

Methodological Guidance Climate Change and Health Diagnostic

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A Country-Based Approach for Assessing Risks
and Investing in Climate-Smart Health Systems

INVESTING IN CLIMATE CHANGE AND HEALTH SERIES

Methodological Guidance: Climate Change and Health Diagnostic

**A Country-Based Approach for Assessing Risks
and Investing in Climate-Smart Health Systems**

Investing in Climate Change and Health Series



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This document is part of the “Investing in Climate Change and Health” series, which aims to enable management and task teams with the tools and resources necessary to improve WBG action on climate change and health. Other documents in this series include:

- *World Bank Approach and Action Plan for Climate Change and Health, 2017*
- *Geographic Hotspots for World Bank Action on Climate Change and Health, 2017*
- *Climate-Smart Healthcare: Low-Carbon and Resilience Strategies for the Health Sector, 2017*

As this program evolves, diagnostics using the methodology outlined in this report will become available for individual countries.

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How to use this document

This guidebook is designed for use by task teams from the World Bank Group (WBG) and other development partners who are conducting climate change and health diagnostics in a client country or region. The methods are new and evolving, reflecting state-of-the-art approaches to increase resilience and promote low-carbon development. Guidance materials, including this guidebook, will be updated and revised with experience.

This work also provides an introduction to health system resilience, offers guidance on initiating the diagnostic process and forming a strong implementation team, and describes the five main stages in detail. Each chapter includes step-by-step instruction and advice.

Each implementation of the climate change and health diagnostic will be different; every country and health system has a unique set of attributes and development constraints. This guidebook offers a framework that can be used by specialists at the WBG and other development partners to guide their engagement with advice on matters specific to different stages. Each team's experience will help to enrich the methods. It is therefore important for each team to share their ideas and lessons with the aim of improving the guidebook and the effectiveness of a climate and health diagnostic.

Intended audience

This document is primarily directed to development partners, including WBG staff working on health, nutrition, and population projects and programs. Much of the content also may be useful to those working on related issues in areas such as environment and natural resources, water, energy, transport, urban, and others. As a crosscutting discipline, climate change and health issues are germane to projects in many disciplines. Although some of the language in this document is specific to WBG policies and procedures (e.g., task team leaders, global practices, etc.), the document has value beyond this institution as other development banks, bilateral aid agencies, and communities are tackling common issues. Tools and approaches here can be applied in many of these contexts.

Policymakers and managers likely will find this document useful as it provides a framework for assessing climate change impacts and opportunities within the health sector that may inform higher level dialogue and decision making. Operational teams should find value in the specific tools and approaches here that can be integrated within WBG lending programs. The examples should also provide useful context for all readers.

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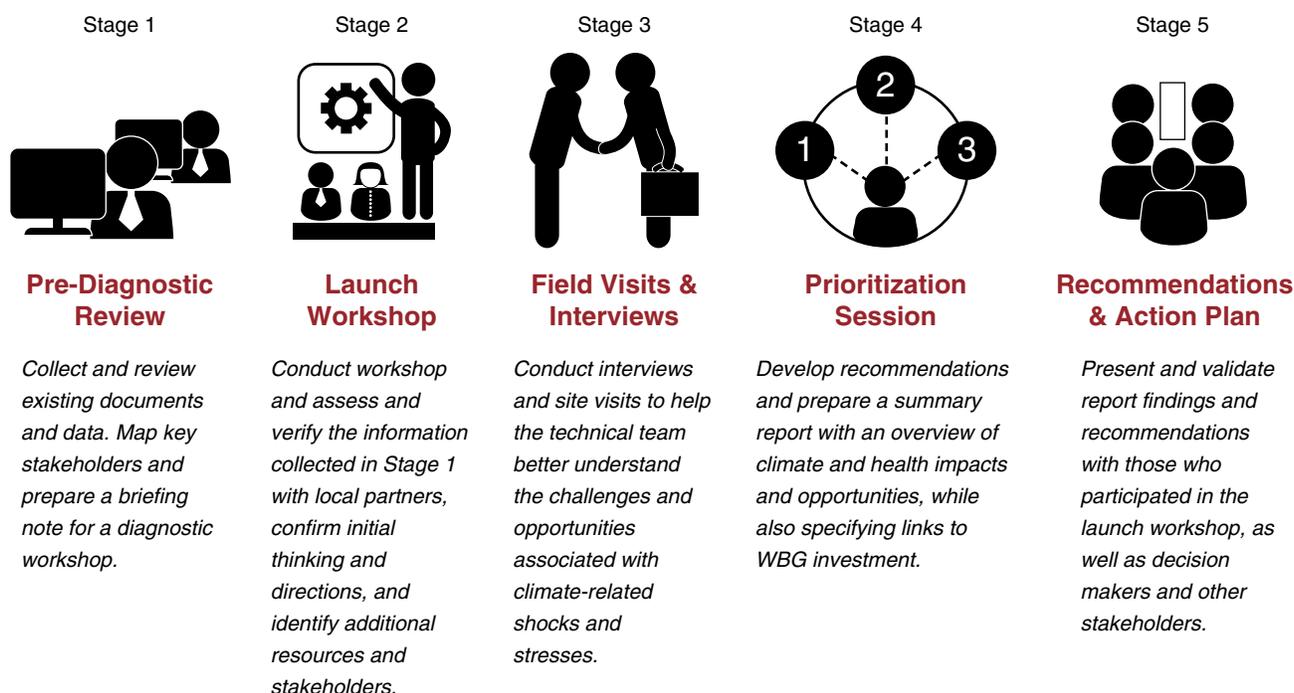
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Country-Level Climate Change and Health Diagnostic

The overall goal of conducting a climate change and health diagnostic is to link knowledge to investment. It aims to identify events and conditions where climate stresses and shocks undermine the effectiveness of health systems (at local or national scales), increasing morbidity and mortality. The diagnostic uses these insights to prioritize interventions toward establishing climate-smart health systems that both increase resilience and reduce climate forcing emissions. The diagnostic also identifies shocks and stresses in other sectors that could have negative consequences for public health in general or health systems in particular. Diagnostics are to be conducted within the context of an active lending portfolio so that recommendations can be directly integrated into investment.

Figure 1: Mapping the diagnostic process, step by step.



Benefits of Conducting a Diagnostic

The process of diagnosing climate-sensitive risks and opportunities builds on information and knowledge across the local and national levels. It considers options to increase the effectiveness and efficiency of policies and measures to manage those risks and targets opportunities to facilitate low-carbon growth. The resulting Diagnostic goes directly to the question of how well health systems could manage extreme weather and climate events, climate-sensitive disease outbreaks, and other possibilities outside the range of historic experience. Benefits of this approach include:

- **Client relationship.** A comprehensive diagnostic facilitates a more internally coordinated approach by the WBG and other development partners in regards to communities and health systems at local and national scales. It is an opportunity to bring together a multi-sector team to support an integrated approach to health system leadership, including expertise from other sectors, such as hydrometeorological and climate services.
- **Inclusion.** Preparation of a climate change and health diagnostic embraces multiple stakeholder perspectives, including

across departments and tiers of government, civil society, and the private sector.

- **Learning.** A diagnostic encourages a wider appreciation by specialists in other sectors of the health risks of climate change and ways that those risks could interact with their own sectors. This learning applies to all of those involved in the process: government technical staff, development partners, and lending task teams, etc.
- **Development impact.** Country-specific diagnostics generate better advice and ultimately can enhance the impact of investment.
- **Business development.** Climate change and health diagnostics deliver a tangible output—a prioritized set of recommendations that enable task teams to develop proposals for ongoing support to increase health system resilience and enhance low-carbon interventions in the context of a changing climate. The proposals could be supported by a range of environmental funders.

Connecting Health and Climate Change

Introduction

Many World Bank Group (WBG) client countries—and especially their poor populations—are being disproportionately affected by the impacts of climate change on human health. According to new WBG analysis, 79 percent of countries supported by the International Development Association (IDA) are among the most at-risk countries for negative health outcomes associated with climate change (for either health impacts caused by climate change, health impacts associated with climate change-causing emissions, or both). Half are in Africa (World Bank 2017a). This significant majority underscores an absolute need for further engagement on the health and climate agenda and implicates a need for prioritization in future investment. Integrating climate and health considerations into current and upcoming investments presents a straightforward approach to helping development lending teams and countries meet overall climate commitments while aligning with country demands to address climate and environmental impacts on health.

The WBG is committed to pursuing an end to extreme poverty and to building shared prosperity. This commitment includes improving health outcomes and achieving universal health coverage while also mitigating and adapting to climate change. The compounded effect of climate change on health will jeopardize these core WBG objectives and undermine the viability of investments, which rank among the largest of any development institution in the world.

WBG recently established an “Approach and Action Plan for Climate Change and Health” describing institutional targets, geographies, and approaches to mainstreaming climate-smart healthcare (World Bank 2017a, 2017b, 2017c). One commitment within this Plan focuses on country-level engagement; in particular, it emphasizes conducting climate change and health diagnostics that assess overall health system and health outcome sensitivity to climate and other environmental changes, while identifying opportunities for investment and interventions to build climate-smart health systems.

Regionally, climate and health work stands to add considerable value to development investments, with minimal additional effort undertaken by country teams. International experts and partners have articulated and validated the case for WBG involvement, and the institution has identified key geographical areas of impact (along with methods of assessing subnational impact). The WBG has developed climate-smart health tools that can readily be built into investments, and also established an international community of climate and health experts that it can draw upon to perform country- and project-specific analyses.

Addressing climate change and health spans multiple sectors. The WBG has a comparative advantage in aligning analytic and operational expertise across health, climate, economics, environmental management, and other core areas to address multidimensional development threats. Working at a system level, the WBG is especially well placed to help clients embed an integrated approach in their planning. Deep implementation expertise can then support countries in effectively executing programs and interventions, establishing a platform or standard upon which other development institutions can build. WBG research and economic analysis can also help countries establish financial baselines that

can be useful in government-wide planning beyond merely health and environmental sectors.

To promote understanding of potential future climate resilience, the Climate Change and Health Diagnostic (hereafter referred to as the “Diagnostic”) was developed to help technical staff at the WBG and other development partners facilitate an action-focused dialogue among stakeholders about risks, resilience, and the performance of sectors and systems. The Diagnostic identifies priority actions and investments to enhance a health system’s (and other related systems’) resilience, reduce greenhouse gas emissions, and increase the climate-smart potential of planned or ongoing projects.

The methods outlined in the Diagnostic aim to identify risks and measure the ability of health (or other) systems to manage potentially disruptive climate-related shocks and stresses. It helps identify those risks that would be difficult for communities and health systems to manage while maintaining services to protect public health. This process takes into consideration socioeconomic and political factors that can influence the vulnerability and capacity of populations and health systems.

The overall goal of conducting a climate change and health diagnostic is to link knowledge to investment. It aims to identify events and conditions where climate stresses and shocks undermine the effectiveness of health systems (at local or national scales), increasing morbidity and mortality. The diagnostic uses these insights to prioritize interventions toward establishing climate-smart health systems that both increase resilience and reduce climate forcing emissions. The diagnostic also identifies shocks and stresses in other sectors that could have negative consequences for public health in general or health systems in particular. This diagnostic has been conducted within the context of an active lending portfolio so that recommendations can be directly integrated into investment.

This diagnostic approach is an extension of analyses and information gathered during the process of conducting vulnerability,

adaptation, and capacity assessments (V&A assessment). V&A assessments are conducted at local to national scales to provide information on the health risks of climate variability and change and on the options to increase resilience to those risks (WHO 2012). The results are communicated to health systems, other stakeholders, and the public. These V&A assessments:

- Improve evidence and understanding of the current associations between weather/climate and health outcomes;
- Provide health officials, stakeholders, and the public with information on the magnitude and pattern of current and future health risks associated with climate variability and change, including the populations and communities most vulnerable to these risks;
- Identify opportunities to incorporate climate change concerns into existing policies and programs designed to manage health risks associated with weather and climate, and to develop new programs where necessary to prevent and reduce the severity of future risks;
- Serve as a baseline analysis against which future changes in risks and in policies and programs can be monitored; and
- Forge collaborations with sectors such as water and infrastructure to further promote activities to improve population health in a changing climate.

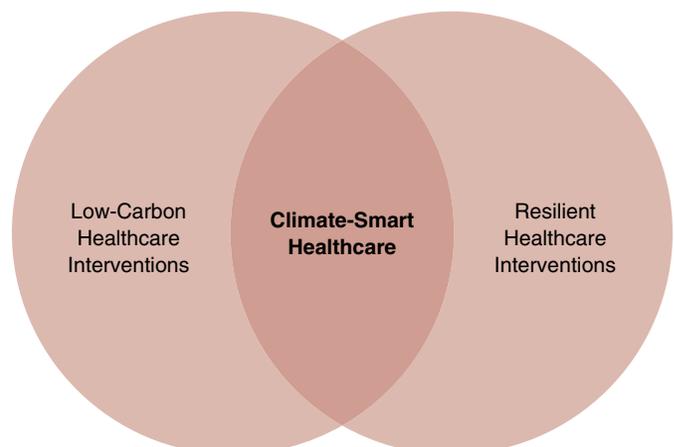
The development of a country diagnostic is also a first step toward the actualization of climate-smart healthcare—a new approach to achieve low-carbon, resilient health systems that recognizes the significance of the climate and health relationship and prioritizes actions to reduce the health sector carbon footprint and adapt systems to be resilient and responsive in the face of climate change (Figure 2).

This work seeks to stimulate and support greater integration of health and climate considerations across the institution, within

Box 1. Defining Components of a WBG Climate Change and Health Diagnostic

- Identifies climate-related events and conditions that stress and shock health systems
- Identifies climate-related events and conditions in non-health sectors that can negatively impact health or health systems
- Prioritizes interventions that address these shocks and stresses
- Provides information useful in establishing climate-smart health-related interventions
- Directly links to an active lending portfolio

Figure 2: Climate smart healthcare.



the Health, Nutrition, and Population (HNP) Global Practice, and in other sectors. As part of corporate climate commitments, the WBG established a target of ensuring 28 percent of its portfolio generates climate co-benefits by 2020. Individual global practices have their own targets that support this; for example, HNP aims to ensure that 20 percent of new operations are climate considerate by 2020. Doing so requires a much wider embrace of climate change issues within all departments but particularly HNP, where there is at present little climate involvement.

