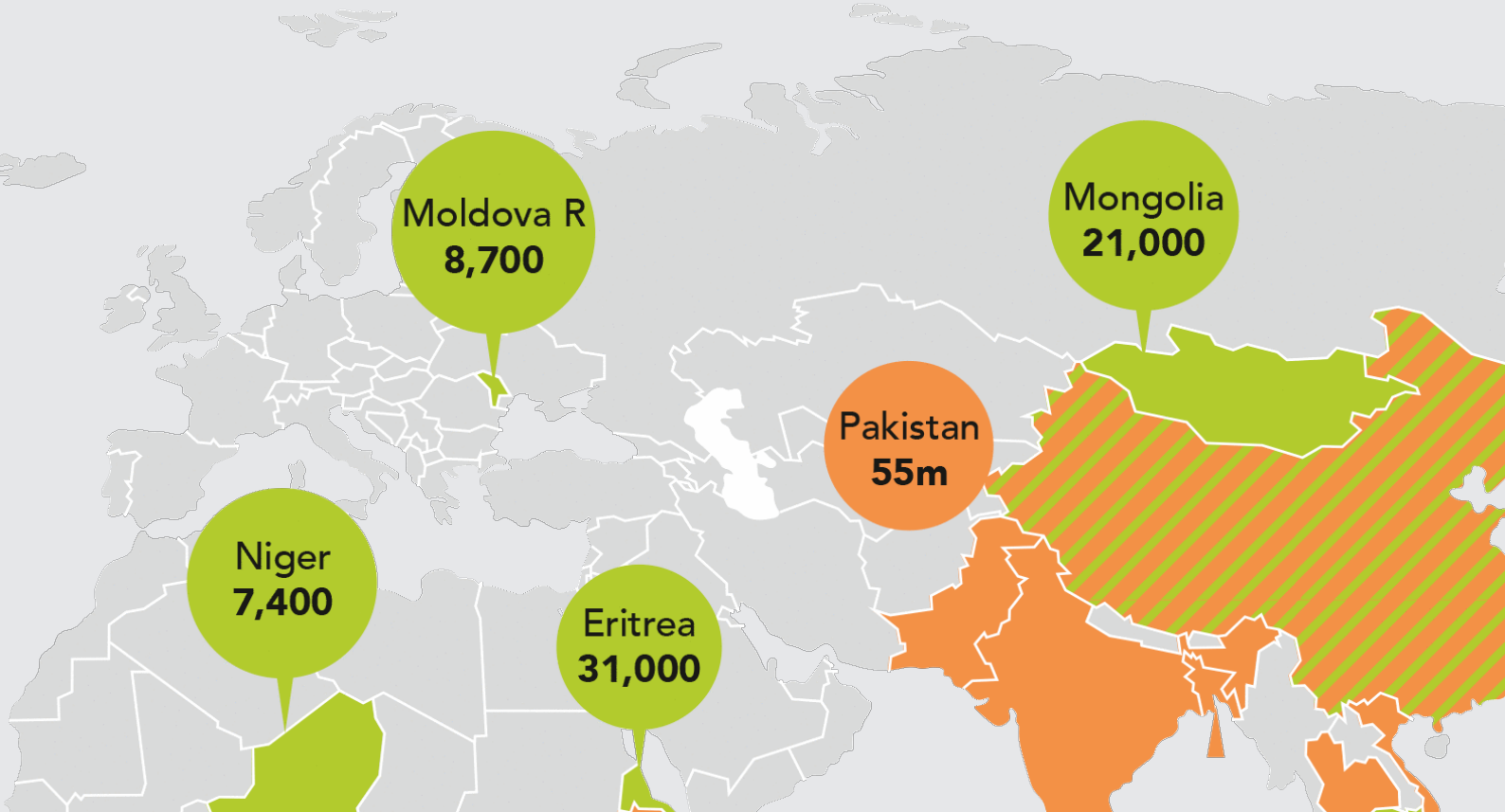
Nexus Brief, Nr. 3, July 2017

Climate Change & Environment

Health



Key Messages

Climate variability and change are intimately linked to human health. Apart from health effects such as heat stress caused by direct climate exposure, climate impacts on human health are typically mediated through natural systems (including vector-borne or waterborne diseases) or caused by disruptions of social and economic systems, as in the case of undernutrition.

