic will push up to 150 million people into extreme poverty by 2021 (World Bank 2020a). In addition, COVID-19 also threatens to delay the achievement of the Sustainable Development Goals (SDG) (figure 2.1) with its potential to reverse the hard-won health and human capital gains achieved over recent decades (UN/DESA 2020).

Climate change presents just as serious a threat to human health and health systems as COVID-19. However, unlike COVID-19, the health risks of climate change are projected to rise over the coming decades, unless rapid and profound action is taken. Rising temperatures, changing rainfall patterns, sea-level rises, shifting disease vector ranges, along with extreme weather and climate events, threaten human health and well-being through a number of direct, indirect, and synergistic pathways (Smith et al. 2014). A useful way of thinking about climate change and health is as a threat multiplier, making those already vulnerable more so, potentially pushing

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millions into poverty in the coming years. Without further action to reduce extreme poverty, provide access to basic services, strengthen resilience, and increase adaptive capacity, climate impacts could push an additional 100 million people into poverty by 2030 (Hallegate et al. 2015).

It is clear that the planet is now locked into a certain degree of climate change. Health systems must, therefore, adapt to the coming changes. However, we must also take every opportunity to mitigate against that to which we cannot adapt. Actions to limit the health impacts of climate change thus require adaptation and resilience-building actions, combined with rapid global action to reach zero net, to stabilize the climate and maintain average global temperature increases below 2°C. Delaying action until 2030 would increase total mitigation costs by 50 percent (IPCC 2018). To help accelerate climate action, the World Bank has been working to incorporate climate change in its operations and supporting countries to shift toward low-carbon and climate-resilient development (box 2.2).

Despite climate change not being directly implicated in the emergence or transmission of COVID-19, there are several important interactions between the health impacts of the COVID-19 and the climate crises. Each shares several overarching drivers and impacts similar vulnerable populations.

FIGURE 2.1
COVID-19's Impacts on the Sustainable Development Goals



Source: UN 2020.

BOX 2.2

WORLD BANK'S INVESTMENTS IN CLIMATE ACTION



The World Bank Group has been committed to tackling climate change—a major threat, particularly for the world’s poorest and most vulnerable. Soon after the world came together for the landmark Paris Agreement on climate change in 2015, the World Bank unveiled its first *Climate Change Action Plan (CCAP20) 2016–2020*, delivering USD83 billion in climate finance for developing countries. This has recently been updated with the *Climate Change Action Plan 2021–25 (CCAP25)*, with a goal to integrate climate and development in order to maximize the impact of climate finance. The updated plan will direct climate financing toward mitigation, reduce greenhouse gas (GHG) emissions, and in terms of adaptation, help client countries, with support from the private sector, to prepare for negative climate effects.

To deliver on the twin goals of reducing poverty and boosting shared prosperity, CCAP25 will prioritize climate action across six areas:

1. Increasing climate finance
2. Prioritizing resources for climate impact
3. Improving and expanding climate diagnostics
4. Reducing emissions and climate vulnerabilities in key systems
5. Supporting a just transition out of coal
6. Aligning financing flows with the goals of the Paris Agreement

Over one-third (35 percent) of the World Bank Group financing will have climate co-benefits (CCBs) over the next five years, while 50 percent of the climate financing from the World Bank’s International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA) will support adaptation and resilience. This represents a big step up from the 26 percent achieved on average during CCAP20 and an even bigger step up in dollar terms, because the World Bank Group’s total financing has also expanded.

Source: Summarized from World Bank 2021. <https://thedocs.worldbank.org/en/doc/d06622e74a388000e2e440438d461b99-0020012021/original/CCAP-2021-25-Highlights.pdf>

Each frequently requires overlapping health sector responses either to deal with current threats or to ensure opportunities to build back better are not missed.

- Climate change and its drivers are known to increase the risk of emerging and reemerging infectious diseases, and therefore, of pandemics. For example, deforestation contributes to CO₂ emissions and the destruction of habitats that

in turn increase the risks of zoonotic spillover events of infectious diseases from wildlife and livestock to humans.

- Several of the populations most vulnerable to the health impacts of climate change overlap with the groups most at risk from COVID-19. They include elderly populations, people with preexisting or chronic conditions (especially those related to respiratory illness), minority

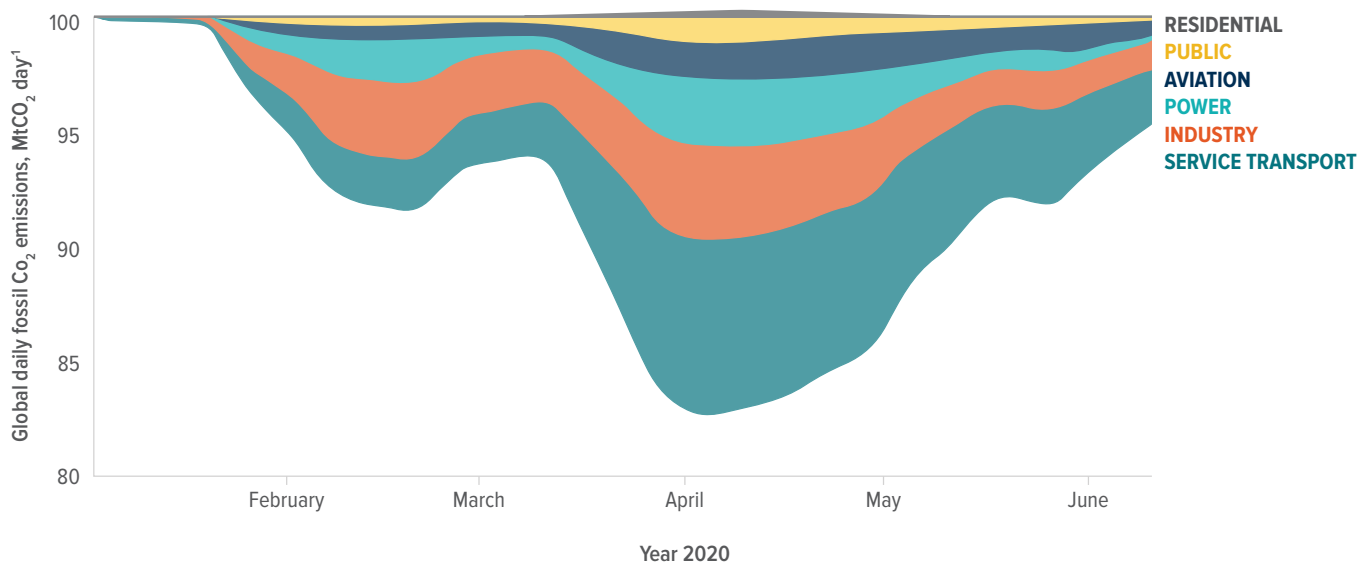
groups, and those of lower socioeconomic status or in poverty. The dual threats of COVID-19 and climate change, which exacerbate existing inequalities, can overwhelm health systems and add layers of complexity to already strained public health preparedness and response efforts.

- Measures to control COVID-19 can also have adverse implications for managing climate risks. These include reducing the capacities of emergency shelters in times of windstorms, flooding, and wildfires, due to social-distancing requirements. Moreover, extreme weather events related to climate change, such as heat waves, tropical storms, and wildfires, as well as ongoing issues like air pollution, have not disappeared during the COVID-19 pandemic, with any short-term reductions in CO₂ emissions likely to be temporary (figure 2.2).

- Health sector responses to the COVID-19 pandemic have the potential to make health systems more resilient and better adapted to climate-related events. These measures include strengthening the health workforce capacity; improving disease surveillance and health information systems; enhancing the rapidity of medical supply chains; along with streamlining health technology development processes to speed and scale up innovations, such as telemedicine and vaccine development.
- The convergence of COVID-19 and climate change also offers opportunities for health systems to become more sustainable and move further toward system decarbonization. Potential measures include more efficient public health systems, such as integrated surveillance, energy-efficient health facilities and transportation, along with the incorporation of sustainable cooling practices in the medical cold chain.

FIGURE 2.2

Temporary Reductions in Greenhouse Gases (GHG) Resulting from Lockdowns



Source: Le Quere et al. 2020.

Note: CO₂ = carbon dioxide; MtCO₂ day⁻¹ = metric tons of carbon dioxide per day

OPPORTUNITIES FOR A LOW-CARBON, CLIMATE-RESILIENT FUTURE

The collaboration witnessed in the mounting of a global response to COVID-19 provides lessons that can be replicated for addressing climate implications for population health and health systems. Ensuring that investments and resources for recovery are structured with a longer-term green, resilient, and inclusive development perspective in mind will provide greater value than immediate reactive response, thus breaking the cycle of short-term panic that is in turn followed by neglect.

The following sections outline health sector interventions that contribute to a low-carbon, climate-resilient future, which could be integrated into the COVID-19 response and recovery efforts. “Climate-smart health care” — a term coined by the World Bank in 2017 — encompasses both climate

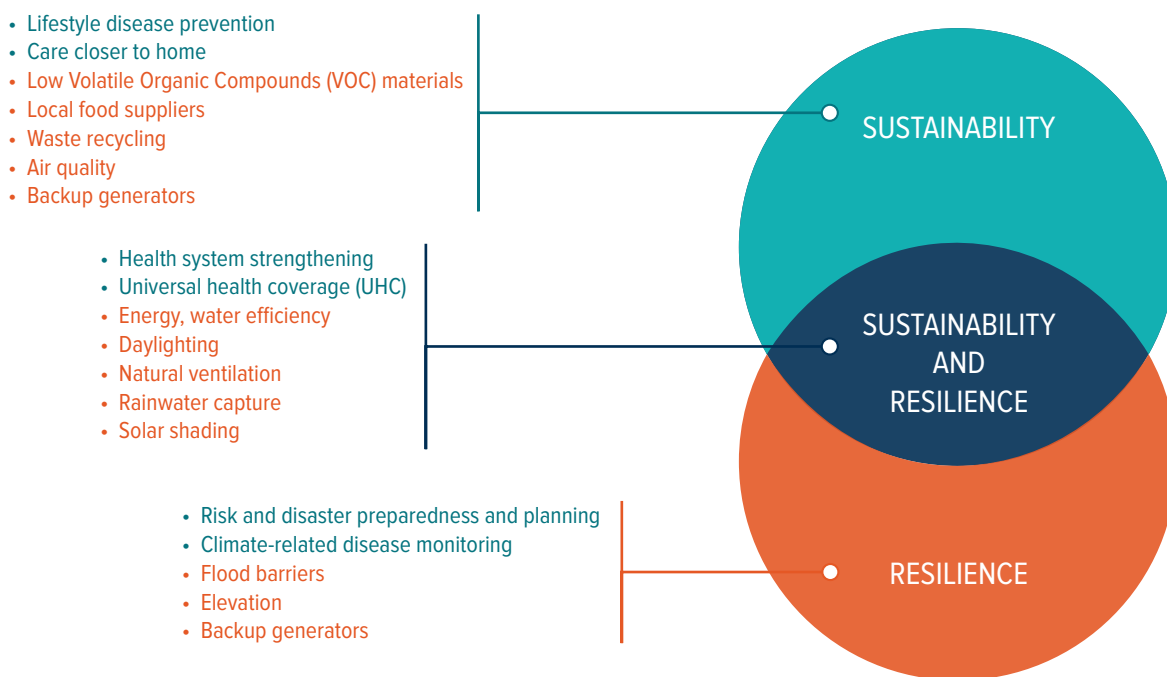
change mitigation and adaptation efforts that could be taken by the health sector (figure 2.3).

The climate-smart health care approach recognizes and integrates the need to ensure that adaptation and resilience measures are put in place for the changes we know will come, while at the same time, addressing the health sector’s own contribution to the problem by limiting its net global GHG emissions. Climate-smart health care also seeks to maximize the potential health co-benefits of actions to mitigate climate change, which promise to deliver further reductions in mortality and morbidity in a changing world.