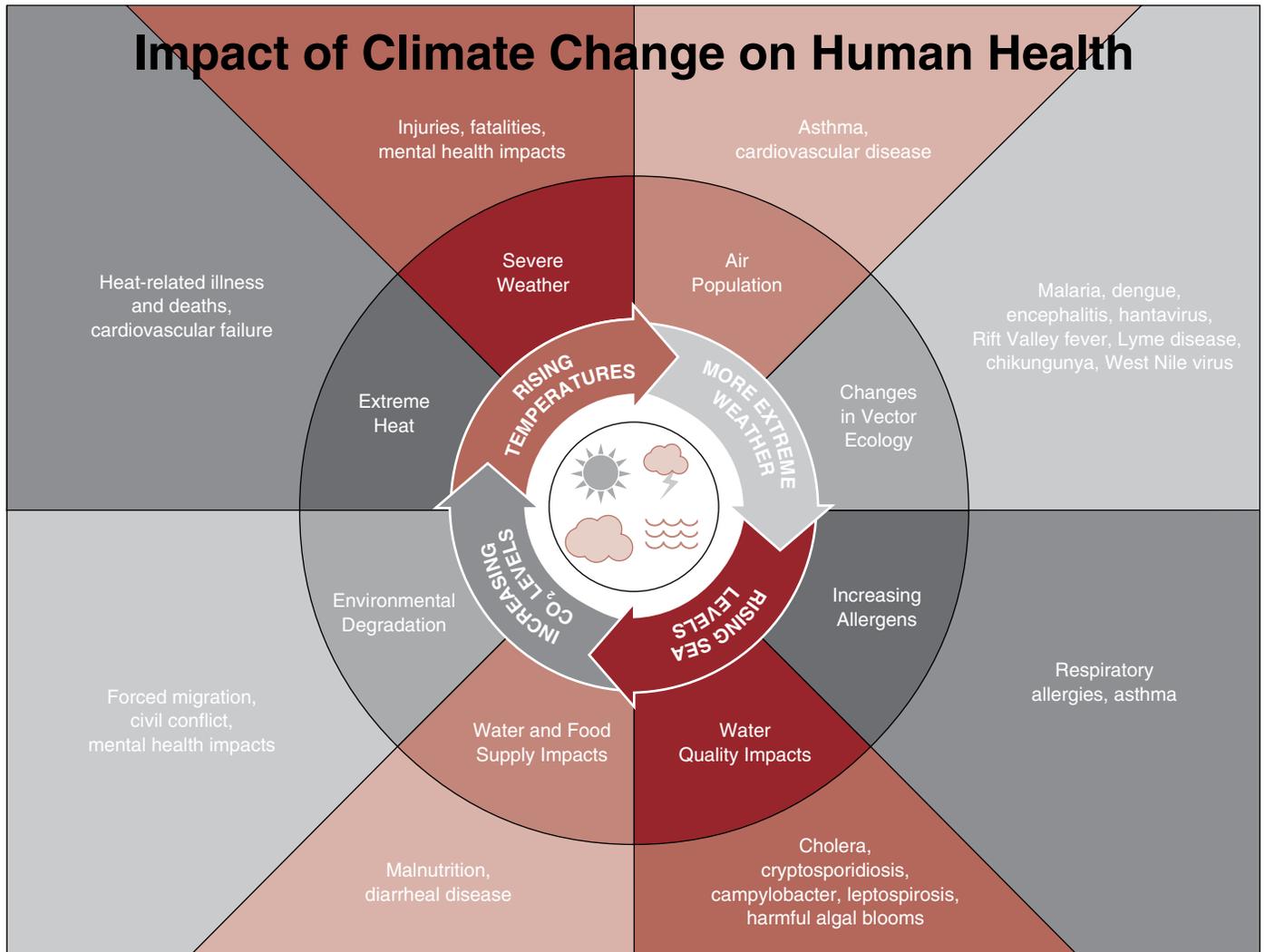
The Health Risks of Climate Variability and Change

Climate change will harm—and is harming—human health. Increasing temperatures, changing precipitation patterns, increases

in extreme weather and climate events, sea level rise, and ocean acidification are expected to affect any health outcome that is sensitive to weather or climate. Impacts include the effects of heatwaves, floods, and storms. They lead to more suitable conditions for the transmission of important infectious diseases and also harm the natural systems and socioeconomic sectors that ultimately underpin human health (Smith et al. 2014; see also Figure 3). In summary, health impacts can arise from:

- Climate change-related alterations in the frequency, intensity, and duration of extreme weather and climate events (e.g., heat waves, floods, droughts, and windstorms). Each year, these events affect millions of people, damage critical public health infrastructure, and cause economic losses costing billions of dollars. The frequency and intensity of some types of extreme weather events are expected to continue to increase

Figure 3: Health risks of a changing climate.



Source: Dr. George Luber, CDC.

over coming decades as a consequence of climate change (IPCC 2013), suggesting that the associated health impacts could increase without additional prevention actions, including impacts on mental health.

- The effects of climate change on natural and physical systems that in turn alter the number of people at risk of undernutrition, the changes in geographic range and incidence of vector-borne, zoonotic, and food- and waterborne diseases, and the prevalence of diseases associated with air pollutants and aeroallergens. Additional climate change in coming decades is projected to significantly increase the number of people at risk of these major causes of ill health.
- Climate-induced economic dislocation and environmental decline, as well as through development setbacks incurred by damage to critical public health infrastructure and livelihoods by extreme weather events.

Efforts are only just beginning to detect changes in current health burdens associated with changing weather patterns and ascertain the extent to which climate change is responsible (Ebi et al., 2017). Rising temperatures due to climate change are increasing the number of cases of heat-related illnesses, Lyme disease, and diseases associated with vibrios, in some regions.

While climate change will likely benefit some health outcomes in certain locations in the short term, the overall balance will be

detrimental, particularly in low- and low-middle-income countries that experience higher burdens of climate-sensitive health outcomes (Smith et al., 2014). Climate change may not be the most important driver of climate-sensitive health risks over the next few decades, but it could be significant beyond 2050. It is a stress multiplier putting pressure on vulnerable systems, populations, and regions.

At the same time, considerable progress was made in recent decades to reduce the burden of major climate-sensitive health outcomes, at least partly through efforts to achieve the Millennium Development Goals and other international development goals (Smith et al., 2014). These trends are expected to continue in coming decades (WHO 2014), depending on the development pathways followed (Ebi 2014).

The post-2015 development agenda includes 17 proposed Sustainable Development Goals (SDGs; Figure 4). Goal 13 calls for urgent action to combat climate change and its impacts, while Goal 3 aims to encourage healthy lives and promote well-being. Yet, virtually every other goal includes some dimension that touches upon health and climate considerations, underscoring the relevance of an integrated systems perspective across environmental and health spheres. Fundamentally, all goals are linked such that progress in one can lead to collective achievement toward improved development and a more sustainable future.

Climate variability and change present unique challenges to health systems. Everyone is exposed to changing weather patterns,

Figure 4: Sustainable Development Goals.



although this exposure is not the same for all. Particular locations and population groups have higher levels of exposure to, for example, higher ambient temperatures (than the prevailing average for a region) or to greater risks for flooding.

Climate change will increase for decades even after a reduction in emissions, as opposed to most environmental health hazards where exposures can be reduced over time with improved control (e.g., exposure to tobacco smoke or groundwater sources of arsenic). Vulnerabilities will shift with changes in climate and due to changes in urban infrastructure, technology, access to safe water and improved sanitation, and factors associated with development choices. Additional evidence, new knowledge of trends, changing projections of climate and vulnerability, and emerging best practices in adaptation will affect options for managing the health risks of climate change. Together, these changes are likely to alter the effectiveness and success of health systems strategies and policies. In some cases, climate change could affect the longer term sustainability and resilience of a program, such as those designed to ensure access to safe water in coastal zones experiencing accelerating sea level rise and storm surges.

The structure of health systems increases the challenges of climate change given that, in general, different departments manage individual health outcomes (e.g., malaria or undernutrition) with often limited interactions across departments. The health risks of climate change span most departments in a ministry of health, requiring crosscutting approaches to adaptation.

Further, programs and activities often implicitly assume that the same approach to managing a health risk is appropriate across spatial and temporal scales. This top-down approach worked well over the past 150 years to significantly increase public health but is likely to be insufficient in coming decades as climate and other global environmental changes make it more difficult to maintain and improve population health. Further, the magnitude and pattern of future climate-related health risks will depend on the local context, requiring consideration of local vulnerabilities and capacities in program planning.

Given that the health risks of climate variability and change vary over spatial and temporal scales, the extent to which a program or intervention could be affected by a specific hazard at a particular time depends on local vulnerabilities and capacities. What is a low risk in one situation could be a high risk in another, with those risks changing over time as, for example, diseases emerge in different times of the year or in new areas.

To effectively protect public health, adaptation also should incorporate strategies to manage the upstream drivers of adverse health outcomes, restricted to not only issues such as access to safe water and improved sanitation but also factors such as travel and tourism, which are sources of emerging disease threats (Semenza et al., 2016).

The focus of health adaptation to date has been on strengthening health systems (e.g., public health and healthcare policies, measures, and institutions) to better manage the changes that already are evident and to increase preparedness for projected risks. Incremental improvements are important first steps in a transition to systems-based approaches that can more effectively manage the multiple, simultaneous challenges that individuals, communities, and health systems will experience over coming decades. However, incremental changes are unlikely to be sufficient to manage surprises that exceed the capacity of health systems. Modifying current programs to manage each climate-related hazard separately may lead to inadequate preparation of health systems to manage multiple and synergistic exposures that are increasingly occurring in a particular location, such as a drought followed by flooding, or multiple infectious disease outbreaks. More comprehensive, systems-oriented, and transformative approaches are warranted to manage multiple and synergistic exposures.

Key steps in modifying health systems include undertaking a vulnerability and adaptation assessment and developing a national health adaptation plan, within iterative cycles of learning timed to correlate with anticipated shifts in exposures, incoming data streams, and other information to inform management choices. Systems-based approaches are more effective when they incorporate planning, implementation, evaluation processes, uncertainty, and unpredictability into analyses of the magnitude and rate of climate change. Other critical components include the capacity of systems to manage change, the effectiveness of interventions, and learning. To be effective, adaptation should incorporate strategies to manage the upstream drivers of adverse health risks.

Climate will continue to change for decades or longer and modifications to health systems should aim to increase resilience to both current and future risks, creating—where possible—increased flexibility to address future hazards as they arise. This can be of particular concern for public health and healthcare infrastructure in coastal regions where the integrity of and access to infrastructure and access may be compromised with climate change impacts like sea level rise.

Climate change and its consequences can result in shocks and stresses that can affect public health and other aspects of development. Impacts are felt directly through the loss of lives, livelihoods, and infrastructure, as well as indirectly through the diversion of funds from development to, for example, emergency relief and reconstruction (DFID 2005).

The impact of a shock depends not just on its magnitude but also on the extent of exposure of human and natural systems, the susceptibility of those systems to harm, and their ability to cope with and recover from exposure (IPCC 2012; Steinbruner et al., 2013). The extent to which health systems are prepared for and

have the capacity to manage changes in hazards, exposure, and susceptibility will determine their resilience in coming decades.

Therefore, climate resilience requires an evaluation of the potential consequences of projected climate change within the context of plausible future change in the extent of exposure to climate-related hazards, susceptibility to those exposures, and the capacity of health systems to prepare for, manage, cope with, and recover from exposures. More climate-resilient health systems have greater capacity and flexibility to prepare for and manage changing risks.

Poverty is a key factor increasing vulnerability (Hallegatte et al., 2016). In most countries, for example, poor urban households are more exposed to floods than the average urban population. Without action, climate change could lead to higher agricultural prices and threaten food security in poorer regions in Sub-Saharan Africa and South Asia. Without inclusive development, climate change could force more than 100 million people into extreme poverty by 2030. There are parallels in the experiences of nations under other kinds of duress. For example, countries that experienced major violence over the period 1981–2005 had an extreme poverty rate 21 percentage points higher than countries with no violence (World Bank 2011).

To promote understanding of potential future climate resiliency, the Climate Change and Health Diagnostic is designed to help technical staff at the WBG and other development partners facilitate an action-oriented dialogue among stakeholders about risks, resilience, and the performance of sectors and systems. The Diagnostic identifies priority actions and investments to enhance a health system’s resilience (and that of other related systems), reduce greenhouse gas emissions, and increase the resilience-building potential of planned or ongoing projects.

What Is Resilience?

Resilience is the capacity of individuals, communities, institutions, and systems to cope with a hazardous event, trend, or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (IPCC 2014). A climate-resilient health system is one that is capable and has the capacity to anticipate, respond to, cope with, recover from, and adapt to climate-related shocks and stresses. A climate-resilient system delivers sustained improvements in population health in an unstable and changing climate (WHO 2015).

Resilience is not synonymous with climate change adaptation. Current public health strategies, policies, and measures are being modified to enhance management of climate-sensitive

health risks (i.e., adaptation). These modifications are critical to decrease vulnerability to climate variability but do not necessarily increase resilience to future (and different) weather patterns. Health system resilience recognizes that a wide range of hazardous and potentially disruptive events—stresses and shocks, both natural and human-induced—are increasingly likely to occur with climate change. A climate-resilient approach to health systems aims to ensure the performance of a health system.

Additionally, resilience is not synonymous with sustainable development. Resilience aims to achieve long-term sustainability objectives—meeting the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Commission 1987). Resilience is about learning to live with changing patterns of risks—expected and unexpected—that will increasingly arise with climate change. Resilience recognizes that complex interactions among people, the economy, and the environment will change over time. While sustainability aims to put the world into balance, resilience looks for ways to manage in an imbalanced world (Zolli 2012). As such, resilience and sustainability are complementary approaches.

Resilience is more than the ability to recover from shocks; it incorporates preparing for, coping with, and managing risks. Health system resilience depends not just on the capacity of these systems, but also on the overall performance and capacity of other systems, such as those concerned with ensuring water and food security and safety. The *World Development Report 2014: Risk and Opportunity: Managing Risk for Development* argues that risk management is a powerful tool for development (WHO 2014). It contends “the solution is not to reject change in order to avoid risk but to prepare for the opportunities and risks that change entails. Managing risks responsibly and effectively can save lives, avert economic damages, prevent development setbacks, and unleash opportunities. It has the potential to bring about security and a means of progress to people in developing countries and beyond.” Trade-offs and synergies must be considered to identify ‘win-win’ situations that reduce the possibility of loss and increase potential benefits.

Building climate-resilient health systems is a cumulative process that makes resilience a goal, in addition to protecting and promoting public health, and being responsive and efficient in providing social and financial protection (WHO 2015). This entails building capacity to: recognize, monitor, anticipate, communicate, and prepare for health risks stemming from a changing climate; prevent, respond to, manage, and cope with uncertainty, adversity, and stress; adapt operations to changing risk conditions; recover from crisis and setbacks with minimal outside support; and learn from experience and improve system capacity for the future.

