

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

Health

Introduction

Purpose: This annex to the Climate Risk Screening and Management Tools is designed to provide you with more information on climate change¹ implications for health. The information is grouped into the following sub-sections, with the corresponding step from the Tool shown in parentheses:

- Climate Risks to Health (Step 2)
- Adaptive Capacity Related to Health (Step 3)
- Opportunities Related to Climate Risk Management of Health (Step 5)
- Climate Risk Management Options for Health (Step 6)
- Additional Key Resources Related to Health

The questions and examples provided in this annex are illustrative and designed to stimulate thinking about climate risks, adaptive capacity, opportunities, and climate risk management options. Actual climate risks will depend on the context and anticipated climate changes for particular geographies.

Sectoral focus: The material in this annex focuses on health, and aligns with the following Program Areas of the Standardized Program Structure: HL.3 Malaria, HL.4 Global Health Security in Development, HL.5 Other Public Health Threats, HL.6 Maternal and Child Health, and HL.9 Nutrition. Note, to the extent your design involves multiple sectors, you may want to consult other relevant annexes such as the [Water Supply and Sanitation Annex](#). In particular, if any construction is anticipated, referring to the [Infrastructure, Construction, and Energy annex](#) is highly recommended.

¹ In this document, the term “climate change” refers to both climate variability and climate change. “Climate variability” refers to variations in climate (including the normal highs and lows, wet and dry periods, hot and cool periods and extremes) and can refer to month-to-month variability, year-to-year variability, and even decadal scale variability. In this document, “climate change” refers to those variations as well as persistent change in climate over decades or longer (USAID, 2014. Climate-Resilient Development: A Framework for Understanding and Addressing Climate Change).

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

Tool Step 2: Climate Risks to Health – Illustrative Examples and Questions

Once you have reviewed this section, you can navigate back to the Tool by clicking on the relevant hyperlink in the header.

| Vector-Borne Diseases | Waterborne Diseases | Nutrition |
|--|--|--|
| <ul style="list-style-type: none">• Shifts in the geographic range, seasonal presence, and biting rates of disease vectors due to changes in temperature, precipitation, and ecology.• Acceleration of the life cycles of climate-sensitive disease vectors due to higher temperatures and changing precipitation patterns.• Emergence or re-emergence of diseases through shifting migratory paths and species habitat due to a variety of climate. | <ul style="list-style-type: none">• Increase in incidence of diarrhoeal diseases related to higher temperatures especially in dry seasons and poor drinking-water quality.• Spread of waterborne diseases due to extreme events (e.g. floods) and the health emergencies that follow.• Changes in waterborne disease patterns due to changes in water flows and resulting changes in pH, nutrient and contaminant levels, and salinity.• Increase in the risk of food contamination due to higher air temperatures, sea surface temperatures (related to pathogen exposure in seafood), and humidity.• Increase in harmful algal blooms (HABs) due to higher temperatures. | <ul style="list-style-type: none">• Direct impacts on agricultural productivity, including impacts on livestock and fisheries, due to temperature increases and changes in rainfall.• Reductions in food micronutrients due to higher temperatures and CO2 emissions.• Reductions in calories per person and increases in the percent of underweight and stunted children due to food insecurity from changes in rainfall patterns and increases in drought incidence. |