Poor people are particularly vulnerable to climate change due to low adaptive capacities and limited resources to cope with climate-related health threats. Thus, ongoing changes in climate patterns and the resulting implications for human health are expected to put a strain on livelihoods in low-income countries. In the absence of appropriate policy responses, the consequences can hinder global development efforts as stipulated in the United Nations Sustainable Development Goals (SDGs).

Although some health impacts of climate change are favorable, the negative effects from climate change on health are generally expected to outweigh the positive ones. The World Health Organization (WHO) estimates that between 2030 and 2050, an additional 250'000 deaths per year will be attributable to climate-associated increases in malnutrition, malaria, diarrhoea, and heat stress.

The most promising adaptation measures for reducing future vulnerabilities to climate change are climate-sensitive improvements in essential public health functions. In this respect, ongoing efforts to strengthen health systems in low- and middle-income countries provide a crucial contribution to protecting health from climate change. Health systems should also increasingly integrate specific climate-conscious interventions.

The most alarming health-related outcomes of climate change are expected to be increased risks for food insecurity and undernutrition, both of which carry important implications for social development and political stability. This climate-health-security nexus calls for international support that builds resilience to climate stresses, and that should increasingly target health systems in politically fragile and climate-vulnerable countries.

The fact that the health impacts from climate change are strongly interlinked with environmental and social systems provides an opportunity to leverage the benefits of adaptation and mitigation measures through intersectoral collaboration.

Context

Why this nexus brief?

This nexus brief sheds light on the complex interaction between climate change and health outcomes, discusses policy responses in a development context, and identifies the environmental determinants that mediate climate impacts on human health. While the general concepts are illuminated from a global perspective, the main focus is devoted to how the climate-health-development nexus manifests itself in low- and middle-income countries.

Climate change and global health

Since the early stages of industrialization, humanity has increasingly dominated the natural environment, putting unprecedented demands and stresses on nature's life-support systems and inducing major global changes such as human-caused climate change.

Climate variabilities are intimately linked to a range of diseases caused by heat stress and to the transmission of infectious diseases attributable

to altered environmental conditions. In addition, extreme weather events such as droughts, flooding and hurricanes have health consequences ranging from death, injuries and mental illness to malnutrition due to crop failure. Being strongly interlinked with both human health and the climate system, the environment acts as a major mediator in the climate-health nexus involving air pollution and climate-related effects on infectious disease occurrences.

A broad range of plausible interactions among environmental, social and behavioural factors makes the attribution of health outcomes to climate change complex, but the scientific consensus holds that the climate change effects on human health are predominantly adverse (Woodward et al., 2011). The World Health Organization (WHO) estimates that between 2030 and 2050, an additional 250'000 deaths per year will be attributable to climate-associated increases in malnutrition, malaria, diarrhoea, and heat stress (WHO, 2014a).

Climate change is mainly expected to exacerbate existing health hazards among populations that are currently affected by climate sensitive diseases (IPCC, 2014). In addition, existing diseases may extend their current range and new conditions may emerge.

Thus, with poor populations being particularly vulnerable to climate change, climate sensitive public health interventions are imperative for securing future economic and social development.