For a health system to increase its climate resilience, its independent building blocks also need to become climate resilient (e.g., leadership and governance, the health workforce, health information systems, essential medical products and technologies, service delivery, and financing). Coordination and collaboration also may need to be strengthened with other sectors, such as hydrometeorological services, agriculture, water, transport, and tourism, etc. Building climate resilience occurs through reducing overall vulnerability and strengthening specific system capacities.

Resilience as a Priority for Health Systems

Extreme weather and climate events, such as storms and droughts, are not the only risks health systems must face. Health systems also are affected by disease epidemics, migration, economic downturns, and infrastructure failure. These shocks can cause loss of life and asset damage, affecting the capacity of health systems to protect and promote population health. Acute shocks and chronic stresses can also have a deep and lasting impact on human development. Disaster losses are often linked with, or exacerbated by, poverty and vulnerability of the poor that stem from socioeconomic and environmental imbalances. While the origins and long-term impacts of shocks may differ dramatically, the necessity of health systems to absorb, adapt, and continue functioning in the short term remains constant.

Qualities of Health System Resilience

Health systems vary nationally and locally but all share common “building blocks” that are needed to protect and promote population health (WHO 2015). These building blocks include leadership and governance, the health workforce, health information systems, essential medical products and technologies, service delivery, and financing. Collectively, they represent the starting point for enhancing climate resilience, as shown in Figure 5.

These components provide a comprehensive approach to integrating climate resilience into health systems. Understanding the level of effort within these components will inform prioritizing the results of the climate and health diagnostic by providing insights into those areas where additional resources and activities could increase the capacity of health systems to prevent additional morbidity and mortality from climate-sensitive health outcomes.

Qualities that make a health system resilient include those in Table 1. Looking at health systems in relation to these qualities can reveal underlying weaknesses that may not be apparent when using more traditional risk assessment methods.

What Is ‘Low-Carbon Development’?

Low-carbon development is an approach for designing, building, operating, and investing in health systems and facilities that generate minimal amounts of greenhouse gases (World Bank 2017a). This approach puts health systems onto climate-smart development pathways. It also aligns health development and delivery with global and national goals for reducing greenhouse gas emissions to reduce the magnitude and pattern of health risks that health systems will need to manage later in the century.

Low-carbon development saves money by reducing energy and resource costs, and it can improve the quality of care by increasing the resilience of healthcare facilities to extreme weather and climate events and other disasters. In low-resource, energy-poor settings, powering healthcare with low-carbon solutions can enhance access to care, with particular benefits for the poor and most vulnerable.

Co-benefits of low-carbon development include improved health through reduction in environmental pollution and climate change and more efficient, less costly health systems. Tailoring technology and models of care to the environment and to disease burdens can slow the rising burden of health-related expenses, and can stimulate and strengthen local economies.

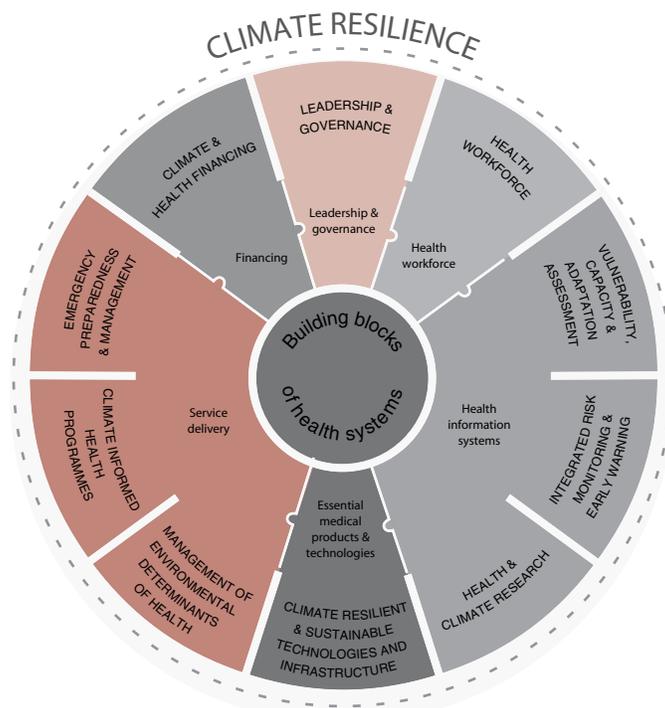
Key elements of low-carbon healthcare include:

- Health system design and models of care based on low-carbon technologies, coordinated care, emphasis on local providers, and driven by public health needs
- Building design and construction based on low-carbon approaches
- Investment programs in renewable energy and energy efficiency
- Minimal waste and sustainable healthcare waste management
- Sustainable transport and water consumption policies
- Low-carbon procurement policies for pharmaceuticals, medical devices, food, and other products
- Resilience strategies to withstand extreme weather and climate events

The Climate Change and Health Diagnostic is an opportunity to build low-carbon development into investments in health system strengthening, aligning efforts at adaptation and mitigation.

Table 2 shows selected low-carbon health sector interventions that could be considered (See *Climate-Smart Healthcare: Low-Carbon and Resilience Strategies for the Health Sector* (World Bank 2017a) for more details).

Figure 5: Building blocks of a climate-resilient health system.



Source: WHO 2015

Table 1: Qualities of resilient health systems.

QUALITY	DESCRIPTION
Robust	Well-conceived, constructed, and managed physical assets that can withstand the impacts of shocks without significant damage or loss of function. Robust design anticipates potential failures, making provision to ensure failure is predictable, safe, and not disproportionate to the cause. Robust health systems do not depend on a single asset, avoiding cascading failures and design thresholds that might lead to catastrophic collapse. An important aspect of robustness is proper operations and maintenance to ensure that systems are functioning properly.
Redundant	A redundant network or system includes spare capacity or backup to accommodate disruption, extreme pressures, or surges in demand. Providing diverse ways of achieving a given need or fulfilling a particular function, such as surveillance, is a means to achieving a redundant system. If one service channel gets disrupted, another can be used.
Reflective	Resilient health systems examine, learn, and evolve based on their past experiences and new information, modifying standards or norms based on emerging evidence rather than seeking permanent solutions based on the status quo. As a result, people and institutions examine and systematically learn from their experiences and leverage this learning to inform future decision making.
Coordinated	Coordination between health systems organizations and agencies means that knowledge is shared, planning is collaborative and strategic, and decision making is based on investments that are mutually supportive toward a common outcome. Exchange of information between systems enables them to function collectively and respond rapidly.
Inclusive	Being inclusive recognizes that risk is perceived differently by different stakeholders and that shocks and stresses primarily affect the most vulnerable. An inclusive approach contributes to a sense of shared ownership or joint vision. This can be achieved through consultation and engagement with a wide range of stakeholders, including particularly vulnerable groups, to ensure that systems are more resilient by considering a wider range of vulnerabilities, risk management capacities, and localized information. Equity in access to infrastructure and services underpins social cohesion and opportunity.

Table 2: Select low-carbon health sector interventions.

INTERVENTION	ACTIVITIES
Energy efficiency and renewables	<ul style="list-style-type: none"> • On-site renewable energy sources • Reduced energy devices (lighting, etc.) • Passive cooling, heating, and ventilation • Service delivery and low-carbon models of care • Cold water detergents
Waste management	<ul style="list-style-type: none"> • Waste minimization • Waste segregation and recycling • Clean waste disposal • On-site disposals • Wastewater pretreatment and sanitation improvements • Choice of cleaning products
Water supply	<ul style="list-style-type: none"> • Water conservation, including rainwater harvesting where appropriate and use of low flow devices
Transport and travel	<ul style="list-style-type: none"> • Tele-solutions where technology allows
Supply chain management	<ul style="list-style-type: none"> • Food and pharmaceuticals • Use of local materials where appropriate
Low-carbon service delivery	<ul style="list-style-type: none"> • Alignment with public transport networks or the development of such, as well as reliance of population on walking and cycling

Shocks and Stresses

A *shock* is a single unpredictable event and a *stress* is an ongoing hardship that can affect population health:

Shocks are sudden events, whether environmental, climatic, or other, that impact the performance of systems. Many different types of climate-related shocks can strike at different levels, including disease outbreaks, floods, high winds,

landslides, or droughts. Severe economic volatility could be included because of its effect on the capacity of health systems to manage other stresses.

Stresses are longer term trends, whether environmental, climatic, or other, that undermine the performance of a health system and increase the vulnerability of actors within it. These can include natural resource degradation, loss of agricultural production, demographic changes (e.g., aging and depopulation), climate change, political instability, or economic decline (DFID 2011). Stresses can be cumulative, compounding gradually until a tipping point is reached, and transformed into a shock.

Managing risks from specific shocks and increasing overall resilience are different and complementary practices. The first requires knowledge of shocks that health systems will likely face; some of these will be predictable (e.g., increases in the frequency and intensity of heat waves, or increased flooding intensity) and others will be surprises (like sudden changes in the geographic range of a vector-borne disease, such as malaria). Building resilience increases the ability of health systems to avoid shocks and to manage risks when faced with uncertainty, including increased risk tolerance, flexibility, and adaptability (de Bruijne, Boin, and van Eeten 2010). Resilience focuses on enhancing the performance of a system in the face of multiple shocks and stresses, rather than preventing or mitigating the morbidity and mortality due to a specific event (Arup International 2014). Considering a broader spectrum of risks is an opportunity to take a strategic view across different types of risks, including the underlying drivers of risk and the systems they impact, and thereby better prioritize risk mitigation interventions.

Including low-carbon considerations in health systems reduces risk in other dimensions. Although lower- and middle-income country health systems generate only a small proportion of the national, cumulative greenhouse gas (GHG) emissions, they still contribute to the country's GHG footprint. By building greener health systems, countries help reduce overall emissions, increase the chances of greater environmental sustainability, and reduce pollution; these have more proximal benefits for human health. Environmentally friendly health systems have benefits for the environment and the people who live in them, while also cultivating a standard of excellence that others can and should seek to replicate.

Undertaking a Climate Change and Health Diagnostic

Steps in Conducting a Diagnostic

Development of any new climate-smart strategy begins with the creation of baselines and the identification of suitable opportunities. For climate and health considerations, this means conducting a health and climate assessment (suitable for use by an institution or government) that describes risks, capacities, and opportunities. Established approaches for carrying out such climate change and health assessments were developed by the World Health Organization (WHO) and partner governments. These assessments are broadly relevant to the development community and have been used to help countries formulate climate change and health action plans to address unique geographic and system needs. Country-specific climate and health diagnostics using the WBG approach (World Bank 2017a) expand upon these assessments to increase their relevance for development operations and to inform investment. Methods developed here may be useful for other development institutions and investors endeavoring to undertake similar analyses.

A climate change and health diagnostic consists of five stages (explained in greater detail in subsequent sections), with leadership commitment for low carbon and resilience interventions on the front end and a longer term engagement with development partners through financing or technical assistance at the back end (Figure 6).

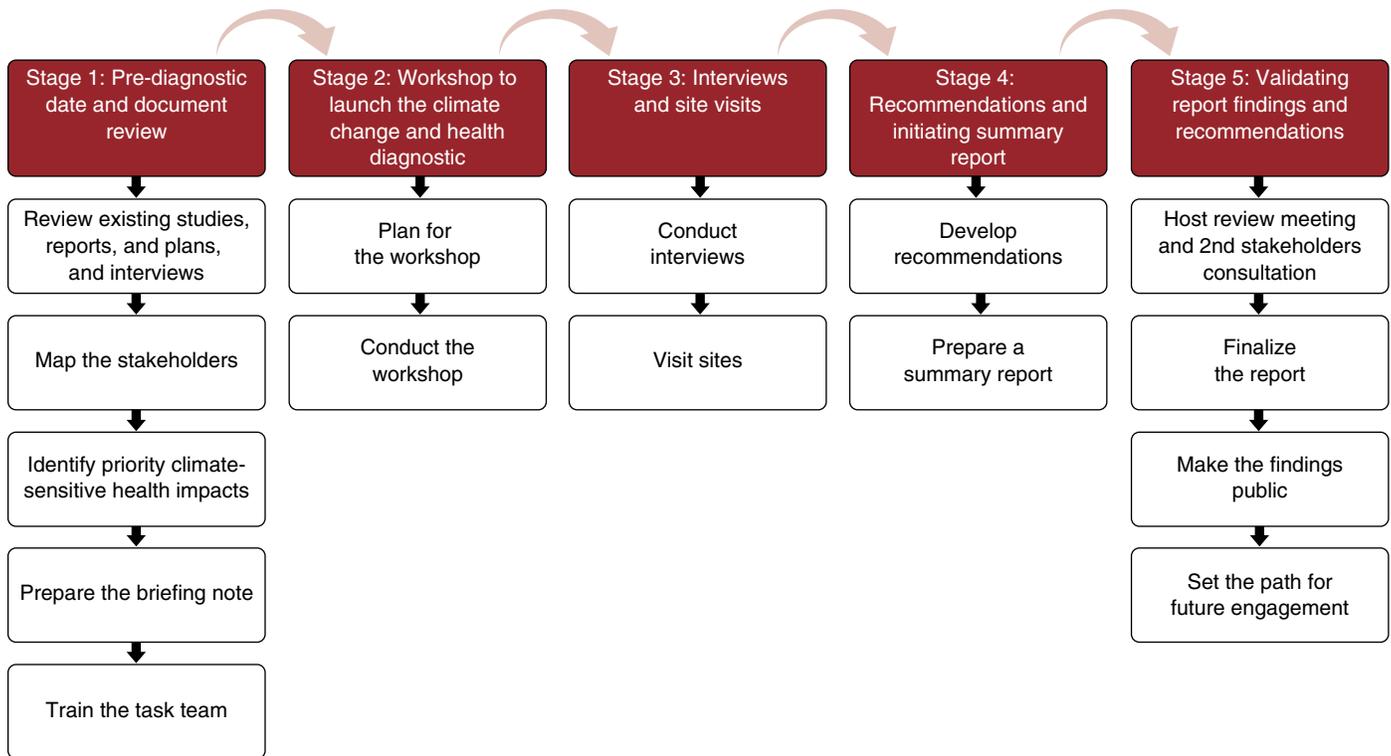
Stage 1: Conduct a pre-diagnostic document and data review. This stage focuses on collecting information and leveraging existing efforts, particularly health V&A assessments and adaptation planning documents within the health sector, as well as information regarding investments and adaptation projects that are relevant for health. Stocktaking identifies all relevant studies, reports, or plans developed by the ministry of health, the national climate change team, the WBG, WHO, or other organizations and development partners. If the national adaptation plan already contains a health component, then the stocktaking involved in that process would provide a basis for this stage. Documents and reports should be sought that provide details on recent climate-related shocks and stresses and the effectiveness of health systems in preventing associated morbidity and mortality.

This first stage should map the key stakeholders to include in the diagnostic. It also should result in a briefing note that can be used for a diagnostic workshop and for technical specialists at the WBG and other relevant development partners. Information gathered during the stocktaking exercise might need to be complemented by specific background studies or data collection initiatives.