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

| Infrastructure/Supply Chains | Heat Stress | Other Health Stress |
|--|---|--|
| <ul style="list-style-type: none"> ● Destruction or disruption of sanitation and health facilities and access roads due to extreme events, such as floods. ● Disruptions in access to health facilities, as well as drug and supply distribution chains, due to weather and climate events. ● Disruption in energy and water sources for medical centers due to extreme weather events. ● Lack of access to food, especially in urban areas due to extreme events impacting transportation and infrastructure. | <ul style="list-style-type: none"> ● Increased risk of heat-related death or illness, including hyperthermia due to higher temperatures. ● Reduced labor productivity and capacity for work due to health impacts from temperature increases (in already hot climates this impact can accompany relatively small temperature increases). ● Cardiac stress due to higher air temperature increases (especially for older adults). ● Elevated heat exposures increases the risk of preterm birth. | <ul style="list-style-type: none"> ● Increased respiratory illnesses due to air quality problems associated with higher temperatures and ozone in urban environments as well as increases in drought-related forest fires and increases in surface dust. ● Higher allergen levels where higher atmospheric CO2 levels increase plant productivity. In addition, there is an increased risk of mold due to increases in moisture in flooded buildings. ● Human migration on seasonal and permanent time scales due to climate change impacts (e.g., impacts on water supply). ● Psycho-social stress caused by loss of livelihood, malnutrition, disease, and social conflict due in part to climate change. ● Disproportionate health impacts to marginalized and vulnerable populations including those with low-incomes, children and pregnant women, elderly, vulnerable occupational groups, persons with disabilities, and persons with preexisting or chronic medical conditions. |

Illustrative questions by climate stressor:

Temperature:

- How may higher temperatures directly increase morbidity and mortality, particularly for the elderly?
- How may higher temperatures affect the geographic extent and life cycle of pathogens and disease vectors?
- How may harmful algal blooms increase with rising water temperatures?

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

Flooding:

- How may flooding directly harm people (e.g., through drowning or debris impacts)?
- How may flooding affect access to health care or supply chains, or cause physical damage to health facilities?
- How may flooding affect the incidence of waterborne disease through decreases in water quality (e.g., via sewer overflows)?

Drought:

- How may prolonged drought affect agricultural production and therefore nutrition?
- How may drought affect availability of potable water?
- How may drought affect migration?
- How may drought increase wildfire and soil aridity, and thereby decrease air quality?

Sea level rise and storm surge:²

- How may increases in storm surge directly cause increases in morbidity and mortality?
- How may sea level rise and storm surge damage health facilities or decrease access to them?
- How may sea level rise and storm surge affect waterborne disease and the quality of potable water?

Illustrative questions by programming or system element:

Vector-Borne Diseases:

- What are the epidemiological linkages between climate variables and critical vector-borne diseases? How important are variations in temperature and/or precipitation?
- How will current observed trends or patterns of disease vectors be affected by changes in climate patterns? How will the key hotspots of disease shift over time?
- Will any vector-borne diseases become more or less important over time? Are there emerging vector-borne diseases that may need more attention?

Waterborne Diseases:

- What are the epidemiological linkages between climate variables and critical waterborne diseases?
- How will climate change impact current observed trends or patterns of water and flooding, and therefore disease pathogens?
- Will there be areas that experience increased or more frequent flooding? Will there be areas that receive more and/or less rainy days and with different amounts of rain on rainy days?
- How will the key hotspots for waterborne diseases shift over time? What implications do those have for disaster preparedness and response? For water-related infrastructure

² A temporary sea level rise associated with a storm.

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

planning or health responses?

- Will any waterborne diseases become more or less important over time? Are there emerging waterborne diseases that may need more attention?

Nutrition:

- What are the linkages between climate variables and productivity of key crops important for food security?
- What are the linkages between climate variables and nutritional value of key nutritional crops?
- How will climate change impact the current observed trends or patterns of under-nutrition and/or stunting? How will the key hotspots shift over time?

Infrastructure and Access to Health Services:

- Are health facilities and their related energy and water supplies prepared for increased flooding and/or drought risks?
- How likely are access roads to health facilities and/or markets likely to be washed out and/or damaged in an emergency?

Heat Stress and Other Health Stresses:

- What are existing patterns of health-related heat stress, and how are these patterns expected to shift over time due to changes in temperature?
- Is the frequency of wildfires increasing? What is the impact on air quality?

Tool Step 3: Adaptive Capacity Related to Health – Illustrative Questions

Once you have reviewed this section, you can navigate back to the Tool by clicking on the relevant hyperlink in the header.