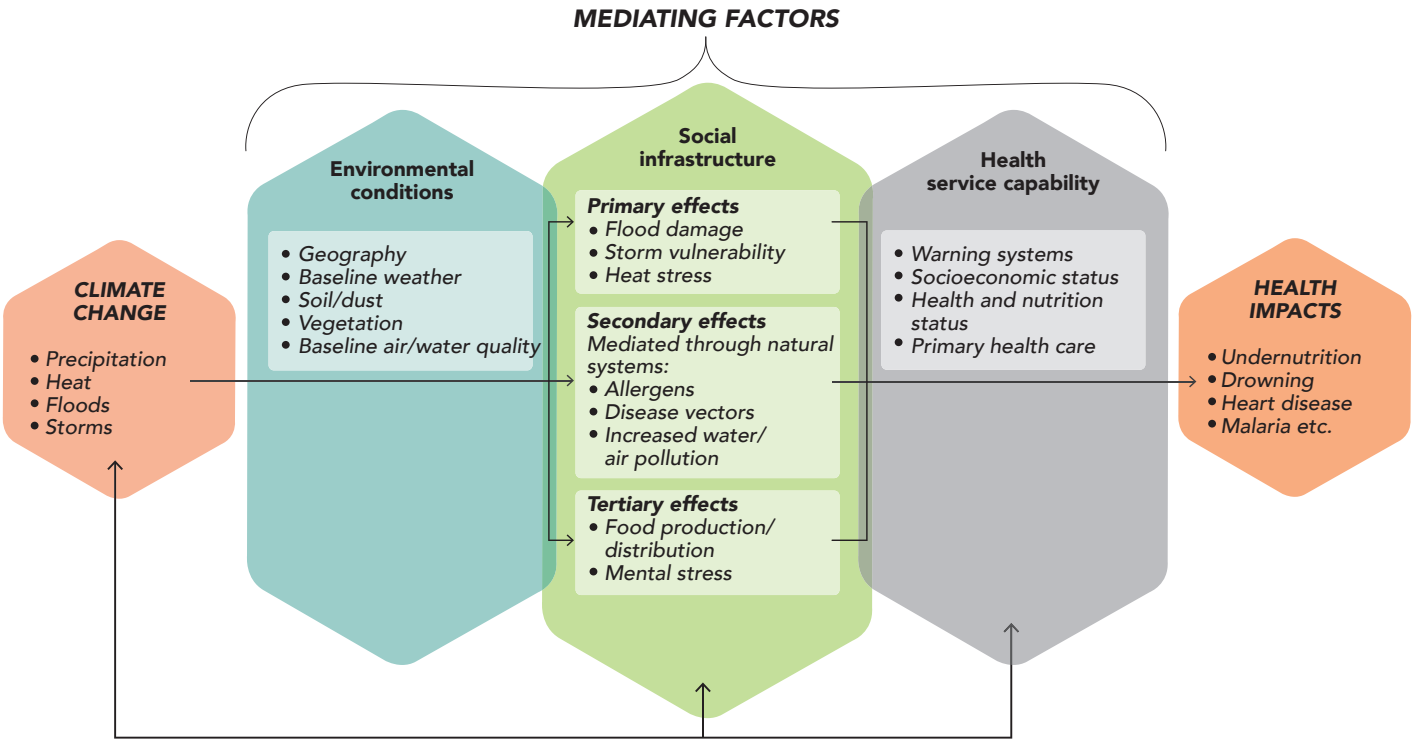
Three categories of climate-related health impacts

There are three broad pathways by which climate variability and change affect human health (see Figure 1):

- Primary effects via direct climatic exposure that relates primarily to health outcomes caused by extreme weather such as heatwaves or floods
- Secondary effects resulting from climate-induced changes in ecosystems including vector- borne and waterborne diseases and in air quality
- Tertiary effects that are heavily mediated by human systems and stem primarily from social and economic disruptions driven by climate change such as undernutrition or mental stress

Compared to primary effects, the mechanisms by which climate affects human health are typically more complex for secondary and tertiary effects as health outcomes interact with environmental, social and political factors (McMichael, 2014).

Figure 1. Three pathways by which climate variability and change affect human health
Adapted from IPCC, 2014; Butler et al., 2010



Primary effects affecting people directly

The primary effects include various relatively direct impacts of higher temperatures and the immediate physical risks from exposure to extreme weather events. Hot days are strongly associated with increased mortality rates both in low- and high-income countries (Honda et al., 2013). As an example, the heatwave in Europe 2003 was associated with an exceptional increase in mortality rates (Robine et al. 2008). Furthermore, flooding and windstorms have been shown to adversely affect human health principally through injury and infectious diseases such as diarrhoea or cholera as well as vector-borne diseases such as dengue or malaria (Jakubicka et al., 2010). As Figure 2 shows, the nations that are most affected by weather-related disasters (in terms of the proportion of affected people) are primarily in developing regions; six of the most-affected countries are in Sub-Saharan Africa. Urban areas with limited infrastructure and reduced capacity for disaster reduction are particularly vulnerable to heavy precipitation (Cissé, 2013).