The first stage also includes training of the climate change and health diagnostic task team and the preparation of other workshop materials.

Stage 2: Conduct a workshop to launch the Diagnostic. The purpose here is to assess and verify information collected during Stage 1 with in-country partners, confirm initial thinking and directions, and identify additional resources and stakeholders that should be part of the overall assessment. This includes a workshop in which participants discuss the collected data, evaluating the extent to which communities

Figure 6: The diagnostic process by stage.



and health systems could manage the shocks and stresses. They would also identify additional resources, tools, and policies that, if available, could prevent adverse population health consequences today and under a changed climate.

Stage 3. Conduct interviews and site visits. These activities will help the technical team better understand the challenges and opportunities that climate-related shocks and stresses could present for specific populations, communities, and health systems. They also allow for a qualitative assessment of the extent to which current policies and programs could manage the risks. The interviews and site visits also will identify opportunities for promoting low-carbon development while increasing adaptive capacity.

Stage 4: Develop recommendations and prepare a summary report. This stage produces an overview of climate and health impacts and opportunities in the target country in the format of a five-part report (with annexes). The report should be a comprehensive account of the latest in climate and health information in the client country, detailing impacts, opportunities, a systems assessment, and recommendations for actions and investments (or line items in projects). It should incorporate factors such as the likelihood and timing of the threat, competing demands, windows of opportunity based on current and planned projects and investments, and stakeholder concerns and preferences. It should also prioritize policies and measures to

increase the capacity of communities and health systems to prepare for and manage climate-related shocks and stresses. This document also should evaluate the extent to which priority actions and investments could increase low-carbon growth, identifying options that could achieve adaptation and mitigation goals.

Such an overview ensures due consideration of a country’s resilience to the health risks of climate change, including: critical gaps or areas of weakness in health systems; the dependencies and interdependencies among health and other sectors that can lead to cascading disruptions or failures or compound existing vulnerabilities; and opportunities to align WBG-recommended actions and investments with local goals and objectives. Prioritization can be based on cost-benefit analyses, cost-effectiveness analyses, multi-criteria analyses, risk-based prioritization, or other approaches.

Stage 5: Present and validate report findings and recommendations. This stage brings together participants in the launch workshop (Stage 2) with decision makers and other stakeholders to present the findings of the diagnostic and discuss priority recommendations. It is critical for this report to have clear value for WBG lending teams, as well as government and other international partners. Ideally, this meeting will result in agreed priorities and next steps to increasing resilience and low-carbon growth in the context of the capacity of health systems and barriers and constraints to investments.

Getting Started

The fundamental steps for initiating the climate and health diagnostic include:

- Contact the WBG Climate Change Group, Climate Analytics and Advisory Services Team, or build a team familiar with climate change, health, and development lending in the context of the country of interest.
- Identify the key local and national stakeholders who will participate in and contribute to the climate and health diagnostic.
- Form a team of technical specialists that includes technical staff from the WBG or other development partners who will support developing and implementing the diagnostic.
- Prepare a schedule that identifies the time periods for each stage, including research, country missions, and synthesis.

It will be important to ensure the participation and engagement of health system leaders and management from the WBG and other development partners from the start of the process of conducting a climate change and health diagnostic. This should include direct correspondence between the initiating team, the expert team, and country stakeholders, including development partners and government officials. Identification of a local government focal point is also critical for the arrangement of activities.

There will need to be an agreed timeline for the diagnostic. Stages 1 and 2 (pre-diagnostic data review and workshop/meetings) can be expected to last 1–2 months. The workshop will be held

over several days, plus a few days for interviews and possible field trips. Developing recommendations and writing up the report would be expected to take a final 2–3 months, depending on the extent of review and coordination of institutional timelines.

Form the Diagnostic Team

Conducting a climate change and health diagnostic is an opportunity to task a multi-sector team of technical experts and specialists to deliver recommendations that cut across disciplines and traditional silos to protect population health in a changing climate.

The team leader will coordinate all activities and be the central contact point with the client. In some cases, the team leader will be part of the country team and actively engaged in the country. In others, it will be an expert in climate change and health familiar with the relevant institutions and lending practices. It is important that the team leader has a solid understanding of the country context and history of engagement with the WBG and other development partners.

To support the team leader, the team should consist of technical specialists in the areas of projected climate change for the country or region, the health risks of climate change, and development plans for the country, including low-carbon development. It is also recommended that the team include a member with strong facilitation skills for the workshop and prioritization session. A translator may also be required depending on the country of engagement. (Full team composition provided in Table 3).

Table 3: Diagnostic team composition.

TEAM MEMBER	EXPERTISE/ACTIVITY
Team leader	Coordinate all activities and liaises with the client.
Administrative support	Provide logistical support for planning and conducting the launch workshop, including issuing invitations, selecting the venue, providing support during conducting the workshop (including taking notes of discussions).
Technical specialist(s) in climate change projections for the country	Provide information on the magnitude and pattern of climate change at temporal and spatial scales of interest, and of investments and country adaptation projects relevant for health.
Technical specialist(s) in climate change and health	Conduct a desk review of reports and studies, providing summary information for the launch workshop and for the climate and health diagnostic. These experts can be WBG staff and consultants.
Development specialist(s)	Provide information on the country context with respect to development priorities, including low-carbon development.
Facilitator	Facilitate the launch and final workshops.
Translator(s)	As necessary.
Editor	Edit the final report.
Design expert	Lay out and format the final report.

In addition to the technical specialists, important team members working behind the scenes should include, for example, staff and consultants conducting the desk review of available reports and studies, administrative and logistical support for event planning, and a designer and editor for the final report.

The team members also should have a direct link to a WBG Country Management Unit (CMU) or a lending program, or the equivalent for other development partners.

Conduct a Pre-Diagnostic Document and Data Review

Stage 1 is primarily desk-based. The task team leader, working with select members of the team will undertake five primary tasks.

- A. Reviewing existing studies, reports, plans, and interviews**
- B. Mapping the stakeholders**
- C. Identifying priority climate-sensitive health impacts**
- D. Preparing the briefing note**
- E. Training the task team**

Representatives from local and/or national health systems and other sectors are introduced to the objectives and implementation steps of the climate and health diagnostic. Knowing what to expect allows leadership at the ministry or department of health to prepare relevant data for the review, and to articulate expectations for their staff. Being sensitized to the goals and objectives of the climate and health diagnostic will enhance the engagement of health systems and other sectors in the process.

Stage 1 is typically conducted by a smaller group within the task team, including the leader and one or two technical specialists. The key outputs from this stage include a briefing note that captures the main findings of the desk review, a preliminary list of shocks and stresses for national or local health systems, a detailed stakeholder list, a list of relevant WBG investments and in-country adaptation projects, and a briefing note and materials for the launch workshop.

A. Review Existing Studies, Reports, Plans, and Interviews

A review is conducted of the state of understanding of the national health risks of climate variability and change, of the populations and regions particularly vulnerable to these risks, and of the ministry of health capacities to manage these risks. This understanding can be gleaned from policies, reports, and plans from the ministry of health, universities, donor agencies, other development partners, and research publications. In some cases, it may be difficult to obtain copies of all the desired reference materials: they might not be accessible on the Internet or may be unpublished. In addition, some documents may be in the local language, requiring time and resources for translation.

The types of studies, reports, and plans of interest would include: ministry of health plans; projections of the magnitude and pattern of climate change; health vulnerability and adaptation assessments; national adaptation plans; National Adaptation Programmes of Action (NAPAs); poverty assessments; disaster management plans; capital investment plans; and WBG and development partner initiatives. This review will assist in developing an initial list of shock and stress profiles and of capacities and barriers to increasing resilience to the health risks of climate change. (A list of some resources are provided in Annex A.)

In tandem with the development of these Diagnostic methods, a pilot was conducted in Madagascar. Throughout the report, examples from this applied country case are cited for purposes of clarity and illustration.

Some questions to identify where impacts may occur today or in the future are outlined in Table 4. Obviously, other questions may also be important, depending on the local and development contexts.

An example from the Madagascar climate change and health diagnostic is of the potential risks climate change presents for undernutrition (World Bank 2018).

Of all climate-sensitive health impacts, undernutrition stands out, as it is already a critical issue in Madagascar, and new climate stresses will worsen the situation. Increases in extreme weather can disrupt food and health system supply chains. Protein and nutrient content of some cereal crops are declining with rising atmospheric concentrations of carbon dioxide (CO₂) (Myers et al., 2014). Poor households reliant on subsistence food production systems can be easily disrupted by climate-related exposures, such as flooding or extreme heat. As these systems are not integrated into markets, there

Table 4: Suggested questions to assist in information gathering.

<p>Current burden of climate-sensitive health outcomes in the country</p>	<p>What are the priority climate-sensitive health outcomes in the country? What is the recent burden of these outcomes? Has the burden changed over time?</p> <p>Are temperature and precipitation associated with the health outcome(s) or with the transmission cycle(s) of interest in the country? How important are the associations to the current burdens of climate-sensitive health outcome?</p> <p>Is there evidence that infectious diseases, such as malaria, dengue, or diarrheal diseases, are changing their geographic range or seasonality of transmission?</p> <p>Does the number of cases of the health outcome increase (or decrease) during heat waves, floods, droughts, and/or storm surges, or have these events affected the transmission cycle? How important is the increase or decrease?</p> <p>Are there trends for the hazards, suggesting how climate change could affect the burden of climate-sensitive health outcomes over the shorter term, such as the health consequences of flooding?</p> <p>Which populations and regions are particularly vulnerable?</p>
<p>How effective is the health system in managing the burden of climate-sensitive health outcomes?</p>	<p>What policies and programs are in place to manage climate-sensitive health outcomes? How effective are these?</p> <p>What is the status of surveillance and monitoring systems to track the number of injuries, illnesses, and deaths from climate-sensitive health outcomes?</p> <p>Are there plans to alter the policies and programs over the next few years?</p>
<p>Future burden of climate-sensitive health risks in the country:</p> <ul style="list-style-type: none"> • Availability of safe water (quality and quantity) • Food safety and security • Health outcomes associated with extreme weather and climate events • Vector-borne and other infectious diseases • Health outcomes associated with poor air quality • Population displacement 	<p>How much might increasing temperatures and changing precipitation patterns affect the magnitude and pattern of burdens of priority health outcome(s)? How important could this change be over the next few decades?</p> <p>Could changing weather patterns alter food security? Over what time period?</p> <p>Could climate change alter the geographic range, seasonality, or intensity of transmission of malaria, dengue, and other infectious and re-emerging diseases? Over what time period?</p> <p>How could changes in the patterns of extreme events (heat waves, droughts, floods, extreme storms) affect the burden of climate-sensitive health outcomes? Over what time period?</p> <p>Based on projections, are health outcomes likely to become more/less important over time? Could climate change facilitate the emergence of health outcomes that may need more attention? How could hotspots of health outcomes change with climate change?</p>

(continued)

Table 4: Continued.

<p>Environmental factors that could affect population health in the country, including:</p> <ul style="list-style-type: none"> • Wildfires • Coastal erosion • Saltwater intrusion 	<p>To what extent do temperature, precipitation, other weather variables, and sea level rise affect access to ecosystem services? How important is the association?</p> <p>How could water supply and sanitation systems be affected by changes in precipitation or salinization?</p> <p>How could wildfires and coastal erosion, for example, affect access to environmental services?</p> <p>To what extent could changes in these environmental factors affect population vulnerability to the risks associated with climate change?</p>
<p>Social and economic context in the country, including:</p> <ul style="list-style-type: none"> • Community services • Livelihoods, • Social capital • Economic resources • Infrastructure 	<p>To what extent do temperature, precipitation, other weather variables, and sea level rise affect social and economic factors? How important is the association?</p> <p>How could climate change affect the future availability and level of these services? Over what time period?</p> <p>To what extent could changes in these socioeconomic factors affect population vulnerability to the other risks associated with climate change? Over what time period?</p> <p>What are the ongoing and planned investments and adaptation projects of relevance for health?</p>
<p>Health systems in the country, including factors such as:</p> <ul style="list-style-type: none"> • Ability to deliver services • Access to health care facilities • Supply chains, particularly during extreme weather and climate events 	<p>To what extent do temperature, precipitation, other weather variables, and sea level rise affect the ability of health systems to deliver services?</p> <p>Have extreme weather and climate events affected access to health care systems? How important was the disruption?</p> <p>Have extreme weather and climate events affected supply chains? How important was the disruption?</p>
<p>Geography and climate of the country</p>	<p>Which regions of the country could be affected by the climate-related hazard? Over what time period?</p> <p>Where are the most vulnerable populations for the health outcome(s) of interest located?</p> <p>Which ecosystems and other services are of importance? Over what time period?</p> <p>Are there other factors of concern?</p>

is no trade to smooth shocks and stresses, leaving populations highly vulnerable.

The information gathered should identify vulnerable populations and regions. For example, some regions may be more vulnerable to floods and droughts, while other regions may be more vulnerable to high ambient temperatures and heat waves. Communities with high rates of poverty, limited access to healthcare, low levels of literacy, high prevalence of climate-sensitive health outcomes (such as undernutrition or diarrheal diseases), and other factors can increase sensitivity to the hazards created by a changing climate. Table 5 shows examples of populations vulnerable to the health risks of climate change (adapted from WHO 2013).

Constrained access to healthcare is a particular cause for concern with regard to the ability of health systems to manage climate-related stresses, such as increases in patient numbers during extreme weather and climate events, when large numbers of patients may require medical support. A low ratio of medical

professionals to the population served indicates there is very little capacity to treat new patients. Such systems might not be able to respond effectively when climate shocks result in a large number of cases. Additionally, the urban concentration of health facilities relative to those available in rural areas, coupled with often inadequate transportation infrastructure to reach clinics, indicates that climate change will likely impact poor people living in rural areas disproportionately. Scaling up in rural areas can be difficult because of the high cost of such activities.

This first stage should gather information regarding the structure of the health system, which is essential for the design and implementation of interventions. Different departments usually focus on individual health outcomes (e.g., malaria or undernutrition) with only limited interactions between them, exacerbating the challenges. The health risks of climate change cut across most of the departments in a ministry of health, requiring multidimensional approaches to adaptation. Within a country, there can be large

Table 5: Populations vulnerable to the health risks of climate change.