When applied to the stages of pandemic preparedness, response, recovery, and rehabilitation, there are climate-smart interventions that may be prioritized at one or more stages (see figure 2.4). During preparedness, it is important that the

FIGURE 2.3

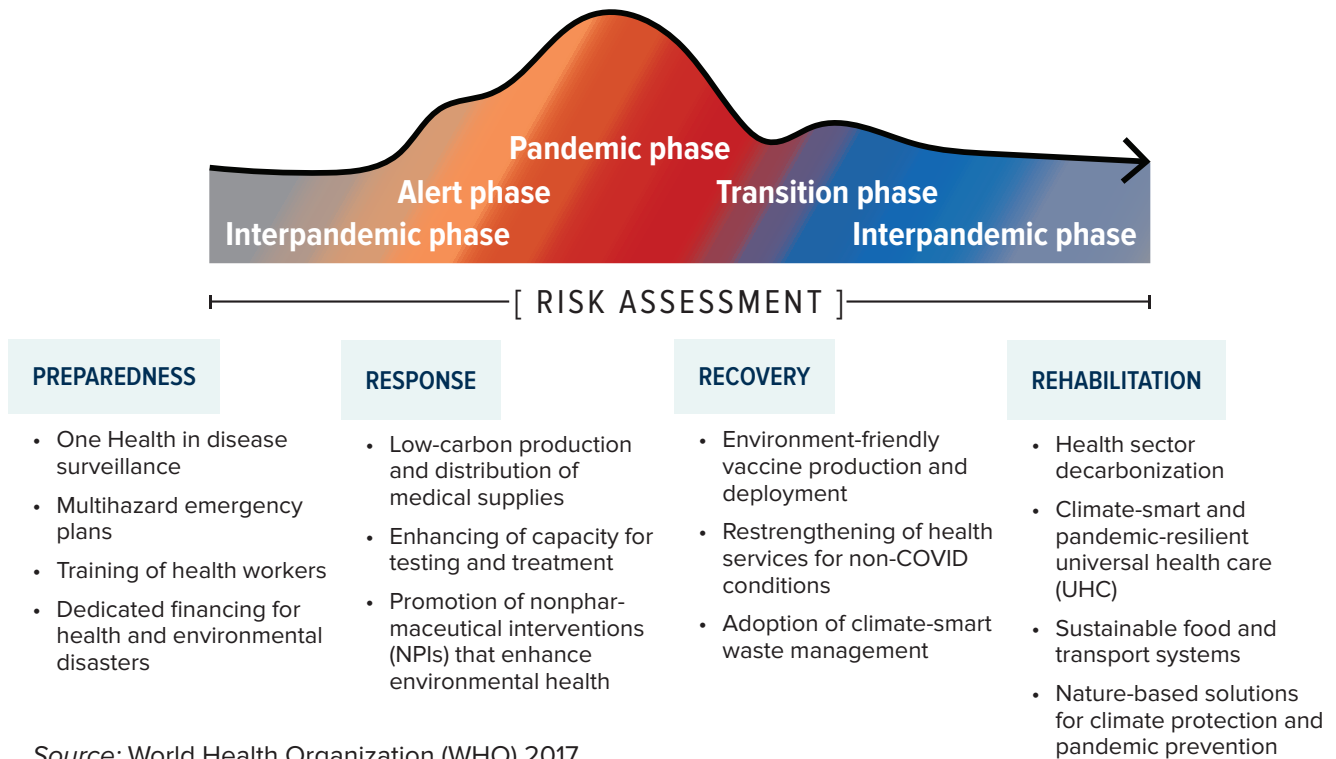
Climate-Smart Health Care as the Convergence of Sustainability and Resilience



Source: Bouley et al. 2017.

FIGURE 2.4

Climate-Smart Interventions throughout the Different Phases of the Pandemic Response



Source: World Health Organization (WHO) 2017.

surveillance systems built consider human, animal, and environmental health by using a One Health approach. Emergency plans built need to be able to address multiple hazards by tapping into the capabilities of diverse agencies so that they can tackle concurrent climate threats. Furthermore, health workers and allied health professionals need to be trained. Finally, and most importantly, dedicated financing should be put in place for these multisectoral activities.

In the response phase, medical supplies should be distributed using the lowest carbon options reasonably available. Enhancing capacities for testing and treatment will also improve capabilities for dealing with climate shocks, and where possible, nonpharmaceutical interventions (NPIs) that promote environmental health should also be considered.

In the recovery phase where vaccines are an option, their procurement should be performed with environmentally friendly production and low-carbon deployment, such as sustainable cold chains.

Health systems strengthening should be a key pillar of recovery to ensure a longer-term legacy, further ensuring against climate shocks. Adopting climate-smart waste management practices is also useful, in particular against flood threats. Finally, in rehabilitation, the health sector can take further measures to decarbonize and uncouple health gains from carbon emissions, embed support for sustainable food and transport practices, and employ nature-based solutions that are frequently also the cheapest options, even in the short term.

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SECTION 3.

INTEGRATING CLIMATE-SMART HEALTH CARE INTO COVID-19 RESPONSE AND RECOVERY ACTIVITIES

The World Bank's COVID-19 Strategic Preparedness and Response Program, using MPA (World Bank 2020b), provides a common operational framework for supporting individual countries' specific needs in preventing the spread of COVID-19; strengthening public health and essential medical care structures; building resilience to emerging and reemerging infectious diseases and reducing their risks; along with procuring and deploying vaccines. MPA can be seen as a menu of options for structuring national-level health emergency responses that are supported by the World Bank. This menu provides an opportunity to incorporate climate-smart health care into COVID-19 responses to ensure that this unprecedented global health investment also contributes to global climate goals.

Several examples of countries implementing practical measures to address the combined threats of COVID-19 and climate change were used to inform this report. They are summarized in table 3.1.

TABLE 3.1

Country Case Studies Showcasing Climate-Smart Interventions in COVID-19 Response and Recovery

COUNTRY	CLIMATE-SMART INTERVENTION	COVID-19 RESPONSE AND RECOVERY COMPONENT
Colombia	Sustainable procurement	Supply of essential medical commodities
Gambia, The	Health care waste management	Capacity for testing, isolation, and treatment
India	Renewable energy	Capacity for testing, isolation, and treatment
Nepal	Medical waste management	Health services for non-COVID-19 conditions
Philippines	Disaster risk management	Emergency preparedness, planning, and rehabilitation
Yemen, Rep.	Disease surveillance	Public health surveillance and risk assessment
Ghana	Vaccine cold chain	Vaccine readiness, procurement, and distribution

To ensure an efficient and effective pandemic response while also tackling climate change, real and perceived trade-offs must be carefully considered in the design and implementation of any climate-smart interventions. This requires a high level of innovation and collaboration across multiple sectors, and it is, therefore, useful to follow a number of key principles to guide the process. These include evidence-based decision-making, country ownership, multisectoral approaches, along with iterative monitoring, evaluation, and learning.

Building on the World Bank's climate-smart health care approach (World Bank 2017) and integrating MPA, this report identifies nine key areas of the COVID-19 response, based on the MPA components, and details climate-smart health care interventions that could be integrated into ongoing and future activities. Each intervention area is briefly explained and then opportunities for climate adaptation and mitigation are presented.

To ensure an efficient and effective pandemic response while also tackling climate change, real and perceived tradeoffs must be carefully considered in the design and implementation of any climate-smart interventions.

3.1 PUBLIC HEALTH SURVEILLANCE AND RISK ASSESSMENT

International policy frameworks, such as the International Health Regulations (WHO n.db.) under the auspices of the World Health Organization (WHO), as well as the Global Health Security Agenda (GHSA n.d.), have outlined the principles and policy measures for building the national capacities of countries to prepare for and respond to pandemic threats. The perennial threat of infectious pathogens underscores the need for constant integrated disease surveillance, prompt diagnosis, and robust research to understand the basic biology of new organisms and our susceptibilities to them, as well as develop effective countermeasures to control them. Without comprehensive and timely data, it is difficult to detect cases and clusters, mount immediate containment responses, and plan for eventual mitigation and suppression efforts. Critical components of strong surveillance include integrated health information systems; clear channels and protocols for routine data collection, reporting, analysis, and interpretations; capacity for screening, case detection, contact tracing, and trends monitoring; along with early warning functions. A well-functioning surveillance system also generates the information needed for assessing risks, including what kinds of risks exist and which populations face higher risks than others. While countries generally had some form of surveillance and information systems before the pandemic, many of them were compelled to set up new surveillance systems targeted at the pandemic situation, while some have further enhanced their existing surveillance procedures and technologies to cope with the scale and rapidity of the COVID-19 spread. These mechanisms can be made more effective by ensuring that they are integrated and managed in a climate-friendly way.

CLIMATE ADAPTATION AND RESILIENCE

Adopting the One Health approach in disease surveillance and environmental monitoring (including climate services for health) for the early detection of climate-sensitive infectious diseases.

COVID-19 is a stark reminder that viruses and other infectious pathogens circulate in nature. Hosted by animals, they can easily jump to human beings and produce an epidemic subsequently when not contained. One Health — a unified approach that recognizes links among human, animal, and environmental health (Destoumieux-Garzón et al. 2018) — can inform the development of integrated surveillance systems for both human and animal diseases as well as environmental determinants (box 3.1). In the face of climate change, there is also a growing recognition of the importance of “climate services for health” — the use of reliable climate information to help improve planning

and decision-making in the health sector (WHO and WMO 2016). The development and delivery of health-tailored climate products and services will help enhance the ability of health systems to prepare for and cope with the health impacts of climate change and variability.

Strengthening surveillance for climate-sensitive diseases, such as dengue, heat-related illnesses, air pollution-related diseases, and nutritional deficiencies, using lessons from COVID-19.

COVID-19 has motivated many countries to review and improve their national disease surveillance systems in order to cope with the increasing demands of the pandemic. These COVID-19 surveillance systems can be leveraged to enhance surveillance systems, particularly for other climate-sensitive infectious diseases. Ultimately, a robust and highly integrated disease surveillance system should cater to all types of diseases and hazards,

BOX 3.1

THE WORLD BANK’S WORK ON ONE HEALTH AND COVID-19

For more than a decade, the World Bank has worked to promote and operationalize One Health approaches and mainstream them into health sector investments worldwide (Berthe et al. 2018).

It was previously estimated that building One Health systems would require financial investments ranging from USD1.9 billion to USD3.4 billion per year (World Bank 2012). These amounts are substantially below the average USD6.7 billion per year in losses due to the six major zoonotic disease outbreaks in 1997–2009.

One Health responses are already a key feature of the World Bank’s global COVID-19 Multiphase Programmatic Approach (MPA). For instance, One Health is integrated across all the components of the India COVID-19 Emergency Response and Health Systems Preparedness Project — from disease surveillance and control to stronger laboratories to integrated information and communication management. The Emerging Infectious Diseases Prevention, Preparedness and Response Project in China also has a strong One Health focus, as reflected in components, such as the risk-based surveillance systems for zoonotic and other emerging health threats, as well as the improved protocols for information sharing between agencies responsible for human and animal health.



including those related to climate change, such as heat-related illness and air pollution-related diseases. Such an all-hazard approach to disease surveillance will ensure the systematic and timely collection and utilization of data to inform public health responses, whether for future pandemics or health consequences due to climate change (see country case study 3.1).

Integrating risk and vulnerability assessment to include pandemics and climate change with special attention on identifying vulnerable populations. Risk assessments at organizational, national, and global levels are central to both pandemic and climate adaptation planning in the health sector. However, risk assessment tools are often implemented in parallel with one another. Pandemic risk assessments, evaluations of preparedness capacity, and business continuity plans, conducted by health care organizations, had failed to anticipate the magnitude of this current pandemic. WHO has supported at least 34 developing countries in assessing their climate and health vulnerabilities. The World Bank is also beginning to conduct these national-level assessments that will be able to feed directly into recommendations for the World Bank's operations. The Climate Change and Health Diagnostic, conducted in Madagascar, is one such example, with others in the pipeline (see box 3.2) (Berry et al. 2018). There is a need for more country-level and subnational assessments, as well as support for operationalizing assessment findings and ensuring that climate considerations are mainstreamed into public health programming. Stress-testing exercises to assess health system readiness for climate risks have also been proposed, but this method has yet to be widely adopted by health ministries and other organizations (Ebi et al. 2018). Although COVID-19 reinforces the critical importance of risk assessments, backed by robust

and up-to-date data, there is a growing opportunity for developing integrated approaches to assess multiple interconnected hazards, including pandemics and climate change.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Integrating low-carbon and energy-efficient surveillance systems for health, weather, and environment. In addition to more coordinated data analysis and utilization, an added benefit of integrated surveillance systems for health and environment is the resultant efficiency in data collection, processing, and storage, which can translate into reduced and more efficient use of energy. To further lower the amount of GHG emitted by disease and environmental surveillance systems, health- and environment-oriented agencies should also consider the adoption of low-carbon data storage and processing technologies, as well as make sure that facilities are powered with clean renewable energy.

Adopting low-carbon and energy-efficient rapid-testing and contact-tracing technologies. While viral detection, using the reverse transcription polymerase chain reaction (RT-PCR) technology, remains the gold standard for COVID-19 diagnosis, rapid tests with similar levels of diagnostic accuracy are also now being developed (Guglielmi 2020). The cartridges for the RT-PCR machines contain a complex mixture of reagents that can be hard to dispose of safely. Similarly, rapid test kits, designed for single use and made of nonrecyclable plastics, can produce environmental harms through their production and disposal. Therefore, rapid test development should incorporate environmental and energy considerations and support improved waste management to ensure that these new technologies do not contribute to worsening

Country Case Study 3.1 Republic of Yemen:

STRENGTHENING DISEASE SURVEILLANCE TO COMBAT COVID-19 AND CLIMATE IMPACTS



Violent conflict has spiked dramatically in the Republic of Yemen since 2010, with climate change compounding the country's fragility. The COVID-19 pandemic has added even greater stress to the already complex situation in the country. Despite the challenges, the existing disease surveillance system — previously used to detect outbreaks of diseases, including cholera and malaria, in the country — has been utilized for the COVID-19 response. The functionality, utility, and universality of the surveillance system are shown in its ability not only to respond to disease outbreaks related to escalating conflict and climate vulnerabilities but also to capture relevant data in COVID-19 detection and response. This has enabled mobile teams in the country to respond rapidly to the outbreak and monitor disease trends within the districts.