Secondary effects mediated through natural systems

Secondary health effects arise when climate affects biological and ecological systems, which in turn have an impact on human health. Most notably, climate variabilities may alter the patterns of occurrence of infectious diseases, especially those transmitted by climate-sensitive vectors such as mosquitos or ticks. Warmer temperatures are known to influence the transmission of malaria through an increase in the population of mosquitos. In fact, temperature variations during the last decade have favoured territorial expansion of malaria to higher altitudes as in the East African highlands (Chaves et al., 2010). Overall, however, climate-induced effects are usually masked by the more dominant impacts of the major control interventions such as the distribution of insecticide-treated nets – the most important factor in driving down malaria prevalence in Africa (Bhatt et al., 2015). In light of the territorial expansion of the disease due to climate change, such control strategies need to be expanded to areas that were previously not exposed.

Figure 2. Countries most affected by weather-related disasters (1995-2015)

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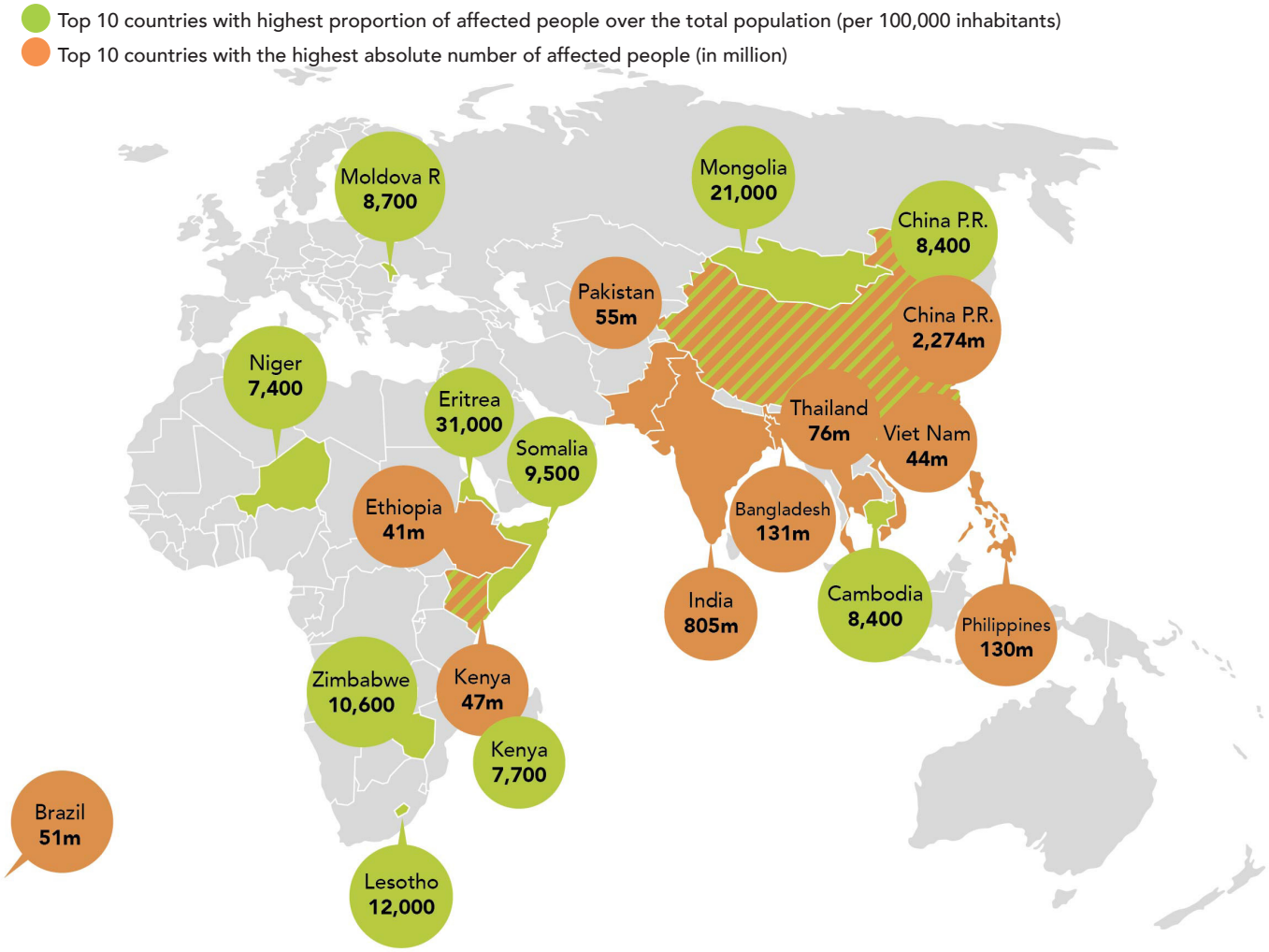