Information Capacity

- What climate and health information is available to prioritize diseases and/or health impacts for increased surveillance and/or predictive systems? How adequate is that information?
- What surveillance systems are in place that provide place-based information on changes? Are they adequate?
- Are there predictive systems for critical diseases and other health outcomes that incorporate climate information?
- How is surveillance and/or predictive information incorporated into strategic planning of resources (financial, infrastructure, medical personnel and training), distribution chains, disaster preparedness, etc.?

Social and Institutional Capacity

- To what extent are national and local planning, budgeting, and emergency response capabilities able to respond to gradual and rapid onset climate changes affecting health?
- What is the percentage of the population with access to health centers or health services, and/or water and sanitation services?
- What kind of surge capacity or other ability to respond exists within health service to respond to crises that may be caused or exacerbated by climate change? How likely are

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

health services to be overwhelmed by a climatic event?

- How many children, elderly, and other vulnerable populations with special needs or health issues would need assistance and are disproportionately susceptible to climate-related health risk?
- What planning systems exist for disaster risk and response, urban planning, and/or supply of services, which may include climate resilience? (e.g., are there impoverished populations living in slums, or is there already a strong planning system to reduce health and other risks?)
- Does the Ministry of Health work with related ministries, such as those covering weather- and climate-related services, disaster risk and response, water management issues, etc.?
- What national and/or international research programs exist to:
 - Understand the climate linkages of diseases with poorly understood causes?
 - Identify hotspots of health impacts under climate change scenarios?
 - Identify new and emerging health threats due to climate change?
 - Develop new and innovative approaches to managing health impacts?

Human Capacity

- What organizations are in place to promote effective community responses to climate risks to public health?
- How are population pressures (e.g., crowding) affecting adaptive capacity?
- To what extent do training materials for doctors, nurses, and other medical personnel include information around climate change impacts on health?
- Are medical personnel properly trained to address health issues outside of their typical area of expertise and therefore able to address newly-emerging, climate-related health issues?
- What working relationships do Ministry of Health staff have with other ministries around health-related priorities?
- What human capacity exists or is being developed in surveillance and/or predictive systems?

Financial Capacity

- What investments are being made to reduce climate risks to public health, public health infrastructure, and health service delivery?
- How easily can the government move funding to emerging health priorities?
- What research is the government funding related to climate-related health risks?
- What capacity does the government have to apply for international climate finance?
- Does the country have internal mechanisms for funding climate-resilient development (e.g. infrastructure) that would improve the resilience of health facilities or health outcomes?

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

Tool Step 5: Opportunities Related to Climate Risk Management for Health – Illustrative Examples

The need to address climate risks related to health may provide a range of additional opportunities. For moderate/high risk strategic elements, projects, and activities, the important types of opportunities to discuss are climate change mitigation,³ potential co-benefits for non-climate development objectives, leveraging political will, opportunities to increase gender equality and female empowerment, and other development issues. For Washington-based and low-risk strategic elements, projects, and activities, opportunities should focus more on how to support resilience more broadly.

Once you have reviewed this section, you can navigate back to the Tool by clicking on the relevant hyperlink in the header.

Improve health care systems

- Leverage investments to reduce health-related climate impacts to improve the broader health care system.
- Increase the capacity of health care and emergency services to support disaster planning and management.

Engage new or a greater variety of stakeholders in health services

- Develop new public-private partnerships to build climate-resilient health care infrastructure.
- Facilitate interactions among stakeholders and health decisionmakers on climate change impacts.
- Engage the climate, environment, and meteorological ministries as well as local academic institutions to ensure they are capturing the most relevant information for climate-sensitive disease monitoring and early warning systems, and to leverage investments in health and meteorological monitoring to their mutual benefit.
- Broaden engagement to other sectors to design future infrastructure that focuses on maximizing multiple, cross-sectoral benefits, including benefits to health.