Under the World Bank financing, the Electronic Integrated Disease Early Warning System (eIDEWS) was expanded in 2017 to cover 1,991 sites consisting of 22 governorates and 333 districts in 2019.¹ It was established to strengthen routine disease surveillance, predominantly in the early detection of epidemic-prone diseases, and was initially designed as an early warning system (Dureab et al. 2020). The eIDEWS collects data on 28 diseases from health facilities, including vector control and disease outbreaks of cholera, dengue fever, and malaria. It is directly implemented by the Republic of Yemen Ministry of Public Health and Population at various levels (health facility, district, governorate, and central levels) with the close support of WHO (World Bank 2019). The aim of eIDEWS is to reduce morbidity and mortality through the early detection of and rapid response to disease outbreaks. eIDEWS generates alerts that flag the need for epidemiological investigations in affected districts in the Republic of Yemen. This has allowed for the reporting of notifiable diseases in a timely manner and the issuance of weekly eIDEWS bulletins to health partners and other stakeholders.

eIDEWS has now been galvanized in the COVID-19 response. In anticipation of the second wave, health care staff in 21 COVID-19-specific facilities were trained on case management. In addition, surveillance trainings (such as contact tracing and case definition) were conducted. Further, governorate rapid response teams and rapid response teams (RRTs) were mobilized with the World Bank financing to respond to COVID-19. These RRTs function at

BY THE NUMBERS

Electronic Integrated Disease Early Warning System (eIDEWS)

2017

eIDEWS program launched in the Republic of Yemen

1,991

sites covered in 2019

28

diseases under surveillance

21

COVID-19-specific facilities received case management training

84

priority districts with activated Rapid Response Teams (RRT)

different levels (district, governorate, and central) as first-line responders to conduct investigations and provide rapid responses to any outbreak. COVID-19-specific RRTs were activated in 84 priority districts, based on criteria that included districts declaring confirmed and/or probable coronavirus cases and/or districts where contact tracing and contact follow-ups needed to be initiated.

Under extremely tenuous circumstances in the Republic of Yemen, involving dealing with multiple outbreaks, including cholera and COVID-19, the eIDEWS disease surveillance system has kept the fragile health system of the country functioning. With unstable internet connectivity, data can be received via phone calls, with focal points trained to input the data received, thus allowing for the flexibility of the surveillance system (Dureab et al. 2020). Additionally, it is available as needed 24/7. Even with the global pandemic of COVID-19 causing severe disruption, eIDEWS has continued to follow other disease outbreaks, including cholera, while being utilized in the COVID-19 response. The utility of a national surveillance system for disease detection, such as eIDEWS, in a conflict zone indicates the value of investing in such an infrastructure not just for strengthening health systems or monitoring disease outbreaks due to a changing climate, but also for its universality.

i Information comes from "Update on Project Implementation, 19–27 October 2020," MS PowerPoint presentation.

BOX 3.2

WORLD BANK'S CLIMATE CHANGE AND HEALTH DIAGNOSTIC IN MADAGASCAR



The World Bank piloted a Climate Change and Health Diagnostic in Madagascar in 2018 (World Bank 2018b). This is an island country highly vulnerable to the health effects of climate change, such as undernutrition, waterborne diseases, vector-borne diseases, climate-related disasters, and air pollution (World Bank 2018a). The diagnostic exercise, facilitated by the World Bank and external experts, along with the participation of government officials and other stakeholders, revealed that the health sector's ability to respond to future climate-related health shocks and stresses is hugely constrained by a chronic lack of financing, inequitable service delivery, and poor quality of service. Low levels of access are a particular cause for concern with regard to the system's ability to manage climate-related stresses, including increases in patient numbers during extreme weather events. It was concluded that because of the country's vulnerability to multiple climate-related health impacts and major constraints in resources and capabilities across the entire system, a holistic approach is needed. It should not focus simply on modifying current public health programs to manage each climate-related hazard, but instead, it should increase the health sector's overall performance in the face of climate change by using a range of interconnected climate-smart interventions. The World Bank is now building on the diagnostic to develop a revised methodology for Climate and Health Vulnerability Assessments (CHVAs) that will be published in late 2021.

environmental pollution and climate change. Provided that data privacy protections are put in place, electronic means of contact tracing using mobile phones and QR codes may also aid in rapid case finding, improved energy efficiency, and a reduced ecological footprint associated with the manual methods of contact tracing requiring transport and other resources.

3.2 EMERGENCY PREPAREDNESS, PLANNING, AND REHABILITATION

Existing disaster risk reduction and management plans — for instance, those that anticipate climate-change-related disasters, such as typhoons and flooding — were activated for the pandemic response. However, these plans rarely consider infectious disease outbreaks and often prove insufficient for responding to the pandemic. COVID-19 has renewed attention on emergency preparedness and crisis management, thus providing an opportunity to revisit and improve these plans to enhance the capacities of communities and countries to respond not just to pandemics but also to all forms of external shock, including extreme weather events associated with climate change.

CLIMATE ADAPTATION AND RESILIENCE

Adopting a multihazard approach to emergency planning that covers pandemics, climate-related disasters, and other external shocks. The next generation of country and community emergency preparedness and response plans should be applicable to all forms of external shocks, including infectious disease outbreaks and climate change. While each type of shock has its unique characteristics, these abrupt and catastrophic events share many common characteristics that require

similar capacities and resources, such as robust information systems, the deployment of relevant emergency health personnel, and effective public risk communication. Moreover, future multihazard emergency plans must also be flexible enough to be scaled for varying levels of need — from the most vulnerable or the hardest hit to those less affected, as well as for events outside the range of historical experience (see country case study 3.2).

Setting up coordinated governance mechanisms (including community networks), service protocols, and information systems from a multihazard approach to address external shocks. The multihazard approach to emergency preparedness also applies to governance mechanisms and service protocols that enable anticipatory planning, timely decision-making, and immediate emergency response. Since pandemics, climate-related disasters, and other health emergencies require policy and programmatic coordination across various government agencies and other stakeholders, new legislations can help formalize such multisectoral and multilevel governance structures to ensure a high level of preparedness. Most importantly, these governance mechanisms must include leadership from communities or community-based organizations that have firsthand knowledge of community needs and experience with them.

Training health workers and other personnel for deployment in times of emergency. The COVID-19 pandemic highlighted the importance of having an adequate and steady supply of well-equipped and motivated health workers and other emergency personnel. In this era of pandemics, compounded by the emerging threat of climate change, countries need support to increase their capacity to train health workers, especially those who are equipped to respond to highly complex emergency situations.

Country Case Study 3.2 Philippines:

LEVERAGING MULTHAZARD DISASTER PREPAREDNESS FOR COVID-19 RESPONSE



Visited by approximately 20 typhoons each year, the Philippines is one of the world's most climate-vulnerable countries. Apart from these extreme weather events, the country is also affected by the expected slow-onset long-term changes, such as its sea-level rise that is growing at an even faster pace than the global average rate in certain parts of the Philippines. Both extreme weather and slow-onset events will generate a wide range of health effects, including climate-sensitive infectious diseases, such as dengue and malaria as well as heat-related illness.

In response to the COVID-19 pandemic, the local governments took advantage of the local emergency response systems designed for climate-related disasters, such as typhoons and extreme flooding, by utilizing these existing capacities to organize multisectoral responses. Having been sensitized to previous emergency situations related to climate change, local government staff and communities alike already had systems and practices in place to move rapidly to enforce strict COVID-19 protocols in local communities when the pandemic hit. Pre-pandemic disaster mechanisms were activated. One key example is the Local Disaster Risk Reduction and Management Council composed of different officials who comprise municipal mayors; all relevant appointed officials (including the municipal health officer); chiefs of police, fire protection, and the military; along with sectoral representatives from the civil society and the private sectors.

Because national mandates compel local governments to invest in disaster preparedness, local governments were also quick to realign local budgets and mobilize initial financing for COVID-19-related activities. While certainly not adequate for the magnitude and long duration of the COVID-19 pandemic, these multisectoral governance and anticipatory budgeting mechanisms helped local communities to mobilize for the early pandemic response.

The early experience of the Philippines in tackling COVID-19 has demonstrated that pre-pandemic investments in disaster risk reduction and climate-change adaptations can be harnessed for mounting an immediate response to an unprecedented viral pandemic. While the physical manifestations of climate-related disasters and infectious disease epidemics may vary, there are principles, capacities, and resources common to both. At the same time, the Philippine experience has also shown that disaster preparedness and climate adaptation plans do not often consider infectious disease outbreaks, whether they are climate-related or not.

The relationship between climate-adaptation measures and pandemic-resilience building can be iterative and self-reinforcing. As countries leverage climate adaptation and resilience efforts to tackle COVID-19, many of the lessons from the pandemic response can also strengthen climate adaptation and resilience strategies.

The early experience of the Philippines in tackling COVID-19 demonstrated that pre-pandemic investments in disaster risk reduction and climate change adaptation can be harnessed for mounting an immediate response to an unprecedented viral pandemic.

In addition to multiplying their number, countries must ensure that health workers receive advanced training in areas relevant to disease outbreaks and extreme weather events, such as infection control, ventilatory support, first aid (even basic surgery for disaster-induced wounds and injuries), triage, and sustainable waste management. It is also recommended to include training that ensures the maintenance of essential services, such as waste management during a crisis. Training drills or simulations can be integrated into emergency preparedness, as can formal mechanisms to rapidly train student health professionals and other health volunteers.

Establishing multihazard disaster financing for pandemics, climate-related disasters, and other external shocks. This activity would include strengthening mechanisms to fund key community-based organizations that serve high-risk communities. To augment annual budgets for emergency preparedness and infectious disease control and prevention activities, new funding mechanisms are needed to earmark financial resources for different types of external shocks, including pandemics and extreme weather events. These activities would benefit from being established at the country level, with new funding sources tapped by national and local governments for immediate responses, thus enhancing their ability to prepare and plan for future shocks (see country case study 3.3). Setting up such domestic funding mechanisms can also help reduce the reliance of countries on external funding, including grants, loans, and aid. They may become more limited when many countries are experiencing shocks at the same time, as is happening now in the COVID-19 pandemic.

Country Case Study 3.3 Philippines:

PEOPLE'S SURVIVAL FUND

In anticipation of the future impacts of climate change on local governments, the Philippines created the People's Survival Fund (CCC 2017) — an annual fund that amounts to ₱1 billion (approximately USD19.3 million). It is appropriated by the congress each year and administered by the Land Bank of the Philippines. The purpose of this fund is to provide further financial support to local governments for their climate adaptation initiatives. Through the fund, local governments are invited to submit project proposals that are assessed on certain criteria, such as the municipality's level of climate risk, the project's poverty reduction potential, and the presence of potential spillover benefits beyond its jurisdiction. The fund was established in 2011 through an amendment of the 2009 Climate Change Act. However, until today, only six local governments have benefited from the fund, and none of the approved projects relate to public health. Given the growing recognition of the connection between pandemics and climate change, there is a new opportunity for local governments to submit health-focused project proposals that combine pandemic preparedness and climate adaptation.

BY THE NUMBERS

2017

People's
Survival
Fund created

₱1 BILLION

annual financial
support for climate
adaptation initiatives

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Establishing sustainable low-carbon backup options for electricity [for example, solar photovoltaic (PV)], clean water, adequate food supply, medical supplies, and transport. Preparing for future emergencies, whether pandemic- or climate-related, means ensuring that there is an adequate and reliable backup supply of essential resources. The adoption of sustainable, low-carbon, and energy-efficient forms of production, storage, and commodity transport also strengthens the readiness of services and reduces the carbon footprint associated with emergency response activities.

Adopting low-carbon and energy-efficient devices (flashlights, vehicles, and so forth) used in immediate emergency response. The emergency response and recovery material commodities used by the health sector should also have the following characteristics. They should be produced sustainably, as well as recyclable or reusable. Moreover, they should utilize efficient-energy storage technologies and electricity generated by clean renewable energy. These devices can then contribute to reducing GHG emissions associated with crisis responses.

Incorporating green sustainability principles in rehabilitation plans for affected or destroyed health care facilities and other infrastructure. The rebuilding, renovation, or retrofitting of health care facilities during the rehabilitation and recovery phase presents an opportunity for incorporating sustainability considerations, such as energy efficiency, low carbon, and resilience, as well as minimum standards for the construction and design of cooling infrastructure post-COVID-19 and/or post-climate-related disaster.

Maintaining and restoring degraded lands and environments around health care facilities to support cooling and minimize flooding impacts.

Hospitals and health care facilities can spearhead initiatives to plant native trees and restore other natural environments, such as grasslands and wetlands in the vicinity. Such measures can provide shade (and hence cooling effects), as well as ensure greater water filtration into the ground to minimize the risks of erosion and floods. Increased vegetation near health facilities can also enhance patients' exposure to greenness that has been shown by studies to improve mental health and surrounding air quality.

3.3 CAPACITY FOR TESTING, ISOLATION, AND TREATMENT

The COVID-19 pandemic exposed the limitations of the general capacities of hospitals, laboratories, and primary care facilities, which are all essential in the different aspects of infectious disease screening, diagnosis, and treatment. In many countries, existing health care facilities were upgraded and expanded, including, in some cases, the construction of new hospitals and isolation centers. For example, China pioneered the new concept of a *fangcang* shelter hospital—a large-scale, temporary hospital that is rapidly built by converting existing public venues, such as stadiums and exhibition centers, into health care facilities (Chen et al. 2020). In addition, many developing countries oversaw the construction of new laboratory facilities that meet advanced biosafety standards, with the necessary equipment to handle and process highly dangerous virus-containing specimens. These new health care facilities should be leveraged and sustained as part of providing better access to health care and enhancing the

health system capacity to tackle future health crises, including pandemics and the long-term consequences of climate change. Improved waste management also needs to be incorporated into these plans to help avoid situations where countries are burning unsegregated health care waste in municipal incinerators.