CATEGORY	VULNERABILITY
Demographic factors	Age (proportion of young and old) Gender (proportion of women) Population density
Biological/health factors	Populations with seasonal or chronic undernutrition Populations with high burdens of infectious or chronic diseases Immunocompromised and HIV/AIDS-affected populations Individuals who are mentally or physically challenged
Behavioral factors	Poor food preparation habits Poor hygiene habits and knowledge Unsafe defecation practices
Socioeconomic factors	Poverty Low education and illiteracy Inadequate access to or use of healthcare Inadequate safe water and sanitation access and use Inadequate access to communications and information Displaced and migrant populations Marginalized populations, such as ethnic minorities and nomadic and seminomadic peoples
Environmental or geographic factors	Exposure to environmental pollutants, livestock, or agricultural wastewater Fragile ecosystems, such as drylands, coastal areas, floodplains, mountains, or degraded ecosystems Populations living in crowded, poor, and/or unplanned urban and peri-urban settlements, worker settlements
Sociopolitical factors	Political instability Occurrences of complex emergencies and conflict Limited freedom of speech and information Infringements of civil rights

variations in supervision across urban and rural and geographic regions, with the former often better supervised. Without adequate supervision, it is likely that the health sector will be unable to adequately respond to climate shocks and stresses as the climate signal strengthens over time.

Exploration of health system spending can provide insight into what the system values and prioritizes. What was valued in the past is not always what will or should be valued in the future. Priorities and circumstances change and it is critical to adapt spending to prepare for and respond to new threats. Perhaps none is of more immediate threat than climate change. There will need to be larger budgets allocated to maintenance, rehabilitation, and expansion of the sector given the damage that climate is expected to inflict on the health sector and its associated infrastructure, as

well as the increase in climate-related injuries and illnesses (and, therefore, patients). The potential disruption of services attributed to climate-induced destruction will lead to health challenges. Limited spending in rural communities could also represent a potential threat, given their increased vulnerability.

There may be estimates of the costs of climate-related shocks to health systems. For example, in the Madagascar Climate Change and Health Diagnostic, it was estimated that Madagascar experiences approximately US\$100 million in economic losses annually from cyclones, earthquakes, and floods (World Bank 2016). While data are limited on the cost of such events on the health system, an assessment of 2008 events gives an indication of their magnitude. These should be viewed as conservative figures given the subsequent observed development in the Malagasy economy.

The total cost to the economy was US\$330 million, and the cost to health infrastructure totaled US\$10.3 million. Overall, 70 percent of the costs were associated with physical assets; 30 percent were associated with equipment and furniture, medicines and supplies, and losses of revenues to health facilities. Damage to health infrastructure and to roads connecting communities with health facilities led to the closure of a number of these health centers. This disrupted the country's health services, particularly the treatment of common diseases and diseases covered by control and prevention programs (especially with regard to maternal and child health), in the face of increased need for such services.

Information also should be collected on government goals and objectives as reflected in National Adaptation Programmes of Action, National Adaptation Plans, the country's Nationally Determined Contributions (NDCs), poverty reduction strategies, and other similar papers and plans. The task team may conduct informal interviews with key figures from the ministry or department of health, the national climate change team, and other stakeholders to capture knowledge and experiences not recorded in documents and plans. These interviews can supplement the review with more detailed information on, for example, effectiveness of public health programs.

In the Madagascar Climate Change and Health Diagnostic, the WBG held discussions with an interagency working group on climate change and health to identify the climate and weather information and service needs of the health sector, including gaps in current data, information, and service delivery. Another goal was to assist the Madagascar Meteorological Service in meeting the specific needs of the health sector. It also aimed to help the health sector use climate data and information efficiently for the prevention of epidemics and for guiding response activities for climate-sensitive diseases in the country. The working group has been a catalyst for resource mobilization and climate and health engagement across the government. However, it should not be expected that every country will have such a resource.

The document review and interviews should identify potential entry points in other sectors to ensure a multi-sector approach. The review may identify interventions that would simultaneously optimize climate, environmental, economic, and health benefits. These include climate-smart initiatives but are not limited to climate in scope. Many forms of environmental interventions and ecosystem management can be fine-tuned to deliver economic gain and maximize health benefits. For example, reforestation can promote access to dietary diversity and a wide range of ecosystem services, contribute to creating global carbon sinks, enable agroforestry, provide traditional medicines, and lead to cooler microclimates. Another example is that minimizing freshwater waste can yield a variety of benefits through developing climate-smart urban water systems, and by increasing forest and watershed protection to enhance

water retention. Looming droughts that would otherwise lead to freshwater scarcity and increases in waterborne diseases can be minimized, ensuring water for human consumption and agriculture.

After the initial review of plans, studies, and interviews, the team will meet with relevant departments in the ministry of health and the climate change team to review the list of documents for relevance and applicability to current and planned activities. The team determines the documents that are actually informing and guiding the ministry of health's efforts on climate change and produces a briefing note that summarizes the purpose and conditions under which each document was produced (authors, collaborators, and funders) and real-life application (which department used the document, when, and for what purpose).

A decision could be made at this point to commission specific background studies or data collection initiatives depending on the context and availability of information. This is particularly relevant for health systems with very limited baseline data. The climate and health diagnostic could also serve to identify specific knowledge gaps as one of its outcomes. Given that the climate change and health diagnostic identifies a range of players and actions, there may be an opportunity to work with other development partners and academia to provide inputs into the process.

In addition to identifying climate-sensitive health risks of concern in the country, the document review should:

- Identify climate and shocks that may impact the successful implementation of the project and integrate into project planning; and
- Identify climate change and health risks and opportunities within project documents to establish awareness amongst funders and policymakers.

This information can be used to engage other institutions and departments working on related climate change and health work, and to apply for additional climate-related finance for health activities.

B. Map the Stakeholders

During the diagnostic, it is essential to identify and organize meetings with key officials at all relevant levels of government as well as other stakeholders such as nongovernmental organizations (NGOs), private sector associations, and universities, etc. Inclusiveness is a key characteristic of resilience and the climate and health diagnostic is an opportunity to strengthen connections. Moreover, these stakeholders may play an important role in developing resilience-building strategies and their implementation, particularly for upstream drivers of population health.

To identify the key stakeholders, the task team must understand the political and institutional reality in the nation or region. This may

Table 6: Template for mapping stakeholders and activities.

AGENCY NAME	TYPE OF ENTITY	EXPERTISE 1	CONTACT	CURRENT ACTIVITIES	RELEVANT DOCUMENTS AND DATA	PLANNED ACTIVITIES	ACTIVITY COLLABORATORS	TEAM MEMBER
National climate change team	Government agency	Projections of climate change	Contact name	Modeling regional climate change	Projections of the magnitude and pattern of climate change	Study on historic levels of flooding	Hydrometeorological services	Relationship manager

include regional and national stakeholders, as the upstream drivers of climate-sensitive health outcomes are often the responsibility of other ministries and because policies and actions taken by other ministries may have health consequences. Moreover, developing policies and programs to manage the shocks and stresses explored in the climate and health diagnostic may include modifications to strategies and policies in multiple ministries and departments, within and outside the ministry of health. Finally, to capture and build on ongoing activities and to learn from recent projects, it is important to consult with development organizations, NGOs, and experts engaged locally.

The health and climate team should work in partnership with the country and lending teams to summarize the political and institutional context for managing the health risks of climate change, including the responsibilities of local, national, and regional governments and institutions, as well as donor agencies, research institutes, and civil society groups.

It is important to identify a focal point—one familiar with local partners and fluent in local politics and language—to facilitate the task team’s activities. A comprehensive mapping of actors ensures that a technically suitable and diversified group of stakeholders is included in the climate and health diagnostic. Target stakeholders could include:

- Technical staff at the ministry or department of health
- Representatives of large healthcare facilities
- Representatives of regional resilience collaborations and/or central government initiatives
- Local institutions (public utilities/service providers, planning agencies, public-private agencies providing household services, etc.)
- Private sector (chambers of commerce, industry groups, etc.)
- Civil society (local and international NGOs) and community groups

- Schools, universities, and research institutes
- Other multilateral and international organizations with ongoing activities in the country

In addition to identifying relevant participants, the pre-diagnostic review should include key information about stakeholders’ ongoing and planned activities, including relevant documents and data. Table 6 offers a template for capturing stakeholder information.

C. Identify Priority Climate-Sensitive Health Impacts

The task team will identify a preliminary list of climate-sensitive health outcomes from the desk-based review to consider in the climate and health diagnostic. Climate-sensitive health outcomes of potential interest include those:

- With current high burdens;
- That are likely to increase over coming decades with additional climate change, including outcomes associated with increases in the frequency, intensity, and duration of extreme weather and climate events; and
- Where an outbreak could affect the ability of health systems to manage.

Informal interviews with representatives of the ministry of health, the national climate change team, researchers, and other experts may identify other climate-sensitive health outcomes of potential interest.

The magnitude and pattern of the potential risks that make the preliminary list of climate-sensitive health outcomes should be considered from the perspectives of potential changes in the individual components of risk: hazards, exposure, susceptibility, and capacity:

- Climate-related hazards will change with additional climate change—such as increases in some extreme weather and

climate events—or trends in temperature or precipitation that could affect the distribution of a range of infectious diseases.

- Development choices mean that population exposure to, for example, sea level rise and storm surges, will change with urbanization plans.
- Individual and community susceptibility to climate-related hazards will change as, for example, populations age.
- The capacity to manage the health risks of climate change also will change with investments in health systems, population aging, socioeconomic development, and other factors.

High-priority climate-sensitive health impacts are those that pose proven or potential risk with changes in exposure, hazard, susceptibility, or capacity and that align with ongoing or pipeline investments. For example, when there is a large planned nutrition investment in the country, it would make sense to focus the assessment on nutrition-related threats within the larger context of other key risks (such as infectious disease, heat stress, and malnutrition), as these interventions will have the greatest potential impact.

These higher priority climate-sensitive health outcomes will be used to populate the landscape of targeted interventions for investment. The launch workshop is an opportunity for a broader set of stakeholders to comment on and confirm the set of climate-sensitive health outcomes of interest and their potential health consequences with changes in hazards, exposures, and vulnerability.

D. Prepare the Briefing Note

The briefing note fulfills several functions: it synthesizes information regarding the climate-sensitive health risks that could arise with climate change; describes those systems that might need to manage these impacts; and provides the task team with a solid understanding of the current situation. The briefing note will serve as a reference for the team throughout the climate and health diagnostic. The briefing note needs to strike a balance between comprehensiveness and brevity. The challenge lies in selecting those pieces of information deemed essential for the team member knowledge while also providing a coherent overview. At a minimum, the briefing note should contain:

- A listing of available documents that are included in the review
- Demographic and service delivery snapshots and trends
- Institutional structure of the national or local governments

- Key findings of relevant studies and plans, highlighting the use of these documents to inform policy and projects
- A preliminary list of priority climate-sensitive health outcomes, including the rationale for their selection
- A listing of government goals and objectives
- A preliminary list of investments and how they align with the priority climate-sensitive health outcomes
- An overview of all relevant stakeholders, ongoing activities, and future plans

The briefing note and library of documents are shared with the full team as early as possible in the process. It is assumed that the briefing note alone is not sufficient to fully prepare technical specialists who are not familiar with the country or region; rather it is intended to serve as a guide so that the specialists are aware of the full library of resources available for further, more detailed review. It is the individual specialist's responsibility to ensure that he or she is adequately prepared to participate in the climate and health diagnostic.

In addition to the briefing note, any relevant maps or georeferenced data that could enable the task team to better understand spatial issues should be collected. Examples include projected changes in population densities and economic activity; projected changes in the location of vulnerable populations; and projected changes in the intensity, frequency, and location of hazards.

E. Train the Task Team

In addition to reviewing the guidebook, team members may require training on climate change and health, the concepts underpinning climate-smart healthcare, or knowledge of diagnostic country prior to engaging with stakeholders. This can be done through a combination of group meetings, presentations, and one-on-one briefings. The learning process among the team may require multiple modes of knowledge transfer. It may be challenging to conduct trainings with the full team and, therefore, necessary to conduct multiple trainings or meetings with smaller groups.

Organizing a brown bag lunch or other session in the country office is also an opportunity to train the specialists participating in the climate change and health diagnostic while informing others and achieving broader institutional buy-in for the initiative.

Conduct a Workshop to Launch the Diagnostic

Stage 2 launches the diagnostic process, confirming the initial data and knowledge generated from the stocktaking in Stage 1. This stage also seeks to uncover new knowledge, assess the extent to which participants think health systems could manage the health risks of climate change, and familiarize participants with each other and with the climate change and health diagnostic team. The workshop will engage a broad range of stakeholders, including government, civil society, and experts in international development.

Stage 2 comprises two main parts:

A. Planning the workshop

B. Conducting the workshop

The exact approach to be taken in the launch workshop will depend on work already conducted by government and country stakeholders. Some countries will have identified priority climate-sensitive health risks; others may just be starting those discussions. The extent of knowledge of the health risks of climate change uncovered in the data and document review can be used to modify the plans for the launch workshop to ensure it is as informative and useful as possible.

Regardless of the approach, it is critical to be sensitive to the political arrangements of the country and to respect ongoing channels of engagement and relationships with other development partners. It also is crucial to understand the cultural context of the country and region while designing the workshop agenda, including facilitation of discussions, timing of workshop sessions (i.e., start time in the morning, lunch break, etc.), and finding the right balance between plenary presentations and breakout group activities. In all cases, ample time should be provided for discussion between presentations so as to promote the participation of all stakeholders. In some cases, particularly where language may be an issue, it may be helpful to provide printed copies of reports and other documents.

Information should be collected on key points of the deliberations and conclusions with respect to the feasibility of the results of Stage 1, including the likely extent to which the country's health system could manage changes in the burden of climate-sensitive health risks with current resources and institutional arrangements: what could be managed with additional resources; what might be beyond the capability and capacity of the health system; and what might be the possible consequences. It can be helpful to have designated individuals to take notes during the presentations and discussions.

A. Plan the Workshop

The workshop should take an inclusive approach to identifying workshop participants to facilitate mutual information sharing. It will be important to work closely with the Ministry of Health and other government partners to identify and invite relevant stakeholders to the workshop. It is also crucial to receive support in disseminating the invitations. The Ministry of Health or national climate change team also could support the logistical arrangements and preparations for the workshop and advise on cultural and political customs. The facility selected for the workshop should be large enough to

accommodate up to 75 participants, with tables configured for dialogue and discussion.

The following stakeholders could be potentially relevant attendees, depending on the local context and existing cooperation between different stakeholder groups:

- Technical staff, such as department directors in the ministries of health, environment, and agriculture; national climate change team; emergency and disaster risk management team; hydrometeorological agencies; and others, as well as the heads of vector-borne disease and other control programs;
- Civil society (community representatives, NGOs);
- Academia/researchers;
- International agencies such as WHO and UN Development Programme (UNDP), at headquarters and country levels;
- Other tiers of government (regional and national); and
- Development organizations and donors active in protecting population health, or in adapting to climate change.