Create synergies with other development objectives

- Use surveillance equipment needed for early warning and emergency response to provide information to managers and designers of health programs and services.
- Rebuild “climate smart” after extreme events to improve access to health services over the long run.
- Use demographic and health surveys for the country to provide information to support climate-resilient health services.
- Restrict development in flood-prone areas and use permeable paving materials and other design elements to reduce storm water runoff during heavy rains.

Contribute to climate change mitigation by reducing greenhouse gas emissions

- Invest in green infrastructure and sustainable urban environments that both benefit public health and reduce greenhouse gas emissions (e.g., tree planting reduces physical heat stress, sequesters carbon, and reduces demand for air conditioning; improvements in building design increase occupants’ safety in the case of urban flooding and increase

³ In this document “climate change mitigation” refers to efforts to reduce greenhouse gas emissions.

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

energy efficiency, thereby reducing greenhouse gas emissions).

- Support policies, regulations, and investments that reduce greenhouse gas emissions, improve air quality, and reduce risks of respiratory illness.
- Design health infrastructure (e.g., hospitals) and health system supply chains to minimize their greenhouse gas footprint, as appropriate. For example, install solar panels where feasible.

Leverage communications about climate and health to address other related development factors

- Leverage formal and informal curricula developed on climate change and health to address broader development issues, including the water-energy-food security nexus, and population, health, and environment linkages.
- Address broader issues associated with marginalized populations in communications related to climate and health (e.g., promoting use of social networks to increase resilience of older populations to heat stress carries non-climate co-benefits).
 - E.g., conduct a risk communication pilot to demonstrate communication practices that address multiple health risks simultaneously, including climate-related risks.

Tool Step 6: Climate Risk Management Options for Health – Illustrative Examples

Some illustrative options for reducing climate risks to health are outline below. Once you have reviewed this section, you can navigate back to the Tool by clicking on the relevant hyperlink in the header.

Strengthen early warning systems

- Monitor relevant climate and health parameters important in assessing integrated health risk to ensure early warning of changing conditions.
- Increase development of predictive tools around key priority diseases and heat waves.
- Ensure timely communication to decisionmakers, the media, and the public.
- Improve public education and outreach efforts related to climate and health.

Improve risk management systems

- Develop/improve climate-sensitive vector control programs (e.g., distribute bed nets).
- Strengthen preparedness and response to health emergencies (see additional guidance sections specifically for DRR).
 - Create cooling centers to provide relief from heat to the public.
 - Provide cooling stations for vulnerable populations.
 - Create contingency plans for loss of water treatment and sanitation systems during extreme events.

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

Strengthen foundational health systems

- Improve strategic planning for health services to account for climate change.
- Increase medical training to improve awareness and treatment of climate-related health issues.

Strengthen governance systems around climate change and health issues

- Addressing many climate risks may require integrated work across different technical ministries or institutions. For example, increased cholera risk should be addressed through collaboration of the water resources ministry and the ministry of health. Ensure support for these cross-disciplinary initiatives, working groups, etc.
- Mobilize relevant finance for health systems, surveillance, and research through assessment of resource requirements, available finance, and critical gaps. Consider opportunities to fill them through local health and other relevant finance, development finance, and international climate change finance.
- Consider relevant policies that should be enacted to increase response and encourage cross-sector collaboration around relevant issues.

Expand initiatives to raise public awareness of health and disease

- Leverage school health classes to provide information on heat stress and other health effects of climate change.
- Add information to public health fact sheets with advice on how to respond to the influence of climate stressors on the development and spread of vector-borne and waterborne diseases.

Address research gaps

- Prioritize and clarify a research agenda through discussion with critical stakeholders.
- Support research capacity on relevant climate change and health issues.
- Build multidisciplinary networks to improve public health outcomes related to climate.
- Ensure that climate and health research is clearly connected to policy decisions.

Improve the evidence base and use of early warning for potential impacts

- Identify climate-relevant diseases and gaps in information systems that could provide early warning of changes in relevant health patterns.
- Ensure that information is used in decisions around health resources and supply chains, capacity development, and early warning systems.