CLIMATE ADAPTATION AND RESILIENCE

Ensuring the resilience of health facilities against climate-related disasters and their effects (such as electricity disruption). Hospitals and other health care facilities dedicated to the COVID-19 response should be constructed or upgraded with the consideration of future shocks, such as climate-related disasters and other impacts, including heat stress or droughts (see country case study 3.4). This includes strengthening the physical infrastructure of health care facilities to withstand environmental shocks, building community resilience, and improving systems to prevent the disruptions of essential resources, such as electricity, food, and water.

Strengthening referral networks and contingency plans to ensure the continuity of COVID-19 services during climate-related disasters. The resilience of hospitals will be enhanced by ensuring that they are connected to robust referral networks consisting of other health facilities, health centers, and community-serving institutions that can provide backup care in case of disruptions. Care for COVID-19 patients, whether supportive or intensive, must be continuous for moderate to long periods (for instance, at least 14 days), and therefore, health services cannot be interrupted. Contingency plans that address these aspects, including emergency surge capacity, emergency response procedures, on-site rescue, field hospital, and hospital facility medical equipment, can limit the disruptions of health services during emergencies.

Revitalizing national plans for human resources for health as well as volunteers and workers from other sectors to sustain the COVID-19 response and prepare for climate-related health risks. Prior to COVID-19, massive shortages in health personnel already existed in many countries. These shortages were further magnified during the pandemic. The enormous strain caused by COVID-19 on the health workforce helps illustrate the potential of future shocks and stresses on the health system, such as those caused by climate-related disasters. Countries should, therefore, begin to revisit national health workforce plans to consider augmenting training capacity, revising curriculum to incorporate relevant skills and competencies for tackling health challenges related to pandemics and climate change, and ensuring the equitable distribution of scarce health workers across populations and geographies.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Adopting low-emissions energy and energy-efficiency measures for COVID-19 testing, isolation, and treatment facilities (including natural lighting and ventilation). The COVID-19 pandemic triggered the augmentation of laboratory and treatment capacities in many countries, often resulting in the expansion of existing services and/or the construction of new health facilities. New laboratories, isolation facilities, and hospitals should, therefore, use this opportunity to adopt measures that improve energy efficiency and reduce carbon emissions. Passive cooling also offers co-benefits by enhancing air flow and further preventing the airborne spread of COVID-19, as well as reducing energy demand. Ultimately, the next generation of health facilities needs to be climate-smart and embrace clean renewable

Country Case Study 3.4 India:



HEALTH FACILITY ENERGY RESILIENCE FOR CLIMATE AND COVID-19 RESPONSE

Energy security is key to better and uninterrupted health services, given that it helps in improving equipment functionality, better delivery systems, more functional neonatal care units, and the retention of staff. In light of the COVID-19 outbreak, the solarization of health centers has not only saved money but also provided energy security, and thus, quality health care to the communities. It has also strengthened the already existing health infrastructure so that it can be prepared to face future health challenges, epidemics, outbreaks, or any climate change-induced adversity and deal with them.

As the following examples from two of the lowest-income states in India — Chhattisgarh and Bihar — attest, needs-based solarization can result in the reliable management of cold chains for medicines and vaccines, as well as efficient care services for vulnerable populations, such as pregnant women, newborns, and the elderly, while also maintaining the internet, data sharing, communication, and information systems.

State of Chhattisgarh: Timely Action on COVID-19 and Strengthening Health Centers to Make Them Low-Carbon, Pandemic-Prepared, and Climate-Resilient

For several years, the state has striven to integrate most of the 10 components of the operational framework of climate-resilient health systems, as prescribed by WHO. Nowhere is the connection between Chhattisgarh's COVID-19 response and climate change clearer than in its program for the solarization of its health centers.

The state, through its agency, the Chhattisgarh Renewable Energy Development Authority (CREDA), has been implementing the solarization of health centers throughout Chhattisgarh since 2012. Between 2012 and 2019, CREDA installed off-grid solar photovoltaic (PV) rooftop systems in 906 health centers across the state.

Based on these outcomes, in the midst of the COVID-19 pandemic in 2020, the state ramped up its commitment; it now aspires to solarize an additional 705 health centers. This would allow it to achieve 100 percent renewable electricity in its government health centers. This health system strengthening will make Chhattisgarh more pandemic-prepared and more capable of delivering a COVID-19 vaccine.

The aim of the solarization effort is also to design solar solutions based on the specific needs of the health centers, including their vulnerabilities with respect to prevalent extreme climatic events, such as floods, droughts, heat waves, and air pollution. This approach fits into the state's more comprehensive plan to tackle the health impacts of climate change, as described in its State Action Plan for Climate Change and Human Health (based on the guidelines of the National Program on Climate Change and Human Health, as prescribed by the National Center for Disease Control, Ministry of Health and Family Welfare).

“

Solarization has increased the institutional delivery of health in the state. It has ensured that mothers stayed for at least 48 hours at the facility, which decreased the maternal mortality rates, and newborn care corners and newborn stabilization units in the centers have been functioning better and thus quality of care has improved. There is better cold chain maintenance to ensure smooth execution of the immunization program. Solarization has increased the footfall of patients and generated trust in the public health systems.”

Niharika Barik Singh
Former Health Secretary

The COVID-19 pandemic highlights how powering health with renewable energy can build resilience, not only for health system strengthening and climate resilience, but also for pandemic preparedness.

Masarhi, Bihar: A Climate-Resilient COVID-19 Care Hospital with Staff Quarters

Implemented by the Indian nongovernmental organizations (NGO) — the SELCO Foundation and Doctors for You (DFY) a hospital in Masarhi, Bihar is a new solarized COVID-19 care facility with a six-bed inpatient department, two procedural rooms, and 15 staff accommodation rooms. It is built with sustainable materials and 100 percent- powered by renewable energy. It is a potentially scalable example of how the COVID-19 response, climate resilience, cost savings, and achieving greater access to care can be embodied by a single health facility.

Solar photovoltaic (PV) at the Masarhi hospital is powering, among other things, ventilators for COVID-19 care, a laboratory for testing and analysis, as well as the water pump for the facility. Solarization has ensured 24/7 power for the hospital, resulting in improved staff retention and increased trust from the public; women patients are more willing to stay at the hospital for care because they feel safe there.

The hospital has adopted a holistic approach to climate resilience wherein energy-efficiency measures have been deployed in combination with renewable energy infrastructure. Given the precarious situation of the electricity supply in the region, the hospital is fully powered by a 15-kilowatt solar PV array with battery backup. Although it is connected to the grid, it can continue to operate fully, even in the event of grid power disruptions. In addition, the hospital has incorporated diverse innovative measures that reduce its energy footprint and minimize energy needs.

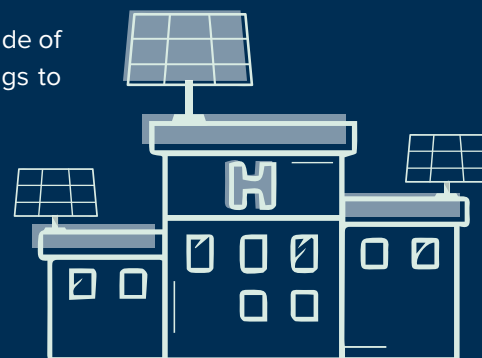
The facility has eco-friendly walling and flooring made from compressed Agri Fiber panels that are manufactured by using crop residue. These panels provide enhanced insulation compared to conventional walling and flooring panels, thereby leading to a decreased need for air conditioning during the summer. Examples of other incremental building solutions added to improve the quality of the space with respect to natural lighting, ventilation, and thermal comfort, leading to the early recovery of the patients, included the following features:

- addition of skylights and turbo ventilators to the roofing;
- windows with exhaust fans; along with
- cool-roof solutions, such as cool-roof paints, modurable roofs made of recyclable materials (also known as mod roofs), and false ceilings to reduce the heat gain through roofing.



Solarization of the health center has helped cut electricity costs by almost 58 percent in the facility. Given the unknowns around COVID-19, especially about how long the pandemic would last, cost uncertainties are plaguing health facilities. To top this, COVID-19 care itself is an expensive proposition. Solarization of the health center helps reduce and balance the costs for a COVID-19 Care hospital.

Ravikant Singh
Doctors for You



energy to help diminish the ecological footprint of the health sector.

Establishing sustainable health care waste management in testing, isolation, and treatment facilities, including waste minimization, segregation, safe recycling, and incineration phaseout in favor of steam-based disinfection. The demand for health care materials and the amount of health care waste have increased dramatically during the COVID-19 pandemic, therefore requiring more sustainable waste management approaches. Waste from COVID-19 should be treated as any other normal waste (HCWH 2020b; WHO 2020a). The improper management of health care waste contributes to proximate environmental pollution (for instance, of air quality and water resources). Incineration also greatly contributes to air pollution and GHG emissions, whereas alternatives, such as steamed-based mechanisms, have proven to be effective (see country case study 3.5). Health facilities should address the entire cycle of health care waste by improving health care protocols for enhanced efficiency and reduced waste generation, as well as adopting green practices and technologies for recycling and disposal. This can include disabling, disinfecting, and recycling syringes and ensuring the sustainable disposal of testing kits.

3.4 SUPPLY OF ESSENTIAL MEDICAL COMMODITIES

The COVID-19 pandemic has driven a surge in demand for essential health care supplies, such as PPE, mechanical ventilators, and medicines. Because suppliers, distributors, and health facilities failed to anticipate the immense need for health care commodities brought about by the pandemic, supply shortages have led to the repeated or

prolonged use of PPE, such as face masks, thereby compromising infection control and health worker safety. The global production of PPE and other commodities is catching up, but this has often been done at the expense of using more sustainable and deeply considered processes. An opportunity exists to encourage and develop shorter and more resilient supply chains that can respond to all types of shocks, including pandemics and climate-related disasters, while reducing emissions and protecting planetary limits.

CLIMATE ADAPTATION AND RESILIENCE

Ensuring the steady supply of PPE, mechanical ventilators, medicines, and other essential commodities, including non-mercury-based thermometers and waste collection bins and bags, throughout the entire COVID-19 response and in preparation for potential climate-related shocks. Building shock-resistant supply chains at the local, national, regional, and global levels will support the continuous provision of health care supplies during this pandemic as well as enhance the health sector's capacity to immediately respond to future crises, including climate-related disasters. Factories and transportation services must put in place backup options, including for electricity and manpower, to ensure the continuous production and distribution of essential supplies, especially in times of shock.

Using energy-efficient and low-carbon mechanical ventilators and diagnostics, including X-rays and microscopy, which can function despite electricity disruptions resulting from a climate-related disaster. The initial surge of COVID-19 cases worldwide exposed the global shortage of mechanical ventilators — a key medical device for respiratory illnesses, resulting in difficult patient allocation decisions, improvised adaptations in care protocols, and even the invention of



MOVING FROM INCINERATION TO SUSTAINABLE HEALTH CARE WASTE TECHNOLOGY IN RESPONSE TO COVID-19

In reaction to the mounting COVID-19 cases in The Gambia, the government took the initiative to address the infectious health care waste generated by the COVID-19 response. While responding to the public health emergency, it showed that sustainable health care waste management, including maintaining a low-carbon footprint, is possible by replacing incineration with microwave technology.

Health care waste management is a notable issue in developing countries, where air contamination, surface and groundwater pollution, and the spread of diseases are concerns. While incinerators have traditionally been the waste management solution of choice, they have serious drawbacks. Burning waste emits significant amounts of carbon dioxide (CO₂) and other pollutants, including dioxins and furans, carcinogens, and endocrine disruptors. These pollutants persist in the environment for hundreds of years and build up in the food chain, resulting in their transmission from mother to child.

As part of the COVID-19 response, one of the key components proposed was to improve health care waste management in the sanatorium treatment center in the western region of the country, where most of the confirmed cases would be treated. Under the World Bank-financed COVID-19 operation, procurement moved from incinerators to a more sustainable technology. The health care waste management technology selected by the government of The Gambia uses microwave disinfection technology as a cleaner method for managing and treating medical waste, thereby providing an environmentally friendly, simple, and reliable solution for health care waste management, particularly in the urban areas. The technology is energy-efficient, requiring little energy as well as few staff, no water, steam, and no production of toxic waste. Noting that laboratories and relevant health facilities that are being used for the diagnostic testing and isolation of patients can generate biological waste, chemical waste, and other hazardous bioproducts from COVID-19, the management and handling of highly-infectious biomedical waste are critical as part of the pandemic response.

Throughout the process, the government of The Gambia engaged in initiatives to protect health, while considering its environmental and climate change commitments. It took the initiative and served as the driving force behind the process—researching the options available as well as considering environmental and social safeguards to maintain the health of the population and the environment. Social and environmental safeguards are essential for preventing and mitigating undue harm to people and their environment in the development process. In order to move forward with addressing climate change, while responding to COVID-19, the country will need to take the initiative to maintain a sustained and viable response. Ultimately, country ownership and leadership are key to sustainability and addressing climate change, while responding to COVID-19.