Participation by knowledgeable technical staff is essential to the success of the climate and health diagnostic. If important stakeholders are not able to attend, the task team should make a strong effort to meet with them at another time. All task team members should be prepared to provide a short overview of the climate and health diagnostic process during one-on-one meetings.

All task team members should attend the climate change and health diagnostic workshop. In addition, if possible, a representative from the WBG County Management Unit (or a comparable representative from other development partners) should open the workshop alongside a leader from the local government.

Preparation for the diagnostic workshop is largely performed in parallel with the pre-diagnostic review. Specifically, the briefing note is the key input to the presentations, the draft list of invitees, the preliminary list of climate-sensitive health risks, and goals for group activities. Table 7 outlines the basic sections of the workshop and can serve as a guide for the necessary materials. Any standard presentations should be customized to the local context with case studies that may better resonate with participants.

Table 7: Climate change and health workshop #1 agenda template.

MODULE	COMPONENT	PRESENTER(S)	OBJECTIVES
Welcome and introduction	Welcome	Country Director/program leader and senior official	<ul style="list-style-type: none"> • Explain the broader context of the workshop • Clarify the objectives of the workshop • Demonstrate the commitment of ministry of health and the national climate change team leadership
	Overview of workshop	Task team leader and Ministry of Health focal point	
Ministry of Health achievements, plans, and goals	Overview of ministry of health plans and development goals	Ministry of Health official	<ul style="list-style-type: none"> • Share relevant plans and projects • Discuss and confirm the ministry of health’s long-term goals and objectives with the context of national strategies
Background information relevant to the health risks of climate change	Overview of the climate, environmental, and other drivers of climate-sensitive health outcomes	Official from the national hydrometeorological services, and members of the task team	<ul style="list-style-type: none"> • Describe national and regional trends in weather and climate • Summarize the health risks of climate variability and change • Describe the importance of ecosystems and other drivers in the magnitude and pattern of climate-sensitive health risks

Table 7: Continued.

MODULE	COMPONENT	PRESENTER(S)	OBJECTIVES
Review of national and vulnerability, adaptation, and mitigation efforts relevant to health systems	Overview of national vulnerability and adaptation assessments, and national adaptation and mitigation plans	Senior official from the national climate change team	<ul style="list-style-type: none"> Describe the status of national vulnerability and adaptation assessments and adaptation and mitigation plans
Introduce the Climate Change and Health Diagnostic	Overview of health systems resilience	Task team leader or ministry of health coordinator	<ul style="list-style-type: none"> Explain the concept of resilience Explain the climate and health diagnostic process and outcomes Highlight the benefits of enhancing resilience for protection and promoting health in a changing climate Discuss low-carbon options for decreasing greenhouse gas emissions from health facilities
	Introduction to the Diagnostic	Task team leader or ministry of health coordinator	
Confirm the findings of Stage 1	Overview of the findings from Stage 1	Task team member	<ul style="list-style-type: none"> Share and discuss the main findings from existing studies, plans, and interviews with ministry of health departments Share the preliminary list of priority climate-sensitive health risks identified during Stage 1
Explore how climate change could alter the burden of climate-sensitive health risks	Facilitated breakout group discussions on how climate-sensitive health risks could change over coming decades with additional climate change	Task team	<ul style="list-style-type: none"> Reach consensus on priority climate-sensitive health risks
Explore the capacity of the health system to manage changes in climate-sensitive health risks	Facilitated group discussions on the extent to which the country health system could manage changes in the geographic range, seasonality, or intensity of transmission of climate-sensitive health risks with additional climate change. The use of climate scenarios could prove useful in such an exercise.	Task team	<ul style="list-style-type: none"> Describe the current and likely future capacity of the country health system to manage climate-sensitive health risks
Next steps	Conclusions and planning	Task team leader and ministry of health focal point	<ul style="list-style-type: none"> Explain the next steps, including field visits and interviews Clarify the role of stakeholders throughout the process

B. Conduct the Workshop

The Diagnostic workshop is a one- or two-day event designed to engage representatives from the ministry of health, other stakeholders, and technical specialists from the WBG and other development partners in a process to identify and prioritize climate-sensitive health risks (if not previously performed) and assess the extent to which the ministry of health could manage climate-related shocks and stresses.

Group exercises are recommended on the topics of climate-sensitive health risks and how their burden could change over coming decades with additional climate change, and of what would be needed for the country health system to manage these changes within the context of development plans. The objective is to obtain further information on what additional resources, policies, and other supports would be needed for the country health system to be adequately prepared. This is an opportunity for diverse stakeholders to exchange views on risks that could constrain the health systems from achieving its goals.

One outcome of the group exercises will be to identify what investments and actions in addition to current policies and programs could reduce and manage increases in climate-sensitive health risks. Guiding questions could include:

- What is the level of effectiveness of current disease control programs to manage the current burden of disease? How likely could the programs adjust to manage changes in the geographic range, seasonality, and intensity of transmission of, for example, infectious diseases? Or, how quickly could delivery of health services and supply chains be established in case of an extreme weather and climate event outside of historic experience?
- Are there integrated monitoring and surveillance systems that include, at a minimum, health and environmental data that can provide place-based and timely information? These include not just health systems but also environmental systems that could warn of, for example, the likely timing of flooding events and routine data collected on the socioeconomic conditions of the community.
- Are these monitoring and surveillance data incorporated into strategic planning of resources (financial, infrastructure,

medical personnel, and training), distribution chains, and disaster preparedness, etc.? Does strategic planning consider climate change-related risks and their potential consequences?

- Are memorandums of understanding in place with other ministries and departments, such as hydrometeorological services, to facilitate timely access to data and information?
- Has there been an evaluation of climate-related risks to healthcare infrastructure and of any challenges to maintaining services in cases of epidemics or extreme weather and climate events?
- Are there educational and training programs that could easily be modified to include the health risks of climate variability and change?
- Are there national and/or international research programs focused on issues such as:
 - Understanding the associations between weather variables and health outcomes with poorly understood causes?
 - Identifying hotspots of health impacts under climate change scenarios?
 - Identifying new and emerging health threats associated with climate change?
 - Developing new and innovative approaches to managing health risks?

Participants should consider what additional actions could reduce and manage the risks over what is already included in policies and programs (see Table 8).

A rapporteur should capture the discussions and conclusions, with summaries for each module from each table presented in the section detailing the next steps. The workshop participants should collectively agree on the major findings from the climate and health diagnostic and on next steps for using the results to inform policies to increase resilience in health systems to climate variability and change.

The results should be summarized in a report for a number of key stakeholder audiences, including: decision makers in the country health system, workshop participants, technical experts at the WBG and other development organizations. The team should also collect names and affiliations of participants to ensure comprehensive dissemination of findings.

Table 8: Actions to consider for reducing and managing climate-sensitive health risks.

CLIMATE-SENSITIVE HEALTH CONSIDERATIONS	POSSIBLE ACTIONS, DEPENDING ON CURRENT POLICIES AND PROGRAMS
Current burden of climate-sensitive health outcomes	<p>Implement or strengthen integrated surveillance, monitoring, and control programs, paying attention to whether there may need to be changes in data collection in preparation for climate change-related changes in the geographic range or seasonality of the disease</p> <p>Develop an early warning system using environmental information to warn of likely outbreaks, and develop response plans for when warnings are issued</p>
Effectiveness of the health system in managing the burden of climate-sensitive health outcomes	<p>Ensure incorporation of health risks into national and subnational adaptation planning, to strengthen coordination and collaboration across sectors and ministries</p> <p>Where needed, develop memorandums of understanding to facilitate access to environmental and other data, such as meteorological data</p> <p>Provide training and capacity building to healthcare professionals to better manage health burdens</p>
<p>Future burden of climate-sensitive health outcomes:</p> <ul style="list-style-type: none"> Availability of safe water (quality and quantity) Food safety and security Health outcomes associated with extreme weather and climate events Vector-borne and other infectious diseases Health outcomes associated with poor air quality Population displacement 	<p>Project how climate-sensitive health outcomes or other risks (e.g., food security, extreme weather, and climate events) could change under different scenarios of climate change and development at time periods of interest (e.g., 2030s)</p> <p>When not available or cannot be inferred from projections for other regions, partner with local or national universities to provide projections based on expert judgment</p> <p>Consider how development choices could affect future health burdens; for example, the extent to which unplanned settlements are likely to grow under government plans (which could affect population vulnerability to flooding, diarrheal disease, and other health impacts)</p> <p>Improve strategic planning and improve coordination of policies and programs across government agencies and departments</p>
<p>Environmental factors, including:</p> <ul style="list-style-type: none"> Wildfires Coastal erosion Saltwater intrusion 	<p>Develop memorandums of understanding and collaborations with other sectors and ministries to ensure access to and timely sharing of information and data</p> <p>Develop linkages with local, national, and regional universities to keep current on research on the health risks of climate change, such as the implications of saltwater intrusion for pregnancy outcomes</p>
<p>Social and economic factors, including:</p> <ul style="list-style-type: none"> Community services Livelihoods Social capital Economic resources Infrastructure 	<p>Develop memorandums of understanding and collaborations with other sectors and ministries to ensure timely access to and sharing of information and data</p> <p>Develop linkages with local, national, and regional universities to keep current on research on the socioeconomic determinants of health and how changes in these determinants could affect vulnerability to climate variability and change</p>
<p>Health delivery:</p> <ul style="list-style-type: none"> Ability to deliver services Access to healthcare facilities Supply chains, particularly during extreme weather and climate events 	<p>Assess the capacity of health systems to deliver services, including maintaining access to facilities and maintaining supply chains, during epidemics, extreme weather and climate events, and other disasters</p> <p>Conduct desk-based exercises to explore capacities during disasters outside the range of experience</p>



Conduct Interviews and Site Visits

Stage 3 consists of two primary components:

- A. Conducting interviews with key country experts and stakeholders**
- B. Visiting relevant sites**

A. Conduct Interviews

To supplement the workshop, the diagnostic team should conduct interviews with key informants at the ministry of health and other government agencies. This would elicit expert opinions on health system capacity to manage projected changes in the burden of climate-sensitive health risks and on additional policies, programs, and investments that could increase their capacity to prepare for and manage the changes. It also could be beneficial to supplement the workshop with interviews with key stakeholders unable to participate in the workshop or with field trips to visit highly vulnerable infrastructure or locations.

It may be helpful to hold one-on-one interviews and/or focus group discussions with officials, technical staff, and other stakeholders. Each technical specialist should be proactive in communicating to the task team leader and/or local support the list of people with whom he or she would like to meet. It is preferable to meet with local officials and technical staff in their offices where they have all the materials that may be useful for the diagnostic readily available.

B. Visit Relevant Sites

If considered relevant, field visits could be conducted to obtain further information about the current capacity to cope with significant weather-related events, such as flooding or drought. The selection of sites for field visits should be decided jointly by the task team and ministry of health or the national climate change team staff. The decision should be informed by the priority climate-sensitive health risks identified, the modifications suggested to health adaptation policies and programs, and other issues raised during the workshop. The objective is to gain a further understanding of risks to health systems by visiting locations that could be considered hotspots of vulnerability (existing and projected) and provide a good representation of challenges and achievements.

Organizing the interviews and field trips can be a difficult task, involving travel planning, calls to multiple stakeholders, interpreters, and last-minute rescheduling. If possible, administrative support should be requested from the Country Office to centralize this set of tasks with someone who is familiar with the ministry of health, climate change team, and other stakeholders, and who is fluent in the local language.



Develop Recommendations and Prepare a Summary Report

The objective of Stage 4 is to develop actions and investments to enhance health system resilience based on the data and document review, informal interviews, field visits, and the results of the climate and health diagnostic launch workshop. Work also begins to prepare a comprehensive report.

Stage 4 consists of two primary components:

- A. **Developing recommendations for investments**
- B. **Preparing a summary report**

A. Develop Recommendations for Investments

Timing. Development of recommendations takes place after the launch workshop, one-on-one interviews, and field visits.

Participants and roles. All task team members must participate in recommendation development. Recommendations will likely evolve and transform during the session and throughout Stages 4 and 5. Therefore, it is paramount that the experts who contributed to the Diagnostic are present to discuss and agree on the final set of recommendations, including technical staff from the health system. Their input benefits the process by providing additional insight on issues, feedback on preliminary recommendations, and ideas for increasing the ability to implement the proposed actions and investments.

The Diagnostic coordinator, task team leader, or a professional facilitator will guide the prioritization process. If a facilitator is used, it is important that he/she is an unbiased, enabler of cross-sector dialogue so that all technical specialists feel that there is a level playing field for sharing ideas.

It is helpful to identify an official note-taker prior to commencing the session. The facilitator may use large notepads or whiteboards to help organize suggestions and concepts but there should be someone taking detailed notes in addition. This will be helpful in preparing for the wrap-up session with health system leadership, drafting of the aide memoire, and developing the publication of findings.

Prior to recommendation development, the task team leader will collect the recommendations for actions and investments, writing each on individual sheets or cards. Each card should list a specific recommendation and denote if it is an action or an investment. Technical specialists are asked to present their recommendations. Once all are presented, and any questions or clarifications addressed, the group will cluster the recommendations on a wall or whiteboard. Topics around which topics could be clustered include:

- Proposed actions (institutional strengthening, capacity building, data collection, regulatory reforms, etc.)
- Proposed investments (new infrastructure, rehabilitation of infrastructure, safety net systems, new programs, etc.)
- Measures to address specific climate-sensitive health risks

- Measures to protect specific communities, groups, or assets and address equity concerns
- Short-term versus medium-term measures
- Low-carbon development to increase resilience
- Opportunities for cofinancing of recommendations

The recommendations should consider whether there are specific communities, regions, or infrastructure that could be considered hot spots, and whether revising the list of key climate-sensitive health risks could impact the composition of people or assets at high risk. There also should be discussion of ways to bring the recommendations into better alignment with the health system goals and with enhancing resilience.

At this point, it is not necessary to consolidate or remove specific recommendations. However, if there is early consensus to consolidate, remove, or revise, the group should do so.

Recommendations should be made with specific WBG investments in mind. They can be made for any point along the project cycle (Figure 7).

B. Prepare a Summary Report

The next step is to commence writing of a summary report. The report should provide an overview of the climate change and health diagnostic, with annexes for further reading. The report aims to be a comprehensive overview of the latest climate and health information in the country, summarizing risks and opportunities, assessing systems, and recommending actions and investments (or line items in projects). The latter should take into account factors such as the eminence of the threat, competing demands, windows of opportunity based on current and planned projects and investments, and stakeholder concerns and preferences. The process is iterative and will require follow-up conversations with task teams, government partners, and experts. This process may take weeks to months to ensure comprehensive and vetted results are achieved.

The diagnostic reports should be structured according to the outline in Table 9.

Figure 7: Interventions throughout the project cycle.