Invest in climate-resilient and sustainable infrastructure, including water and energy systems

- Ensure that siting choices for health facilities and building codes take into account current and projected climate risks, such as increasing thermal stress, frequency of floods or extreme events.
- Ensure that water and sanitation systems and energy systems are resilient to climate impacts.
- Consider renewable energy technologies for both primary and backup systems, where feasible.

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

- Consider the sustainability of roads that connect vulnerable populations to health centers or food markets.
- Support planting of trees along streets, protection or creation of green spaces to reduce urban heat island effects.
- Encourage use of green roofs and shade trees to reduce heat exposure.
- Select medical technologies with a lower footprint and to reduce waste, where feasible.

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

Additional Key Resources Related to Health

The following **resources** provide additional information related to climate risks to health and corresponding climate risk management options.

| Title | Author(s) | Organization | Date | Length | Intended Audience | Unique Value |
|--|-----------------------------------|--|--------------|--------|---|--|
| <i>Strengthening Health Resilience to Climate Change</i> | Anonymous | World Health Organization (WHO) | 2015 | 24 pp. | Development practitioners, health care providers, policymakers | Provides a detailed summary of health impacts of climate change and actions to improve health systems to address climate risks. |
| <i>Lessons Learned on Health Adaptation to Climate Variability and Change: Experiences Across Low- and Middle-Income Countries</i> | K.L. Ebi and M. Otmani del Barrio | WHO | 2015 | 72 pp. | Development practitioners, health care providers | Provides more detail than the Tool on adaptation options and lessons learned. |
| <i>Operational Framework for Building Climate Resilient Health Systems</i> | J. Shumake-Guillemot et al. | WHO | 2015 | 56 pp. | Development practitioners, public health professionals, and health managers | Provides guidance for health systems and programming, at the strategy- and project-level, to protect health in a changing climate and manage risks (Step 6). |
| <i>WHO Guidance to Protect Health from Climate Change through Health Adaptation Planning</i> | E. Villalobos Prats and K. Ebi | WHO | 2014 | 36 pp. | Health professionals, development practitioners | Provides additional information for integrating health resilience to climate change into National Adaptation Planning and adapting at a country level. |
| <i>WHO UNFCCC Climate and Health Country Profiles</i> | Anonymous | WHO and UNFCCC (United Nations Framework Convention on Climate Change) | 2015-current | 9 pp. | Ministers of Health, health decisionmakers and advocates | Provides country-specific, evidence-based snapshots of the climate hazards and health risks facing countries. |

NAVIGATION

1. [Introduction](#) | 2. [Climate Risks](#) | 3. [Adaptive Capacity](#) | 5. [Opportunities](#) | 6. [Climate Risk Management Options](#)
[Additional Resources](#) | [Climate Risk Screening & Management Tool](#)

| Title | Author(s) | Organization | Date | Length | Intended Audience | Unique Value |
|---|---|--|-------------------|-------------|---|--|
| <i>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</i> | K.R. Smith et al. | Intergovernmental Panel on Climate Change | 2014 | pp. 709-754 | Public health decisionmakers and practitioners | Provides a comprehensive international overview of health impacts from climate change, as well as adaptation approaches. |
| <i>WMO Infographics on Health and Climate Change</i> | Unknown | WMO | Accessed Feb 2017 | n/a | The general public and public health decisionmakers | Provides helpful infographics on the impacts of climate change on health. |
| <i>The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment</i> | A. Crimmins, J. Balbus, J.L. Gamble, et al. | United States Global Change Research Program | 2016 | 312 pp. | Development practitioners, health care planners, policymakers | While the report focuses on the United States, it reviews and communicates the best available science on the major health implications from climate change, which are applicable to many (if not all) countries. |
| <i>Climate Change and Human Health Literature Portal</i> | Unknown | NIEHS | Accessed Feb 2017 | n/a | Public health researchers, planners, and policymakers | A tool for locating relevant scientific literature on the health implications of climate change. It provides access to a database of studies from around the world, published between 2007 and 2014. |