While responding to COVID-19, The Gambia showed that sustainable health care waste management, including maintaining a low carbon footprint, is possible by replacing incineration with microwave technology.

low-cost options by local producers. In settings that are highly vulnerable to electricity disruption (for example, during climate-related disasters), sustained ventilatory support for critical patients becomes even more challenging. The next generation of mechanical ventilators must be adequate in supply and reliable in times of energy shortages. It is also important to explore innovative design opportunities that promote sustainability and reduced environmental impact.

Strengthening local production and supply chains to ensure the steady supply of commodities while reducing transport emissions. Producing and storing essential commodities closer to health facilities will significantly reduce the need for long-distance transport and, in turn, reduce fuel use and the emissions of GHGs. Local production and storage can thus enhance the resilience of local health systems and surrounding communities by ensuring timely responses to health emergencies, sustaining longer-term response operations without outside aid, and supporting local economies.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Adopting renewable energy and energy-efficiency measures in the manufacturing, storage, and transport of essential commodities. Factories and transport services for the production, storage, and distribution of essential health care commodities for the pandemic response should consider environmental impacts, including air pollution and GHGs, by shifting to renewable energy sources. In addition, some essential commodities, like vaccines and other medicines, require a carefully maintained cold chain that should also shift to low-carbon and efficient technologies in the coming years (K-CEP 2018).

Sustainably managing all waste, including the waste minimization and segregation of all items, such as used PPE that includes masks and medicine packaging. Suppliers and distributors of essential commodities, such as PPE and face masks, as well as the pharmaceutical industry, should share responsibility for the environmental implications of their products across the entire life cycle. This requires encouraging segregation and waste minimization, including avoiding the unnecessary use of chemicals and disinfectants. Reverse logistics channels for particular commodities can also increase the possibility of the recycling and return of used products to manufacturers that can then recycle them or ensure their safe disposal.

Producing washable and reusable PPE made of sustainable materials. Embedding sustainability principles, including low-carbon production, transportation, and disposal, into the production of vital COVID-19-relevant commodities, such as PPE and face masks, is an important consideration. Moreover, next-generation PPE can be developed to be washable and reusable, while still providing similar safety and cost effectiveness, when compared with single-use alternatives.

Adopting sustainable procurement standards for PPE, other equipment, cooling devices, and medicines, including prioritizing the minimization of waste production and avoiding the purchase of products with high carbon levels, high global warming potential (GWP), or high energy consumption. Choices made in the selection and procurement of all health care-related equipment or products should be considered in relation to specific procurement standards that include references to minimizing waste production, low carbon emissions, low GWP, low energy consumption, as well as the utilization of less toxic ingredients (see country case study 3.6).

Country Case Study 3.6 Colombia:

SUSTAINABLE PROCUREMENT AND COVID-19 HEALTH CARE RESPONSE



In Colombia, having a sustainable procurement program in place has allowed several hospitals and health care systems to better cope with the health emergency caused by COVID-19. The health care supply chain plays a major role in many economies and has a significant impact on human health and the environment. At the same time, the pandemic has disrupted the global health care supply chain, thereby leading to shortages of PPE, single-use medical devices, disinfectants, cleaning products, and other key elements associated with the protection of health care workers as well as the diagnosis and care of COVID-19 patients.

In response, a number of Colombian health care systems and facilities, already implementing sustainable procurement policies and practices in collaboration with Health Care Without Harm (HCWH) and the United Nations Development Programme (UNDP), were able to rapidly develop policies and actions to prioritize the use of reusable PPE, while also adapting formulas for disinfectants and detergents. These same hospitals have also been accelerating the use of telemedicine in consultations associated with the diagnosis and prevention of non-respiratory diseases.

In the case of these Colombian hospitals, having a clear environmental policy on sustainable procurement in place made it easier to respond to COVID-19 and continue with a safe environmental approach as part of that response. This pandemic resilience has had associated climate benefits: by procuring supplies and services that prioritize reusables (PPEs) and reduce patient and staff transport (telemedicine), health care institutions have reduced the carbon and environmental footprint of their COVID-19 response and the health sector in general.

3.5 HEALTH SERVICES FOR NON-COVID-19 CONDITIONS

A significant challenge facing the COVID-19 response and recovery is maintaining pandemic-essential services, including testing, isolation, and treatment capacities, while continuing to provide health services for other public health conditions. For example, reproductive, maternal, newborn, child, and adolescent health has, in some cases, seen neglect during the COVID-19 pandemic due to the reallocation of resources to

focus on COVID-19 and changes in care-seeking behaviors. The strengthening of primary health care and health service delivery for non-COVID conditions is important, as it can have long-term resilience-building attributes that reduce the impact of future health emergencies, including those induced by climate change.

CLIMATE ADAPTATION AND RESILIENCE

Strengthening other non-COVID-19 public health programs, including those for climate-sensitive diseases. A high baseline status of health among

individuals is beneficial for preventing severe COVID-19 outcomes and reducing individual vulnerability to climate-related diseases, such as heat-related illness and water-borne infectious diseases. To ensure the maintenance of this baseline, there must be a sustained delivery of prevention and treatment measures that reduce the excess burden of other diseases, for instance, non-communicable diseases, such as cardiovascular diseases, diabetes, and cancer — all of which are key risk factors associated with the COVID-19 infection. Moreover, climate-sensitive health risks, such as vector- and water-borne diseases, heat-related illnesses, and undernutrition, are highly preventable by intensifying existing disease-focused public health programs and incorporating a climate lens.

Enhancing resilience against climate-related impacts and their effects (such as electricity disruption) on health facilities that render non-COVID-19 services. Similar to the recommendation for COVID-19-dedicated health facilities, hospitals and primary care centers assigned to manage patients with other conditions must be protected from the destruction resulting from climate-related disasters. Hospital buildings must be made resistant to strong winds and flooding. Furthermore, off-grid options for electricity and water supply as well as communication channels must always be available as backups.

Strengthening health-financing mechanisms to ensure universal coverage to people with COVID-19 and other non-COVID-19 conditions, including climate-sensitive diseases. The COVID-19 pandemic has exerted tremendous stress on national health-financing mechanisms, whether they are tax-financed or based on social health insurance. The impact is especially serious in settings with high levels of private financing

for health care, leading to greater out-of-pocket expenses and the further impoverishment of households due to health care spending on COVID-19 or other conditions. National health systems should reevaluate national health financing systems to find solutions that ensure sustainable financial flows, for instance, through new sources of revenue. Furthermore, to protect households from the financial risk that results from hospitalization, benefit packages for the treatment of COVID-19 and other diseases, including those linked to climate change, should be developed. Finally, health financing should be made equitable, ensuring that the poor are not left behind.

Integrating mental health and well-being programs for health staff and volunteers into health emergency response and recovery efforts, including those related to the pandemic and climate-related disasters. Health workers and emergency response volunteers responding to COVID-19 and climate-related disasters are likely to experience mental stress and burnout. The failure to address the mental and emotional vulnerabilities confronting the health workforce may impede the effective delivery of health services to patients. Psychosocial support must be made available to all health personnel, with extra support envisaged for the emergency response and the recovery process.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Promoting low-carbon and energy-efficient telemedicine services (along with support for increased access to communication devices and wireless connectivity) to ensure the continued provision of primary care and close last-mile delivery gaps. The demand for telemedicine services has increased during the pandemic, especially for nonemergency health

needs. Telemedicine not only provides a safe, effective, and affordable alternative to face-to-face primary care consultations but also presents an opportunity for maximizing professional time and reducing the carbon footprint of health care associated with electricity use in health facilities and air pollution from patient transport. Telemedicine can also support the continuity of care for patients with chronic conditions and offer a possible solution for hard-to-reach or remote populations lacking access to basic primary care. The expansion of telemedicine must be coupled with improving access to low-carbon and energy-efficient communication devices (for example, mobile phones and tablets) as well as wireless internet connectivity. Technology literacy through education must also be enhanced among vulnerable populations.

Improving the efficiency of care pathways to ensure health provision, reduce emissions, and save costs. Measures that enhance the efficiency of care pathways, such as telemedicine and optimized treatment regimens, will help reduce waste and GHG emissions, while ensuring that more patients receive health care in resource-constrained settings. In addition, efficiencies can lead to cost savings that can be reinvested in other health-improving interventions.

Adopting low-carbon and energy-efficient technologies as well as cooling practices for health care provision. Cooling, especially as temperatures increase, is needed to maintain the functioning of laboratory equipment, keep food safe, guarantee a cold chain for vaccines and medicines, and more. Passive cooling should be prioritized in every new construction project (for example, shades, natural ventilation, or reflective roofs). When active cooling is needed (for example, for air conditioners or the purchase of a new

freezer), energy efficiency and low carbon intensity should be prioritized in the procurement criteria.

Strengthening climate-smart health care waste management. More capacity to treat and dispose of health care waste safely and sustainably is needed; as such, efforts should embrace non-incineration technologies to reduce the carbon footprint of the health sector (see country case study 3.7). Key steps include the minimization of the amount and toxicity of waste through well-informed procurement policies; segregation at source of waste streams; steam-based disinfection; and recycling. The bio digestion of organic waste, including pathological waste (the largest volume of which is composed of placentas) as well as food and kitchen scraps, will yield methane-rich biogas that can be used onsite for cooking or water heating, thus preventing emissions from incinerating pathological waste. Other organics should be sent to landfills.

3.6 NONPHARMACEUTICAL INTERVENTIONS

While health care provision is essential for improving outcomes and reducing mortality among those contracting COVID-19, NPIs, such as physical distancing and the universal wearing of masks, have also proved effective in preventing further viral transmissions. When NPIs achieve their goal of slowing the spread of the virus, the number of COVID-19 patients will be lessened and the health care system not as overwhelmed. The success of NPIs relies not only on the capacity of health care facilities and services but also the awareness and abidance of the broader public, including strong cooperation among other sectors.

Country Case Study 3.7 Nepal:

INTEGRATED SUSTAINABLE HEALTH CARE WASTE MANAGEMENT SYSTEMS TO REDUCE COVID-19 RESPONSE POLLUTION



The COVID-19 pandemic has threatened to overwhelm the waste management systems of some hospitals and health centers. The delivery of the new COVID-19 vaccine is expected to bring another stream of waste. A multiparty partnership in Nepal is demonstrating that safe and environmentally sustainable health care waste management systems can bolster normal operations and help take on COVID-19 waste issues while building health system resilience. Investments in integrated hub-and-cluster systems, based on careful waste segregation, the autoclave disinfection of waste, and the recycling of as much waste as possible, offer the greatest all-round benefits. The bio digestion of organic waste completes the portfolio of climate-smart and resilient waste treatment technologies for health care facilities in low- and middle-income countries.

The Sukraraj Tropical and Infectious Disease Hospital in Kathmandu — the nation’s capital — is Nepal’s only dedicated infectious disease hospital. Operated by the government of Nepal, it has 100 beds, with half now dedicated to COVID-19. It is the country’s first COVID-19 hospital, serving more than 1,000 outpatient cases per day, while also collecting and handling more than 900 swabs per day for COVID-19 tests. The Sukraraj Hospital has a small waste treatment center, with an autoclave donated to help treat COVID-19 waste. The autoclave is not large enough to cope with all the infectious waste from the hospital; so currently, only the COVID-19 waste is being treated. The Sukraraj Hospital is being supported to manage waste from COVID-19 patients by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Nepal and the Health Environment and Climate Action Foundation (HECAF360).

Nearby, spread across the Kathmandu Valley, are five drop-in-centers (DICs) that offer harm reduction services, including Human Immunodeficiency Virus (HIV) testing and syringe exchanges to persons who inject drugs. The DICs are operated by diverse Nepali community-based organizations and NGOs. While financial support comes from the Global Fund to Fight AIDS, Tuberculosis and Malaria as well as Save the Children Nepal, technical support is obtained from HECAF360 and Health Care Without Harm (HCWH). The DICs have been searching for a safe way to dispose of their waste. With neither the space nor resources for the equipment and personnel to treat the HIV test kits and used syringes from their clients, the DICs have accumulated substantial stockpiles of waste, while awaiting a solution.

BY THE NUMBERS

Sukraraj Tropical and Infectious Disease Hospital in Kathmandu

1st

dedicated COVID-19 hospital in Nepal

100

hospital beds — half dedicated to COVID-19

1,000+

outpatient cases served per day

900

COVID-19 testing swabs collected and handled per day

5

Nearby DICs participating in a hub-and-cluster model for enhanced waste management

In response to this situation, the facilities, their backers, and technical support teams are now cooperating to create a system that meets the needs of both the hospital and the DICs. This “hub-and-cluster model” is effective in locations where there is no centralized waste management facility. Larger health care providers with the technical expertise to treat waste safely also treat that of smaller facilities nearby. They provide a valuable service and, in turn, can subsidize the use of their staff and equipment by charging waste treatment fees. This sustainable health care waste management system has the following characteristics:



SEGREGATION. At each of the participating facilities, waste will be strictly segregated to minimize the amounts requiring treatment.