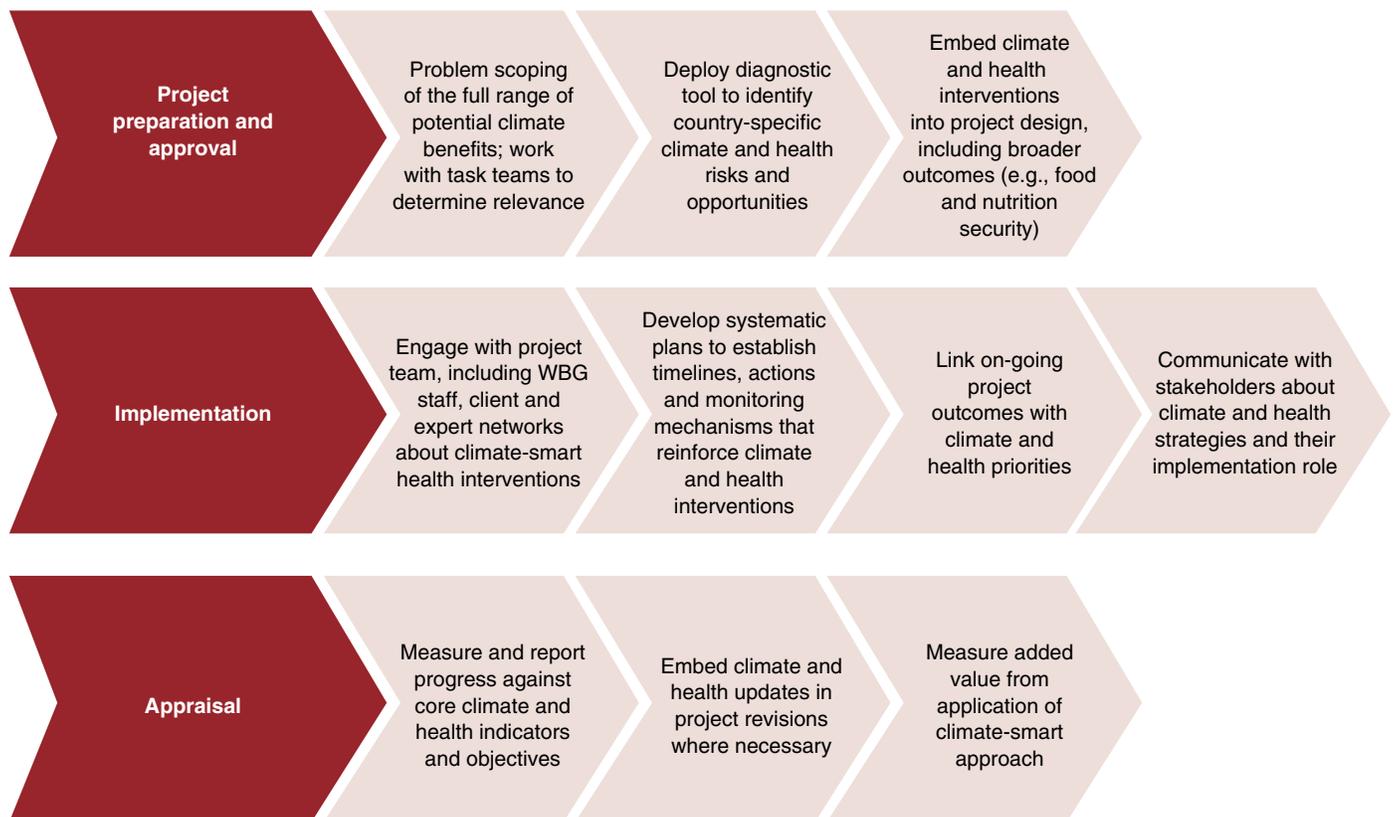


Table 9: Content of the climate and health diagnostic findings report.

SECTION	CONTENT
Introduction and background	Presents the objective of the climate and health diagnostic and any relevant background information.
Executive summary	Provides a summary of the main climate and health risks facing health systems and recommended priority actions and investment.
Benefits of conducting a country-specific climate and health diagnostic	Describes the benefits of a climate and health diagnostic for the country to enhance climate resilience and describes the qualities of health system resilience.
Low-carbon development	Describes the short- and long-term benefits of low-carbon development.
Overview of the climate and health diagnostic	Describes the objective of the climate and health diagnostic, its stages.
Section 1: Methods	Describes the methods to (i) ensure transparency of the approach used, and (ii) illustrate how the approach outlined in <i>Climate Change and Health Diagnostic: A Country-Based Approach for Assessing Risks and Investing in Climate-Smart Health Systems</i> (World Bank 2017b) was followed and adapted.
Section 2: Climate Drivers, Impacts, and Vulnerable Populations	Provides key information on health, socioeconomic, geographic, climatic, and service delivery. This section is a resource for those wishing to understand the scope and magnitude of climate-related impacts and risks. It includes data and discussion on climate change and climate-health risks, and although scientific in nature, is prepared with a general policy audience in mind.
Section 3: Climate-Smart Healthcare Assessment	Provides relevant facts and figures to inform climate change and health decision making, while exploring dimensions of the sector to determine the degree to which it is climate smart. This section identifies pressure points in the health system where interventions may be most useful.
Section 4: Recommended interventions	Prioritizes the recommended actions and investments for enhancing health system resilience, highlighting policies and programs that the health system can start implementing immediately to increase resilience. This includes what can be done, in terms of resilience and low-carbon or co-benefit opportunities for the health sector; what can be done in other sectors; and what has already been recommended by international and in-country experts. This information should be broadly useful to anyone working on climate variability and change and health in the country.
Section 5: Linking to Investment	Identifies entry points and recommends a pathway for future engagement.
Annexes	Provides detailed information on certain aspects highlighted in previous sections (such as in-depth climate change projections, listings of relevant partners, reference documents, and other resources) that may be interesting to certain audiences but that are beyond the immediate scope of the report.



Present and Validate Report Findings and Recommendations

The objective of Stage 5 is to discuss the findings of the diagnostic with the leadership of health systems and government partners, review recommendations, and agree on next steps.

Prior to sharing the draft recommendations, the management from the WBG or other development partners may ask to be briefed. The task team leader should confer with the CMU early in the diagnostic process to ensure that ample time for briefing is allocated. The time between the prioritization session and the review meeting may be quite short, and therefore, the task team leader and CMU should agree in advance on the timing.

Stage 5 includes the following steps:

- A. Reviewing the diagnostic report with country stakeholders**
- B. Finalizing the diagnostic report**
- C. Making the findings public**
- D. Setting the path for future engagement**

A. Review Meeting and Second Stakeholder Consultation

Depending on the local context, the review meeting may be with a small group of health system officials or with the same stakeholders who participated in the launch workshop. The format and size will inform the type of materials that need to be prepared. For a small-scale gathering, the task team should prepare hard copies of the talking points to share. For a larger event, it may be more appropriate to also prepare a PowerPoint presentation.

An aide-memoire should be prepared that captures the main findings of the climate change and health diagnostic, presenting recommendations for priority actions and investments and agreed next steps. Importantly, this should reflect input and feedback from the review meetings and highlight any data gaps that could significantly alter its recommendations. Depending on management norms, the aide-memoire should be delivered to the health system within one week of the review meeting.

Table 10: Climate change and health workshop #2 agenda template.

MODULE	COMPONENT	PRESENTER(S)	OBJECTIVES
Welcome and introduction	Welcome	Country director/ program leader and senior official	<ul style="list-style-type: none"> • Clarify the objectives of the workshop • Demonstrate the commitment of ministry of health and the national climate change team leadership
	Overview of workshop	Task team leader and ministry of health focal point	<ul style="list-style-type: none"> • Self introduction of meeting participants
Present results of the launch workshop and interviews	Review priority climate-sensitive health risks as identified in the launch workshop and interviews	Task team leader	<ul style="list-style-type: none"> • Review priority health risks • Describe the results of the preliminary prioritization of climate-sensitive health risks
Confirm the results of the Climate Change and Health Diagnostic prioritization of health risks (breakout group discussions)	Agree on recommendations for health system investments	Task team leader or ministry of health coordinator	<ul style="list-style-type: none"> • Discuss the climate and health diagnostic process and outcomes, particularly the extent to which health systems could likely cope with changes in the burden of climate-sensitive health risks • Identify populations and communities who are particularly vulnerable to climate variability and change over shorter and longer time scales • Agree on recommendations on policies and programs to proactively address the challenges identified • Identify opportunities for development partners to support implementing the recommendations, including possibilities for cofinancing • Identify key knowledge gaps • Discuss potential costs of such exercises where there is sufficient information available
Multi-sector interventions	Agree on linkages across sectors	Task team leader	<ul style="list-style-type: none"> • Discuss and agree on linkages across sectors, such as meteorology and agriculture, that would increase the effectiveness of investments to promote resilience
Low-carbon and climate-smart development	Discuss opportunities for low-carbon and climate-smart development	Task team leader	<ul style="list-style-type: none"> • Identify current and planned investments where low-carbon and climate-smart development approaches can be applied
Next steps	Conclusions and planning	Task team leader and ministry of health focal point	<ul style="list-style-type: none"> • Explain the next steps • Clarify the role of stakeholders throughout the process

Box 2. Lessons Learned from the Madagascar Workshops

A debriefing from the Madagascar Climate Change and Health Diagnostic Workshop on 4 October 2017 identified what worked and what could have been done better. These are included here so that teams may review in preparation of conducting their own stakeholder consultations.

What worked

- i. Communications and level of engagement
- ii. Buy-in from high-level government and other support
- iii. Advantage of building on a base of existing work
- iv. Diversity of team and expertise as a useful asset

What could have been done better

- i. Logistics
- ii. Translation of documents is necessary, and provide documents ahead of time
- iii. Note taker is necessary to ensure technical staff can focus on core content
- iv. Facilitator enlisted from nontechnical staff would be helpful in defining roles
- v. Would be helpful to have a local WBG staff to represent investments
- vi. Engage the ministry of finance throughout
- vii. Advertising this event so there is broader public awareness could help with further government buy-in
- viii. Greater government opinion helpful, in particular when balancing what the diagnostic process found with the government's own views of what was lacking
- ix. Important to have local consultant to coordinate details
- x. Prepare recommendations so they can be circulated weeks in advance
- xi. Timing of project needs to expand beyond three months
- xii. Clarification of messages
- xiii. Provide access to next steps and actual portfolio early in the day

B. Finalize the Diagnostic Report

After agreeing on priorities and next steps, the task team should revise the climate and health diagnostic report (Stage 4) to highlight the findings while incorporating direction and feedback from stakeholders. This step should consider additional research and verification, as applicable. This will be used by the investment

community and by the government to facilitate communication with a broad set of internal and external stakeholders.

A suggested outline for the content of the publication can be found in Table 9.

It is critical that this report is useful to both WBG lending teams, as well as government and other international partners. After completion of Stage 5 (final workshop), the report should be reviewed by technical experts in climate change and health, environmental health, and country development plans.

The task team leader will take the lead in preparing the first draft of the publication based on the final aide memoire, the discussions and results of the climate and health diagnostic, the notes from the prioritization session, and information collected during the pre-diagnostic review. The first draft is circulated to the task team, and it is the responsibility of all team members to provide comments and revisions to ensure that the publication accurately reflects the diagnostic process and outcomes.

Given that the publication will be a public statement of recommendations for the health system, it is recommended that the draft document be put through a peer review process. Once approved, it should be sent to counterparts for final review and approval.

C. Make the Findings Public

The purpose of the publication is to document the climate change and health risks the country is facing and highlight avenues to increase resilience through investments. Although targeted to the WBG, the publication should serve as a road map for other institutions wishing to work in this area. To effectively communicate the findings to a broad audience, it is recommended that the publication be relatively short (maximum 75 pages), rich with graphics and pictures, and use simple, accessible language. It is also recommended that the publication be translated into the local language and disseminated through local media channels.

D. Set the Path for Future Engagement

The climate change and health diagnostic is a beginning, not an end. In parallel to the preparation of the findings publication, the task team continues a dialogue with the government as to how the WBG or other development partners could support the recommended actions and investments. Depending on the nature of the recommendations, follow-up support may be guided by the task team leader or other technical specialists who participated in the diagnostic and include activities such as studies and surveys to fill data gaps, feasibility studies for critical programs, technical assistance, or a financing operation. It is also likely that many of these recommendations will be adopted and absorbed into lending programs, and the initiating team should provide any necessary support.



References

- Arup International. 2014. *Toolkit for Climate Resilient Cities* https://www.acclimatise.uk.com/login/uploaded/resources/SiemensResilience_InteractPDF_2013-09-25.pdf
- Brundtland Commission (World Commission on Environment and Development). 1987. *Our Common Future*. Oxford: Oxford University Press.
- De Bruijne, Mark, Arjen Boin, and Michael van Eeten. 2010. "Resilience: Exploring the Concept and Its Meanings." In *Designing Resilience: Preparing for Extreme Events*, edited by Louise K. Comfort, Arjen Boin, and Chris C. Demchak. Pittsburgh: University of Pittsburgh Press. https://www.researchgate.net/publication/48323614_Resilience_Exploring_the_Concept_and_its_Meanings
- DFID (Department for International Development). 2005. *Disaster Risk Reduction, a Development Concern, a Scoping Study on Links Between Disaster Risk Reduction, Poverty and Development*. London: Department for International Development.
- Ebi, Kristie L. 2014. Health in the new scenarios for climate change research. *Int J Environ Res Public Health* 11 (1): 30–46. doi:10.3390/ijerph110100030
- Ebi, Kristie L., N. H. Ogden, J. Semenza, and A. Woodward. 2017. Detecting and attributing health burdens to climate change. *Environ Health Perspect* 125 (8). DOI:10.1289/EHP1509
- Hallegatte, Stephane et al. 2016. Shock waves: managing the impacts of climate change on poverty. Climate Change and Development Series. Washington, DC: World Bank.
- Hallegatte S., Green C., Nicholls R., Corfee-Morlot J. 2013. *Future Flood Losses in Major Coastal Cities*. *Nature Climate Change* 3.9: 802–06.
- Hallegatte Stephane, Mook Bangalore, Laura Bonzanigo, Marianne Fay, Tamaro Kane, Ulf Narloch, Julie Rozenbergt, David Treguer, and Adrien Vogt-Schilb. 2016. Shock Waves: Managing the Impacts of Climate Change on Poverty. Washington, D.C: World Bank Group.
- IPCC (Intergovernmental Panel on Climate Change). 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*. Edited by Field, Christopher B., Vincente Barros, Thomas F. Stocker, Qin Dahe, David Jon Dokken, Kristie L. Ebi, Michael D. Mastrandrea, Katharine J. Mach, Gian-Kasper Plattner, Simon K. Allen, Melinda Tignor, and Pauline M. Midgley. Cambridge: Cambridge University Press.
- . 2014. "Glossary." In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by Christopher B. Field, Vincente Barros, and David Jon Dokken, et al. Cambridge: Cambridge University Press.
- Myers, S. S., Gaffikin, L., Golden, C. D., Ostfeld, R. S., Redford, K. H., Ricketts, T. H., Turner, W. R., and Osofsky, S. A. (2014). Reply to De Coster et al.: Exploring the complexity of ecosystem–human health relationships. *Proceedings of the National Academy of Sciences*, 111(18).
- Semenza, Jan C., Annelise Tran, Laura Espinosa, Bertrand Sudre, Dragoslave Domanovic, Shlomit Paz. 2016. Climate change projections of West Nile virus infections in Europe: implications for blood safety practices. *Environmental Health*. 201615 (Suppl 1):S28.
- Sitathan T. 2003. *Singapore's economy: SARS gloom and doom*. Asia Times Online, 23 May 2003.
- Smith, Kirk R., et al. 2014. "Human health: impacts, adaptation, and co-benefits." In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by Christopher Field, et al. 709–754. Cambridge: Cambridge University Press. https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap11_FINAL.pdf
- Steinbruner, John D., Paul C. Stern, and Jo L. Husbands, eds. 2013. *Climate and Social Stress: Implications for Security Analysis*. Washington, DC: The National Academies Press. <https://www.nap.edu/catalog/14682/climate-and-social-stress-implications-for-security-analysis>
- UNISDR. 2013. *Global Assessment Report on Disaster Risk Reduction 2013*. Geneva: UNISDR.