TREATMENT. Autoclaves that use high-temperature, high-pressure steam to kill pathogens will disinfect the waste.



RECYCLING. Much of the waste from the Sukraraj Hospital can be recycled. Noninfectious waste, including paper, plastics, and glass, which have been segregated at source, will be brought directly from the Sukraraj Hospital’s wards to the “green” section of the waste treatment center from which it will be sent for recycling. After treatment in the “red” section, some of the previously infectious waste can also be recycled. In previous research, HCWH and HECAP360 were able to recycle immunization waste, including vaccine vials and packaging; the only exception was the cut needles.

Investing now in sustainable health care waste management systems can address the problems associated with COVID-19 treatment and vaccination, while also developing infrastructure that can continue to be useful once the pandemic abates. Actions taken to counter the spread of the virus can also present potential long-term benefits.

CLIMATE ADAPTATION AND RESILIENCE

Consistently promoting regular hand washing and other personal hygiene practices to prevent COVID-19 and climate-related waterborne diseases. The COVID-19 pandemic provides an opportunity to reinforce basic behaviors for disease prevention, such as regular hand washing and proper cough etiquette. In addition, climate-sensitive water- and food-borne diseases as well as COVID-19 can be prevented by strengthening water, sanitation, and hygiene (WASH) in health care facilities, communities, and households. Special attention must be given to the poor and

vulnerable who generally lack proper access to WASH services. This promotion will contribute to meeting SDG, including those related to health and climate, along with the achievement of universal access to quality health care (WHO 2019, 2020).

Designing temporary shelters for victims of climate-related disasters to ensure the continuation of physical-distancing measures. In countries that are highly vulnerable to extreme weather events, such as typhoons and extreme flooding, the design of temporary shelters and evacuation centers for disaster victims must allow the continuous observance of NPIs, such as physical distancing

and regular hand washing. Hand-washing facilities, including faucets, soap, and other disinfectants, must be adequately available in these temporary settlements. Specific beds or quarters of individuals and households should be adequately spaced to ensure the observance of physical distancing. Natural ventilation and the appropriate design of air flow within evacuation centers can also reduce the risk of airborne transmission of COVID-19.

Designing adaptive social protection programs, particularly for communities at high risk to different forms of external shocks, such as pandemics and climate-related disasters. NPIs, such as stay-at-home orders, school closures, and travel restrictions, can have socioeconomic impacts, including income and job loss as well as reduced access to food and other essential resources. Similar impacts can be anticipated in the aftermath of climate-related disasters. The COVID-19 pandemic provides an opportunity for designing (or redesigning) social protection programs, such as social insurance schemes, along with social assistance and welfare services, in order to help ensure adequate support for populations vulnerable to the unintended consequences of pandemics, climate change, and other forms of external shocks.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Maximizing temporary improvements in air quality due to lockdowns by identifying long-term measures for reducing air pollution. Lockdowns imposed during the COVID-19 pandemic have led to the downscaling of many human activities, especially transport that has, in turn, led to dramatic, yet short-lived, reductions in air pollution and GHG emissions. Nevertheless, the possibility of more sustainable interventions that lead to lasting

decarbonization, without harming the economy, impoverishing citizens, and communities, and exacerbating socioeconomic inequalities, should be explored.

Moreover, air pollution exposure has been demonstrated to be an important factor in increasing the risk of mortality from COVID-19, which should further motivate ambitious air pollution interventions (Poizzer et al. 2020).

Measures to reduce air pollution should be guided by the road map for an enhanced global response to the adverse health effects of air pollution, adopted by the WHO member states at the Sixty-Ninth World Health Assembly in 2016 (WHO n.da).

Promoting healthy, low-carbon, and COVID-compliant environments, travel, and lifestyles.

One of the potential consequences of the lockdowns and other NPIs is the decline of active lifestyles among populations, which can exacerbate the already obesogenic environments in which people lived before the pandemic. There is a need to design local environments that will still promote physical distancing, while encouraging more physically active lifestyles and increasing access to healthier food options provided closer to home. Interventions include addressing food insecurity through food pantries and food distribution programs; promoting safe and convenient walking and protected cycling routes; mitigating urban heat island effects through increasing access to green spaces; and supporting outdoor food vending, such as farmers markets. Communities can establish vegetable gardens that utilize agroecological methods to promote the local production of nutritious foods. This can also help to reduce the carbon emissions associated with large-scale food production and long-distance transport.

3.7 PUBLIC HEALTH RISK COMMUNICATION

The COVID-19 pandemic highlights the importance of timely and effective communication of evidence-based information to protect and save lives. While the availability of social media has enabled the rapid dissemination of information, it has also created new challenges, such as misinformation, mistrust, and the propagation of conspiracy theories related to COVID-19. Risk communication during emergencies must happen in real time and engage a range of stakeholders, including experts, policy makers, community leaders, and the public. Accurate and timely information aids in the planning and design of responses by government agencies and other stakeholders, while shaping the decisions and behaviors of individuals and households. Key factors that contribute to effective public health risk communication include the truthfulness and packaging of the messages; the authority and trustworthiness of the messenger; the accessibility and appropriateness of the channel; as well as meaningful engagement with information recipients, particularly policy makers, implementers, and the public, among others.

CLIMATE ADAPTATION AND RESILIENCE

Developing integrated, robust, and cross-sectoral risk-communication plans and channels that can be applied to all types of external shocks, including pandemics and climate-related disasters. The establishment of harmonized, adaptable communication plans and channels linking different sectors is increasingly important for countries to reduce the adverse impacts of global environmental change. Integrated communication platforms can simplify a government's approach

to public health risk communication. Furthermore, such an integration maximizes limited resources, enhances the system's robustness through repeated use, and sensitizes the public to unified sources of information.

Incorporating relevant climate change and environmental sustainability messages into COVID-19 advisories to convey links between climate change and COVID-19. The availability of information about COVID-19 in traditional and social media has heightened public awareness about the disease and the importance of public health in general. There is an opportunity to integrate information on the health risks of climate change into ongoing public-health risk-communication mechanisms. Journalists can be powerful allies in communicating climate and health messages during a pandemic; thus, there is a need to build journalists' capacities to convey information accurately and in a way that can be fully understood by their target audiences (HCWH 2020a). Climate change-related health problems and COVID-19 are happening in concert, and the dissemination of life-saving information about climate change should not be delayed.

Targeting COVID-19 communication with climate-relevant information for populations vulnerable to climate-related disasters and other health effects. Certain populations — such as the poor, elderly, those with underlying conditions, and indigenous communities — face the compounding burden of the dual crises of COVID-19 and climate change. Relevant information that is tailored and targeted must be designed and delivered to these groups in a timely and effective manner to enhance their capacity to cope with these external shocks and protect their health from both COVID-19 and climate-sensitive diseases. Alternative and analog channels must also be utilized to convey vital information to

hard-to-reach and geographically disadvantaged populations as well as those without access to the internet or mobile phones.

Raising the health, climate, and risk literacy of communities to prepare for and adapt to future external shocks and stresses. The effectiveness of public health risk communication also relies on the baseline readiness of the population to receive, process, and act on the information obtained. The COVID-19 pandemic emphasized the importance of heightened health literacy among the public to ensure the rapid uptake of information and adoption of healthy preventive behaviors. The high level of awareness about COVID-19, infectious diseases, and public health in general should be sustained beyond the pandemic and reinforced with additional public health information, including the health risks of climate change. Communication messages should also be understandable and actionable so that the new knowledge acquired is translated into healthy habits — for instance, proper hygiene against infectious diseases or the preparation of basic emergency supplies at home.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Transitioning to low-carbon and energy-efficient electronic systems for public information dissemination. The carbon footprint of public communication can be further reduced by developing electronic devices that are manufactured through low-carbon production processes and made of sustainable materials. Furthermore, improving the energy efficiency of these devices, for instance, with batteries that have greater storage capacity and longer lifespans, will aid in further reducing the environmental impacts of communication.

Incorporating health promotion messages in COVID-19 advisories that encourage healthy and low-carbon lifestyles while surviving the pandemic. There is an opportunity to incorporate information and messaging on healthy and sustainable lifestyles into COVID-19-related public health advisories. As people continue to observe physical-distancing restrictions, they could benefit from routine advice on how to adopt energy-efficiency measures and sustainable healthy diets while staying at home. In addition, messaging on the safe disposal of used PPE and waste from the home-based care of COVID-19 patients as well as the maintenance of recycling programs should be encouraged.

3.8 VACCINE READINESS, PROCUREMENT, AND DEPLOYMENT

The COVAX Facility^b — convened by the Coalition for Epidemic Preparedness Innovations, the Global Alliance for Vaccines and Immunization, and WHO — aims to support the building of manufacturing capabilities and the advanced procurement of two billion COVID-19 vaccine doses for equitable distribution to participating countries by the end of 2021. To ensure the successful delivery of the vaccine to the world's population, especially the vulnerable, countries must be supported to put in place robust and efficient vaccine delivery systems as well as comprehensive plans for vaccine allocation and community preparation, including the capacity for non-incineration waste management.

^b Further information may be found at the COVAX website, <https://www.who.int/initiatives/act-accelerator/covax>.

CLIMATE ADAPTATION AND RESILIENCE

Establishing energy-efficient, climate-friendly cold chain infrastructure, technology, storage, and distribution. The successful and universal deployment of the COVID-19 vaccine will likely require major investments to address cold-chain capacity gaps (see box 3.3 and country case study 3.8). Some vaccine brands already available require ultracold-chain storage that is widely unavailable in many low-income countries. Without strategic intent, investments in cold-chain facilities could inadvertently lock in unhealthy, polluting infrastructure and technology, accompanied by higher operating costs. Alternatively, by following a clear set of climate-smart principles, these investments could be channeled toward affordable, energy-efficient, and resilient vaccine delivery

systems. The comprehensive assessment of needs, gaps, efficiencies, and existing resources will aid in minimizing the need for new equipment purchases from the outset. Meanwhile, investments in cold-chain infrastructure (storage facilities, storage during transport, and logistics capabilities) and technology (vaccine refrigeration) must consider energy efficiency, the use of refrigerants with low GWP, and the reliance on clean renewable power sources (including microgrids). Building such next-generation vaccine delivery systems can help achieve global health goals, such as pandemic control; lower carbon emissions to protect the planet; reduce the financial burden to power the infrastructure; and ensure seamless vaccine access. Moreover, all these objectives can be accomplished even in the face of future disruptions, as can result from climate-related disasters.

BOX 3.3

PRINCIPLES FOR NEW INVESTMENT IN COLD-CHAIN INFRASTRUCTURE AND TECHNOLOGY



The successful and universal deployment of COVID-19 vaccines will require major investments to address cold-chain capacity gaps. Without strategic intent, these investments could inadvertently lock in unhealthy, polluting infrastructure and technology, accompanied by higher operating costs. Alternatively, by following a clear set of climate-smart principles, these investments could be channeled toward affordable, energy-efficient, and resilient vaccine delivery systems.

Recognizing that vaccines are urgently needed to save lives in all countries, there is an opportunity to establish energy-efficient and climate-friendly cooling systems for COVID-19 vaccines. A first step is to minimize the need for new equipment purchases from the outset, through the assessment of needs, gaps, efficiencies, and existing resources. Second, new investments in the cold-chain infrastructure (storage facilities and logistics capabilities) and technology (vaccine refrigeration) should be based on the following criteria:

- 1. Alignment and consistency with multilateral environmental agreements.** Investments in infrastructure and technology for a COVID-19 vaccine cold chain should support the implementation of countries' commitments under the Montreal Protocol (including the Kigali Amendment) and the UN Framework Convention on Climate Change (UNFCCC) (including the Paris Agreement).

2. Infrastructure investment. Energy-efficient, climate-friendly refrigerants, and clean renewable power sources (including microgrids) should, where feasible, be the central components of the investments in the COVID-19-vaccine infrastructure, such as cold transport and storage facilities, in order to ensure:

- economic viability and the reduction of the governments' financial burden to power the infrastructure; and
- a resilient cooling infrastructure that is low carbon and aligned with both global health and climate goals.

3. Technology selection and program design for replacement.

- The selection of technologies for vaccine delivery and storage, such as refrigerators and cold boxes, should prioritize available, affordable, WHO-prequalified equipment or other validated technologies that are energy efficient. Where countries have the capacity to use climate-friendly refrigerants, technologies should also have low or zero global warming potential (GWP).
- Future WHO performance, quality, and safety criteria should include the minimum standards for climate-friendly refrigerants to inform the design of new cold-chain technologies, including ultracold-chain equipment.
- Monitoring equipment should be included with all cold-chain technologies to ensure that the cold chain is appropriately maintained and unbroken, determine when vaccines are compromised, identify poorly performing equipment, and ensure greater energy efficiency.
- Training programs should be an integral component of any investment to support the implementation and maintenance of technology choices.
- The worst-performing equipment (poor functionality, wasteful energy consumption, and/or containing harmful pollutants) should be prioritized for replacement, both to preserve vaccine potency and increase the cold-chain efficiency.
- Where replacements are made, program design should include provisions for the safe and sustainable disposal of old equipment that includes refrigerants. This could consist of a take-back component for vaccine-refrigerator programs that covers the proper recycling and disposal of obsolete equipment, with costs aggregated at scale.

While the Covid-19 pandemic and the distribution of a vaccine to protect human life both create immense challenges for middle- and low-income countries, they also present a critical opportunity for guiding infrastructure investments toward long-term sustainability and the direct alignment of the global goals of health equity and planetary health.

Increasing the capacity of the health workforce for vaccine delivery for COVID-19 and other climate-sensitive diseases. Health workers and volunteers must be trained in the implementation of mass immunization programs for the release of the COVID-19 vaccine, both in terms of clinical and logistical aspects. Finally, as these health workers may be inadvertently exposed to COVID-19 while delivering vaccines, the supply of PPE must be adequate; thus they must be produced and

distributed in a sustainable manner. A revitalized health workforce dedicated to COVID-19 vaccine delivery can serve as a springboard for other immunization programs for climate-related infectious diseases, such as meningococcal meningitis.

National COVID-19 vaccine planning to provide a template for enhancing the vaccine coverage for climate-sensitive infectious diseases.

Country Case Study 3.8 Ghana:

BUILDING A SUSTAINABLE COLD CHAIN FOR THE COVID-19 VACCINE



In November 2020, the government of Ghana engaged with the World Bank to receive financing to support preparatory activities for the future vaccine deployment, including the capacity strengthening of immunization systems and a number of other activities. As part of climate change mitigation, the project financed improvements for the vaccine cold-chain delivery process by seeking to provide the following elements:

- off-grid solar electricity for rural and peri-urban government health facilities to avert greenhouse gas (GHG) emissions from these facilities;
- reequipping of primary health care facilities to be energy efficient and enhancing existing cold-chain facilities;
- other logistics infrastructure and vehicles with highly fuel-efficient vehicles or vehicles running on low-carbon fuels or electric power; along with
- training of health care delivery workers to support the deployment of low-carbon technologies through the cold chain (World Bank 2020a).

In preparation for the vaccine delivery, the National Technical Coordination Committee (NTCC) and the Technical Working Group (TWG) on COVID-19 Vaccine Readiness and Deployment provided technical, advisory, and coordination support to the government of Ghana. Moreover, NTCC and TWG convened key donor agencies, such as WHO, the World Bank, and the United Nations International Children's Emergency Fund (UNICEF), as well as private sector stakeholders, for collective decision-making on the COVID-19 response, including vaccine delivery. These platforms provide an opportunity for collective discourses on climate impacts among major partners supporting cold-chain and vaccine delivery.

Additionally, there is a health development partner group that meets regularly to discuss various aspects of the health sector in Ghana, share good practices, and take collective stances on key health sector issues. Specifically, for vaccines, the group provides an avenue for discussions revolving around the procurement and deployment of vaccines as well as cold-chain-related matters, which is crucial for a coordinated response toward COVID-19. This group also provides an additional opportunity for discourses and collective actions on climate mitigation measures among key development partners involved in COVID-19 vaccine delivery in Ghana.

The recognition and ownership, displayed by the government of Ghana in establishing a sustainable vaccine cold chain, has enabled an effective response to COVID-19, while still honoring commitments to the Paris Climate Agreement. The World Bank's financing of the vaccine cold-chain process and infrastructure to ensure solar energy and sustainable practices will complement the country's response in meeting its nationally determined contributions (NDC), while also enhancing the resilience of the health system to provide care for its population and addressing the COVID-19 outbreak.

During the release of the COVID-19 vaccine, governments should begin to negotiate with individual pharmaceutical companies, participate in discussions in the COVAX facility, and develop national plans for vaccine deployment. These efforts should build on existing vaccination policies and programs for known infectious diseases as well as provide a template for future vaccination programs for (re)emerging infectious and climate-sensitive diseases. Equity considerations must also inform the allocation of these vaccines, especially in the early phase of the rollout when vaccines are limited and cannot cover entire populations. Vaccine delivery systems that will emerge from the COVID-19 response, which include the infrastructure and the workforce, must also incorporate sustainability (including environmentally sound waste management) and climate adaptation.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Manufacturing vaccines in a manner powered by renewable energy. As billions of doses of the new COVID-19 vaccines are expected to be produced in the coming years, the global pharmaceutical industry will be using tremendous amounts of resources, including electricity, as part of vaccine manufacturing. The new generations of vaccines for COVID-19 and other vaccine-preventable diseases must be produced, using clean renewable energy and sustainable materials to help reduce the carbon footprint of the entire pharmaceutical sector. As part of the vaccine prioritization criteria, it may be worth considering vaccines that can be supported by low-emission storage and distribution.

Making medical equipment and packaging out of sustainable and recyclable or reprocessable materials. There will be a surge of use of plastic

and other material types for vaccines, syringes, and packaging. An opportunity exists to innovate with more sustainable and nonhazardous materials for vaccine manufacturing, storage, and packaging materials. This can help minimize waste and reduce the vaccine industry's carbon footprint, while also ensuring vaccine safety, efficacy, and quality. The recycling and reusability of the vials, syringes, and packaging materials should be considered when selecting materials in the production cycle.

Transporting vaccines to health facilities and communities in a fuel-efficient manner.

The transportation of vaccines to countries, communities, and clinics will also generate huge amounts of GHG emissions. Hence, fuel-efficient transport options must be heavily considered. These one-time investments in sustainable transport for health care commodities will also be beneficial for sustaining the movement of supplies even beyond the COVID-19 pandemic, including in future climate-related disasters.

Managing, recycling, and disposing of used syringes and other waste from immunization programs in an environmentally friendly manner.

National COVID-19 vaccination programs are expected to generate enormous volumes of used syringes, vials, and various forms of packaging. These materials, if not disposed of properly, can create a new form of pollution that will be detrimental to the environment and, in turn, cause more harm to human health. Many countries currently lack adequate health care waste management systems: immunization waste is often burned, destroying recyclable materials, creating significant carbon emissions, and leaving toxic ash containing needles and broken glass from vials. Systems that minimize waste, make syringes safe, segregate and disinfect waste, return reusable items, and maximize recycling, as well as prevent

incineration that can deteriorate air quality, should be implemented.

3.9 BUILDING BACK BETTER

Earlier sections of this report have focused on the different aspects of the COVID-19 response — from surveillance and testing to treatment and vaccine delivery. These actions need to be implemented in such a way that they do not only address the problems generated by the current pandemic, but also create stronger and resilient health systems post-COVID-19. The response phase should help build the foundation for the recovery of communities, health systems, economies, and the society at large. The challenge is to ensure that the recovery process leaves systems and infrastructure on a much better footing than before. Proposals of green, healthy, and just transitions, such as the ones put forward by WHO (2020c) should be adopted as part of the COVID-19 response and recovery plans and investments.

Building for a sustainable and resilient future can enhance the ability of the global community, including the health sector, to set a course toward decarbonization. Further, it can also support communities and countries in their efforts to reduce current and projected climate-related risks as well as prevent future infectious disease outbreaks of pandemic potential. Moreover, post-COVID-19 systems of health care, agriculture, energy, and transport must ensure that equity and justice are placed at centerstage so that COVID-19's socio-economic impacts, disproportionately affecting the poor and the vulnerable, do not recur during future public health crises.

CLIMATE ADAPTATION AND RESILIENCE

Investing in essential services, such as clean water and sanitation, to uplift the baseline health status of populations. The COVID-19 pandemic helped magnify the significant gaps in access to essential services, such as clean water and sanitation, as well as highlighted the key role that adequate WASH can play in pandemic preparedness. Since more disease outbreaks and climate-related health threats are anticipated in the years and decades to come, it is imperative that communities are guaranteed universal access to health-promoting services, such as water and sanitation services. Investments in WASH, including in health care facilities themselves, will upgrade the baseline health status of populations, especially those who are vulnerable to infectious disease outbreaks and the long-term health impacts of climate change (WHO 2020b).

Investing in climate-resilient health care infrastructure to build multifaceted resilience. COVID-19 has underscored the need for greater systems resilience so that health systems and their supply chains can more agilely respond to the shifting burden of diseases, including the emergence of new pandemics (WHO 2015). Health sector investments in the COVID-19 recovery era should focus on building multifaceted resilience. There is an urgent need to build infrastructure resilience that allows hospitals and health care facilities to withstand extreme weather events precipitated or exacerbated by climate change. Finally, building back better also means health systems should enhance their role as integral members of the communities in which they are situated to serve as an anchor for community climate and economic resilience.

Revitalizing the momentum toward achieving UHC to protect citizens from future health shocks.

The massive disruption and additional burden caused by COVID-19 on health systems have led to delays in progress toward UHC, especially in low- and middle-income countries. At the same time, the pandemic has reinforced the importance of ensuring universal access to quality health care for all, especially during moments of crisis. As countries become more equipped to deal with the subsequent waves of infection, pre-pandemic health policy reforms and activities strengthening the health system that are geared toward achieving UHC must be revitalized. Moreover, lessons learned from the COVID-19 response must be considered in the recalibration of national plans for attaining universal coverage. Ultimately, health systems that do not leave the vulnerable behind are the best suited to respond to future pandemics, climate-related threats, and other forms of social, environmental, or economic crises.

Investing in nature-based solutions to enhance the natural environment and protect communities from climate-related shocks and future pandemics. The origins of the COVID-19 pandemic are a stark reminder of the importance of preserving nature to prevent future pandemics. Land-use change, particularly through deforestation for logging, agricultural expansion, and mining, contributes to increasing the likelihood of pandemics. Moreover, these same activities reduce the ability of forest ecosystems to sequester carbon from the atmosphere and protect human communities from climate-related impacts, such as intense flooding, landslides, and the emergence of infectious diseases. Future environmental policies must promote forest ecosystem protection and restoration to maximize the dual benefits of pandemic prevention and climate protection emanating from healthy and sustainable forests.

CLIMATE MITIGATION AND LOW-CARBON HEALTH CARE

Decarbonizing health care systems and aligning the sector with the ambition of the Paris Agreement. Countries have common but differentiated responsibilities and respective capabilities to get to zero emissions in order to meet the ambition of the Paris Agreement to keep the global temperature increase well below 2°C. With health care making a substantial contribution to global emissions, health care investments in the era of COVID-19 recovery need to forge a path toward zero-emission, climate-resilient health care by 2050. Hospitals and health systems everywhere must reduce their GHG emissions and implement interventions that will ultimately fully decarbonize every aspect of their health care delivery and its supporting functions, while maintaining and improving patient care. This transformation must include clinical care and support services as well as facilities and infrastructure. Health care systems must take action to move toward zero-emissions energy, buildings, travel and transport, and waste management, as well as low-emission pharmaceuticals, sustainable food services, and more. Such a fundamental transformation will require massive collaboration and innovation at all levels of a huge sector of society (Karlner et al. 2021).

Accelerating the shift from fossil fuel-based electricity generation to clean renewable energy that is resistant to future shocks. Every aspect of the health care supply chain and delivery is reliant on industries that provide energy, chemicals, building materials, packaging, infrastructure, transport, food, and more. The carbon emissions from these sectors, fueled primarily by a global economic system and a grid infrastructure, based on the combustion of coal, oil, and gas, is the main driver of the climate crisis. A rapid global transition

to clean energy would not only meet the Paris Climate Agreement goal of keeping warming well below 2°C, but also improve air quality to such an extent that the resulting health gains would repay the cost of the investment twice over (Markandya et al. 2018).

Investing in low-carbon, healthy, and equitable transport systems that ensure human mobility, in spite of situations of crisis. Local and national lockdowns around the world have led to massive transport restrictions, disrupting human mobility. Lockdown-driven transport restrictions favor people who have the privilege of owning private vehicles, while disenfranchised poor citizens have to rely on public transport that is insufficient.

To build back better, countries and communities should invest in high-quality public transport systems, coupled with infrastructure for active transport, such as walking and cycling. Next-generation transport systems need to ensure equitable mobility, even in times of crises, brought about by pandemics, climate-related disasters, or other external shocks. They should be designed to help promote physical activity to contribute to the reduction of obesity and other chronic noncommunicable diseases. Moreover, they should rely on low- or zero-emission technology in order to help bring significant improvements to air quality and lower the GHG emissions coming from transport.

Health care can play an important role in this effort. Health facility planning and colocation, with access to public transportation hubs, will also improve access to facilities for patients and health workers, while supporting cleaner patient and staff travel (Hosking, Mudu, and Dora 2011). Health leaders can also advocate for more sustainable modes of public transit and safe modes of active transport, thereby contributing to a broader transition to clean, sustainable

transport systems as part of a healthy recovery. Finally, as technological innovation advances, health care systems will increasingly be able to procure electric and/or hydrogen fleet vehicles. The purchasing power and political influence of health care can help accelerate the broader market transformation required to build economies of scale and make these modes of clean transportation more universally accessible, thereby reducing the global burden of disease brought on by transportation-related air pollution and climate change.

Transitioning to sustainable agricultural systems that also provide a steady and equitable supply of nutritious food to communities. The COVID-19 pandemic demonstrated the primacy of having a continuous supply of adequate food, especially in times of economic precarity and limited mobility. Currently, global food systems are heavily reliant on large-scale farming, postharvest processing, and long-distance transport. Apart from the fact that the foods produced are often rich in calories, fat, and other less nutritious ingredients, they also emit more carbon and contribute to ecosystem destruction, not to mention being prone to supply chain disruptions in times of crisis.