- World Bank. 2011. *World Development Report 2011: Conflict, Security and Development*. Washington, D.C: World Bank Group.
- . 2014. *Climate and Disaster Resilience—The Role for Community-Driven Development*. Washington, DC: World Bank.
- . 2014. *World Development Report 2014: Risk and Opportunity: Managing Risk for Development*. Washington, DC: World Bank.
- . 2017. *Climate-Smart Healthcare: Low-Carbon and Resilience Strategies from the Health Sector*. Washington, DC: World Bank Group.
- . 2018. *Madagascar Climate Change and Health Diagnostic: Risks and Opportunities for Climate-Smart Health and Nutrition Investment*. Washington, DC: World Bank Group.
- WHO (World Health Organization). 2012.
- WHO. 2013. Protecting health from climate change: vulnerability and adaptation assessment. World Health Organization, Geneva, Switzerland.
- WHO. 2014. Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. World Health Organization, Geneva, Switzerland.
- . 2015. *Operational Framework for Building Climate Resilient Health Systems*. World Health Organization, Geneva Switzerland.
- Zolli, Andrew. 2012. “Learning to Bounce Back.” *The New York Times*. November 2. <http://www.nytimes.com/2012/11/03/opinion/forget-sustainability-its-about-resilience.html>

Relevant WBG Tools and Resources

This section describes several existing tools within the WBG that may be useful in helping task teams address the recommendations and implement the interventions.

Climate Change and Health Website

The World Bank has been working to address climate change and health risks and opportunities for several years. As a result, there are a number of reports and knowledge resources generated that can assist in the operationalization of climate change and health project interventions. For example, *The World Bank Approach and Action Plan for Climate Change and Health* offers guidance on framing climate change and health. *Climate Smart Healthcare: Low-Carbon and Resilience Strategies for the Health Sector* offers a comprehensive list of tools and resources for climate-smart health programming. *Geographic Hotspots for World Bank Action on Climate Change and Health* provides a methodology for determining regions that are susceptible to climate change and health risks. Each of these, as well as other reports, training segments, factsheets, and links to non-WBG climate change and health work can be found at: <http://www.worldbank.org/en/topic/climatechange>.

Climate and Disaster Risk Screening Tools

WBG's Climate and Disaster Risk Screening Tools developed provide a systematic means to considering short- and long-term climate and disaster risks in project and national/sector planning processes. Screening is an initial, but essential, step to ensure these risks are assessed and managed to support mainstreaming of climate and disaster resilience into key development policies, programs, and projects.

These self-paced tools provide high-level screening at an early stage of program and/or project development. The tools do not provide a detailed risk analysis, nor do they suggest specific options for increasing the project's resilience. They are intended to help determine the need for further studies, consultation, and dialogue in the course of program or project design.

These tools can be applied to a range of development sectors in support of national plans and strategies, and also project-level investments. The national/policy level tool targets national plans, sector-wide strategies, and development policy and institutional strengthening and reforms (<https://climatescreeningtools.worldbank.org>).

Environmental Health Capacity Assessment Tool

WBG, in partnership with EcoHealth Alliance, has developed a tool for the country assessment of environmental health services. The tool aims to assist countries in: prioritizing and tracking capacity development; optimizing the use of existing infrastructure; and reinforcing progress in addressing other goals and action plans (e.g., climate adaptation, biodiversity conservation, tackling antimicrobial

resistance, disaster risk reduction, and health security). Structured around core components of governance, technical, and focal (alien species) components, the tool establishes standardized criteria for environmental health capacity, while noting that the participation of multiple sectors is likely required for effective operations.

The tool is designed to highlight relevant areas that can reinforce overall ecosystem resilience, intending to build directly on existing climate and disaster risk screening tools and risk reduction resources. It also supports country capacity to anticipate how weather and climate change-related risks interact with other changing environmental factors. The tool's development originated from the WBG Operational Framework for Strengthening Public Health Systems at the Human-Animal-Environment Interface (aka. One Health Operational Framework), which emphasizes value-added application of One Health and the benefits of environment sector involvement in the public health system.

The assessment tool establishes an approach toward collecting and analyzing available data sources to produce a qualitative assessment report (modeling the assessment mission and report after the format used for the WHO's Joint External Evaluations). Application of the tool includes the convening of a stakeholder meeting with participating ministries to present the pilot assessment findings while verifying capacity strengths and gaps with country partners. The stakeholder meeting also serves to review possible opportunities to leverage existing capacity and initiate discussion on prioritization of capacity building needs and areas of alignment and/or reinforcement of existing goals. This is also an opportunity to seek feedback on the tool's overall utility and establish a possible scoring structure. Overall, this assessment tool will highlight country leadership, experience, and expertise while advocating for capacity support to strengthen areas within environmental health services.

Global Facility for Disaster Risk Reduction Resources

The Global Facility for Disaster Reduction and Recovery (GFDRR) is a global partnership that helps developing countries better understand and reduce their vulnerability to natural hazards and climate change. GFDRR is a grant funding mechanism, managed by the WBG, that supports disaster risk management projects worldwide. Working with over 400 local, national, regional, and international partners, GFDRR provides knowledge, funding, and technical assistance.

In recent months, GFDRR has developed two tools that may be of use to the climate and health community: guidance material on post-disaster health sector recovery, and a knowledge hub concentrating on recovery operations.

In partnership with the International Recovery Platform (IRP) and Pan-American Health Organization (PAHO), WBG (through GFDRR) has developed a guidance note for post-disaster health sector recovery. The note is intended to provide action-oriented advice and interventions for local and central government health sector officials who face post-disaster challenges. Milestones are categorized by phases of recovery (immediate, short-term, and medium- to long-term) and specify policy, planning, financial, and implementation decisions that go into developing and implementing a health sector recovery plan.

This guidance is available on the GFDRR website in English and French (<https://www.gfdr.org/sites/default/files/2017-09/Health%20Guidance%20Note.pdf>).

WBG has also developed the 'Recovery Hub', a 'one-stop shop' for disaster recovery operations of which health is one of five featured sectors. The hub will feature knowledge resources, case studies and project documents¹ (<https://www.gfdr.org/recovery-hub>).

Operational Framework for Strengthening Public Health Systems at the Human-Animal-Environment Interface

The One Health concept recognizes the connections between humans, animals, and the environment and promotes coordination to better understand and manage risks. For over a decade, the WBG has worked to promote and operationalize One Health approaches, supported by country partners, technical institutions, international organizations, and development funders. There has been a considerable evidence base established on the topic, with reports and studies addressing various One Health dimensions, such as *People, Pathogens, and Our Planet*, the *Investing in Climate Change and Health* series, and *Drug-Resistant Infections: A Threat to Our Economic Future*. This analytical work has underpinned country operations like the Global Program for Avian Influenza and Human Pandemic Preparedness and Response, and the Regional Disease Surveillance Systems Enhancement program. An Operational Framework for Strengthening Public Health Systems at the Human-Animal-Environment Interface (or One Health Operational

¹ Other related, publicly available disaster preparedness tools include ThinkHazard, which provides a general view of the threats, for a given location, that should be considered in project design and implementation to promote disaster and climate resilience, and the INFORM Risk Index, an open-source risk assessment for humanitarian crises and disasters. INFORM Risk Index can support decisions about prevention, preparedness, and response.

Framework) now builds on this experience and provides guidance to help optimize One Health operations.

The One Health Operational Framework supports country lending programs and establishes a step-by-step, how-to methodology for applying One Health in development operations. It outlines activities and interventions to target disease threats at the human-animal-environment (climate) interface, highlighting mechanisms for institutional and technical implementation to build more collaborative public health systems. It emphasizes elements

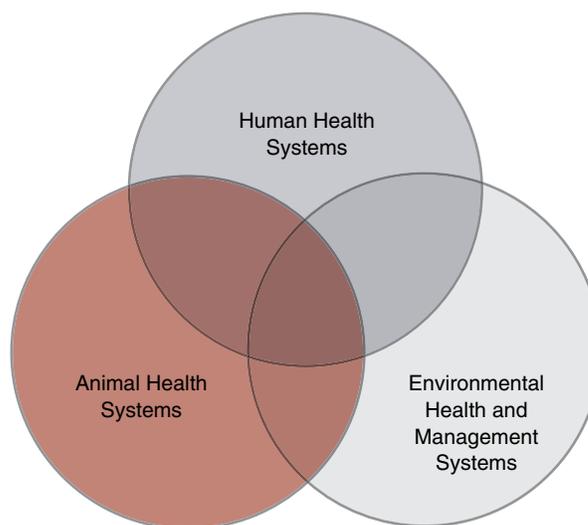
that are critical to include in projects, including specific country requests for national priority issues. The approach presents steps and provides technical guidance for actions and capacity that can be taken at the country level along the ‘prevent-detect-respond-recover’ spectrum. It also provides examples of successful One Health projects to draw upon and replicate, while creating a platform for engagement among international organizations, development lending institutions, and national governments.

Connecting Climate Change and Health with “One Health,” “Planetary Health” and the Sustainable Development Goals

Public health challenges stemming from environmental factors inherently span multiple sectors, and warrant holistic, society-level solutions. “One Health” (humans-environment-animals) and “Planetary Health” (earth systems and health) are related approaches that recognize the connections between humans and environment and that promote coordination to better manage risks and improve health.

The intention of this climate change and health diagnostic firmly aligns with the goals and ethos of One Health and can be considered a tool employed under the broader One Health umbrella. Climate and health interactions fit clearly within the spheres of “human health systems” and “environmental health and management” below. Utilizing the “One Health” title is important because many countries implementing the legally binding International Health Regulations, including Madagascar, are taking measures to develop One Health coordination mechanisms, particularly for the control of zoonotic diseases.

One Health model, as used within the World Bank

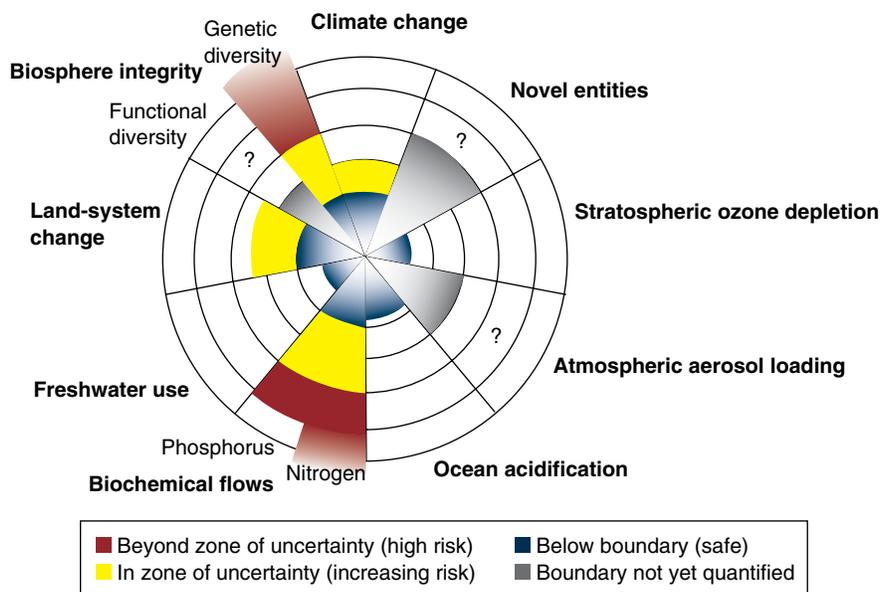


The World Bank has worked for over a decade to promote and operationalize One Health, supported by country partners, technical institutions, international organizations, and other development funders. This has included the generation of a considerable knowledge base on the topic, with reports and studies addressing various One Health dimensions, such as *People, Pathogens, and Our Planet*, *Investing in Climate Change and Health* series, and an extensive portfolio on antimicrobial resistance. This research has underpinned country operations, like the Global Program for Avian Influenza and Human Pandemic Preparedness and Response, and the Regional Disease Surveillance Systems Enhancement program. At present, an *Operational Framework for Strengthening Public Health Systems at the Human-Animal-Environment Interface* (also referred to as the One Health Operational Framework) is in

development and will soon be able to offer further tools toward the achievement of more sustainable health and environmental systems in and among many countries with which the WBG is engaged.

In recent years, support for a related framing has emerged. Planetary Health characterizes public health risks associated with rapidly accelerating, anthropogenic environmental change. There are a range of changes with the potential to significantly impact human health: climate change, biodiversity loss, fishery collapse, land-use change, urbanization, ocean acidification, sea temperature and level increases, and freshwater scarcity. Accordingly, holistic interventions are required to safeguard the future health of both people and planet (Rockefeller Foundation-Lancet Commission Report on Planetary Health 2016).

Planetary boundaries, as defined by Steffen et al., 2015.



The post-2015 sustainable development agenda currently includes 17 Sustainable Development Goals (SDGs). Goal 13 calls for urgent action to combat climate change and its impacts, while Goal 3 aims to ensure healthy lives and promote well-being. Virtually every other goal includes some dimension that touches upon health and/or climate, underscoring the relevance of integrated

systems perspective across environmental and health spheres, which is at the heart of the One Health and Planetary Health approaches. Fundamentally, each of the goals is linked; progress in any one of these areas can lead to collective achievement toward improved development and a more sustainable future.