The post-COVID-19 recovery plans for the future of food should promote the redesign of agricultural systems so as to limit their impact on natural resources, reduce GHG emissions, and maximize the provision of high-quality nutrients that combat hunger and undernutrition, as well as curb the growing pandemic of chronic non-communicable diseases, including obesity, hypertension, and diabetes. The health systems' procurement of sustainable, locally produced food as a build-back-better strategy can also help build more sustainable, equitable, and resilient local agricultural economies, thereby supporting improved population health. By leveraging health

care demand for food in the interests of low-carbon, sustainable agriculture, health systems can support local community-based agriculture, generate food preparation jobs, and develop a source of healthy food for their own food systems.

Nine areas have been recommended for action, which are listed and elaborated upon in table 3.2 — Menu of Interventions for Climate-Smart Health Care Actions for COVID-19 Response.

TABLE 3.2

Menu of Interventions for Climate-Smart Health Care Actions for COVID-19 Response

COVID-19 Health Response Areas	Climate-Smart Health Care Actions	
	Climate Adaptation and Resilience	Climate Mitigation and/or Low-Carbon Health Care
A. Public Health Surveillance and Risk Assessment	<ul style="list-style-type: none"> • Adopting the One Health approach in disease surveillance and environmental monitoring (including climate services for health) for the early detection of climate-sensitive infectious diseases • Strengthening the surveillance of climate-sensitive health impacts (for example, dengue, malaria, heat-related illnesses, air pollution-related diseases, and nutritional deficiencies), using lessons from COVID-19 • Conducting integrated risk and vulnerability assessments to include pandemics and climate change [for example, Vulnerability and Adaptation (V&A) assessments, stress testing, and business continuity plans], with special attention to vulnerable populations 	<ul style="list-style-type: none"> • Instituting integrated (instead of separate) surveillance systems for health, weather, and the environment that are powered by renewable energy • Conducting energy use audits and needs assessments of health care facilities to inform energy-efficiency measures and the availability of alternative renewable sources • Integrating the health co-benefits of mitigation options into risk and vulnerability assessments • Adopting low-carbon and energy-efficient rapid-testing and contact-tracing technologies (such as those enabled by mobile phones) as well as facilities (for example, conducting testing outdoors)
B. Emergency Preparedness, Planning, and Rehabilitation	<ul style="list-style-type: none"> • Adopting a multihazard approach to emergency planning that covers pandemics, climate-related disasters, and other external shocks • Setting up coordinated governance mechanisms (including community networks), service protocols, and information systems, based on a multihazard approach to external shocks • Training health workers and other personnel for deployment in times of emergency • Establishing multihazard disaster financing for pandemics, climate-related disasters, and other external shocks as well as strengthening financing for key community-based organizations serving high-risk communities to reach out to them 	<ul style="list-style-type: none"> • Establishing sustainable low-carbon backup options for electricity [for example, solar photovoltaic (PV)], clean water, adequate food supply, and transport • Adopting low-carbon and energy-efficient devices (for example, flashlights and vehicles) for immediate emergency response • Incorporating green sustainability principles in rehabilitation plans for affected or destroyed health facilities and other infrastructure

- Maintaining and restoring natural environments around health care facilities to support cooling and minimize flooding impacts

C. Capacity for Testing, Isolation, and Treatment

- Ensuring the resilience of health facilities against climate-related disasters and their effects, such as electricity disruption
- Setting up strong referral networks and contingency plans to ensure the continuity of COVID-19 services during climate-related disasters
- Revitalizing national plans for human resources for health, as well as volunteers and workers from other sectors, to sustain the COVID-19 response and prepare for climate-related health risks
- Adopting low-emission energy and energy-efficiency measures for COVID-19 testing, isolation, and treatment facilities, including natural lighting and ventilation
- Establishing sustainable health care waste management in testing, isolation, and treatment facilities, including waste minimization, segregation, safe recycling, and incineration phaseout in favor of steam-based disinfection

D. Supply of Essential Medical Commodities

- Ensuring a steady supply of personal protective equipment (PPE), mechanical ventilators, medicines, and other essential commodities, including non-mercury-based thermometers, waste collection bins, and bags, throughout the entire COVID-19 response and in preparation for potential climate-related shocks
- Using energy-efficient and low-carbon mechanical ventilators, as well as diagnostics, including X-rays and microscopy, which can still function despite electricity disruptions resulting from climate-related disasters
- Adopting renewable energy and energy-efficiency measures in the manufacturing and transport of essential commodities
- Establishing sustainable management for all waste, including waste minimization and the segregation of all items, such as used PPE that includes masks and medicine packaging
- Producing washable and reusable PPE made out of sustainable materials
- Adopting sustainable procurement standards for PPE, equipment, cooling devices, and medicines, including prioritizing the minimization of waste production and avoiding the purchase of products with high carbon levels, high global warming potential (GWP), or high-energy consumption
- Strengthening local production and supply chains to ensure the steady supply of commodities while reducing transport emissions

E. Health Services for Non-COVID Conditions

- Strengthening non-COVID-19 public health programs, including those for climate-sensitive diseases
- Enhancing resilience against climate-related impacts and their effects (such as electricity disruption) on health facilities that render non-COVID-19 services
- Strengthening health financing mechanisms that ensure universal coverage to people with COVID-19 and other non-COVID-19 conditions, including climate-sensitive diseases
- Training health workers on the detection and treatment of climate-related diseases, while managing COVID-19
- Building the mental health resilience of health staff and volunteers while responding to multiple crises, such as pandemics and climate change
- Promoting low-carbon and energy-efficient telemedicine services (along with support for increased access to communication device and wireless connectivity) to ensure the continued provision of primary care and close last-mile delivery gaps
- Improving the efficiency of care pathways to ensure health provision, reduce emissions, and save costs
- Adopting low-carbon and energy-efficient technologies, as well as cooling practices, for health care provision
- Strengthening the capacity to manage health care waste, using environmentally friendly and safe techniques

F. Non-Pharmaceutical Interventions

- Promoting with consistency regular hand-washing and other personal hygiene practices to prevent COVID-19 and climate-related waterborne diseases
- Designing temporary shelters for victims of climate-related disasters to ensure the continuation of physical-distancing measures
- Creating social protection programs informed by high-risk communities that can enable them to adapt to different forms of external shocks, such as pandemics and climate-related disasters
- Maximizing temporary improvements in air quality due to lockdowns by identifying long-term measures for reducing air pollution
- Promoting healthy, low-carbon, and COVID-compliant environments, travel, and lifestyles

G. Public Health Risk Communication

- Developing integrated, robust, and cross-sectoral risk-communication plans and channels that can be applied to all types of external shocks, including pandemics and climate-related disasters
- Incorporating relevant climate change and environmental sustainability messages into COVID-19 advisories to convey links between climate change and COVID-19
- Targeting COVID-19 communication containing climate-relevant information at populations vulnerable to climate-related disasters and other health effects
- Raising the health, climate, and risk literacy of communities to enable them to prepare for and adapt to future external shocks and stresses
- Transitioning to low-carbon and energy-efficient electronic systems for public information dissemination
- Incorporating health promotion messages into COVID-19 advisories to encourage healthy and low-carbon lifestyles, while surviving the pandemic

H. Vaccine Readiness, Procurement, and Distribution

- Increasing the capacity of the health workforce for vaccine delivery for COVID-19 and other climate-sensitive diseases
- Putting national COVID-19 vaccine plans in place to provide a template for enhancing vaccine coverage for climate-sensitive infectious diseases
- Setting up energy-efficient, climate-friendly cold chain infrastructure, technology, storage, and distribution
- Establishing vaccine manufacturing that is powered by renewable energy
- Using medical equipment and packaging made out of sustainable and recyclable or reusable materials
- Adopting fuel-efficient modes of transport to deliver vaccines to health facilities and communities
- Instituting environmentally-friendly management, recycling, and disposal of used syringes and other waste from immunization programs

I. Building Back Better

- Investing in essential services, such as clean water and sanitation, as well as water, sanitation, and hygiene (WASH) in health care facilities, to uplift the baseline health status of populations
- Investing in climate-resilient health care infrastructure to build multifaceted resilience
- Revitalizing the momentum toward achieving universal health coverage (UHC) to protect citizens from future health shocks
- Investing in nature-based solutions to enhance the natural environment and protect communities from climate-related shocks and future pandemics
- Decarbonizing of health care systems and aligning the sector with the ambition of the Paris Agreement
- Accelerating the shift from fossil fuel-based electricity generation to clean renewable energy that is resistant to future shocks
- Investing in low-carbon, healthy, and equitable transport systems that ensure human mobility during crisis situations when fuel supplies are disrupted
- Transitioning to sustainable agricultural systems that also provide steady and equitable supplies of nutritious food to communities

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CONCLUSION

The COVID-19 pandemic has reshaped the world, magnifying gaps in the health system and exacerbating existing inequalities. Similarly, climate change, in combination with current and future global health risks, will continue to threaten the ability of health systems to protect and improve population health. Nevertheless, opportunities exist to tackle these dual crises and future challenges through innovation and coordination. Building on the unprecedented international action around COVID-19, this report has outlined a number of existing practical measures for implementing synergistic actions to enhance health system resilience to both climate change and future pandemics. These measures can help to limit health sector contributions to the climate crisis and decouple progress toward UHC from GHG emissions.

This report provides MDBs and other development partners with a menu of interventions that can be employed in the planning, design, and implementation of ongoing and pipeline health sector development activities to enhance resilience to climate shocks, facilitate climate adaptation, and mitigate GHG emissions. In the case of the World Bank and other MDBs, there is an additional requirement to assess all financing for CCBs. This menu approach is, therefore, also intended to support teams in the design of health sector operations to maximize the contributions to mitigation and adaptation. This report is aligned with the principles of the joint MDB methodology for tracking climate change mitigation and adaptation finance. Further additions and modifications to the menu of interventions contained in this report will be added, as new evidence becomes available and in response to later iterations of the Climate Change Action Plan (CCAP) and the joint MDB methodology.

This report has also been developed for governments and development partners, not only as a response to the emergency phase of the COVID crisis, where immediate support to health systems and the deployment of COVID vaccines is needed, but also to what will come after this. Building back better requires an integrated approach to promoting strong and durable recovery and growth by providing a greener, more inclusive, and resilient recovery from the COVID-19 crisis.

Building back better requires an integrated approach to promoting strong and durable recovery and growth by providing a greener, more inclusive, and resilient recovery from the COVID-19 crisis.

Health, arguably the most affected by the COVID pandemic, is perhaps the sector that most needs to consider the principles of greener and resilient recovery and access to information to make the right choices for the future. Each of the categories in the “Integrating Climate-Smart Health Care into COVID-19 Response and Recovery Activities” section of this report has relevance to these principles. The final category, “Build Back Better,” is specifically included with this in mind. It includes suggestions for investing in essential services, such as clean water and sanitation along with climate-resilient health care infrastructure, to enhance resilience and raise the baseline health status of populations. The section also proposes ways for revitalizing the momentum toward achieving UHC and investing in nature-based solutions to protect communities from climate-related shocks and future pandemics.

This document is structured to be a reference document for both adaptation and resilience, as well as mitigation, to support the work of development partners engaged in climate change mitigation and COVID-related activities. The material in this report is also intended to inform further iterations of the NDCs and their implementation.

Implementing any of the suggested measures will require us to think about how we monitor and evaluate the impact of these activities. Hence, putting robust monitoring and evaluation in place will be of paramount importance. Although this document has not gone into these two areas in detail, they need to be carefully considered at the design stage of any future operations and similar activities by other development partners. This would involve identifying development indicators and other metrics, including, where feasible, those that do not look just at the efficacy of interventions,


but also at their cost effectiveness. This is key for policy makers to be able to evaluate activities and prioritize appropriately in the context of scarce resources.

Furthermore, this report did not look specifically at the roles of the private versus the public sectors. However, it is clear that many of the measures contemplated in this report are significantly dependent on private-sector involvements. Hence, exploring synergies, for example, through the direct financing of public private partnerships (PPP) for some of the stipulated measures, would be important to consider moving forward.

The information documented in this report is intended to be used by public health professionals, policy makers, and operational staff to support their ongoing efforts to tackle both the climate and the COVID crises. The World Bank and others can use this information as the basis for developing materials to further facilitate support to countries, such as topic-specific guidance notes, workshops, and other more focused capacity-building resources.

The COVID-19 crisis highlights the importance of long-term planning in a pandemic response. It should also be the core principle in guiding the health sector’s approach to climate change. The case studies presented in this report will demonstrate how long-term planning for climate change can also enable timely and effective response to the COVID-19 crisis. Tradeoffs must be carefully considered in the design and execution of climate-smart interventions as part of the COVID-19 response and recovery efforts. Striking a balance between the pandemic response and climate protection requires a high degree of innovation and collaboration across sectors. Ultimately, incorporating climate considerations into COVID-19 health

emergency response and recovery activities can be a win-win outcome through the establishment of a legacy of health systems that are pandemic ready and climate smart.



Striking a balance between a pandemic response and climate action requires a high degree of innovation and collaboration across sectors. Ultimately, incorporating climate considerations into COVID-19 health emergency response and recovery activities can be a win-win outcome through the establishment of a legacy of health systems that are pandemic ready and climate smart.

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