In recent years, developing countries have generally been experiencing a transition from predominantly infectious diseases to a double burden consisting of both infectious and chronic diseases such as cardiovascular or respiratory diseases. Exposure to air pollution is an important driver of this epidemiological shift. Air pollution is closely interlinked with climate change and human health as climate-altering pollutants such as particulate matter (e.g. black carbon) or tropospheric ozone also harm health (IPCC, 2014). In fact, air pollution represents the fourth leading fatal health risk and the major environmental cause of death globally, and exposure to air pollution cost the world's economy some $5.11 trillion in welfare losses in 2013 (World Bank, 2016). Thus, in heavily polluted countries such as in China, where an estimated 1 million deaths in 2012 were attributable to air pollution (WHO, 2017), public health can benefit from climate change policies to reduce greenhouse gases, particularly in reducing combustion.

Tertiary effects mediated by human systems

Tertiary effects on health are heavily mediated by human systems. Most of the countries that are exposed to these climate-induced health risks are low-income nations with limited resources to cope with these threats (Gupta et al., 2017).

Disruptions of food production and distribution are the main drivers of these tertiary effects with potential adverse impacts on nutrition and thus human health. A population's nutritional status is typically conceptualized as being determined by the interaction of agricultural production and socioeconomic factors (such as prices for food and drinking water or political stability), all of which are potentially influenced by the climate. Agricultural production, for example, is linked to many climatic factors that influence crop development. Most importantly, rising temperatures and rainfall extremes are expected to reduce the quantity and quality of harvested food (Battisti et al., 2013). Furthermore, extreme weather events increase food prices (Aufhammer et al., 2011), which in turn have negative impacts on population health through lower food consumption, which leads to malnutrition (Green et al., 2013). In southern Africa, for example, unfavourable crop development associated with El Niño-induced droughts caused maize prices to reach all-time highs in several countries throughout 2015 and 2016 (FAO, 2016).

Apart from food disruption, warmer climate and more extreme rainfall are associated with increasing civil conflicts (Hsiang et al., 2011). Climate hazards are linked to soil degradation and limited availability of freshwater. These conditions contribute to the potential for violence and conflicts that carry major health risks for populations.

Facts & Figures

Understanding the complexity of the climate-health nexus

With climate change being a long-run phenomenon, the corresponding health risks are expected to develop over a long period. Quantifying the effects of climate change on health therefore involves considerable uncertainty about the future interactions of human and natural systems. Understanding the expected health effects attributable to future climate change is crucial, however, for planning and prioritizing policy responses and tailoring health services.

Negative effects from climate change outweigh the positive

The favourable health impacts of climate change are expected to include fewer deaths and illnesses caused by low temperatures and reductions in vector-borne diseases in regions that are no longer suitable for the disease-carrying agents (Woodward et al. 2011). In fact, where temperatures are already high, further warming can reduce malaria transmission (Lunde et al., 2013). The negative effects from climate change on health, however, are generally expected to outweigh the positive effects. Regarding the malaria example, warmer temperatures are expected to increase transmission intensity through an increase in the mosquito population. Furthermore, the Intergovernmental Panel on Climate Change (IPCC) assesses the increase in malnutrition as a high-confidence outcome (Figure 3), and expects the greatest negative impact to occur in areas with already low food security (Knox et al., 2012).

Projecting health consequences of climate change

Using a unified approach, WHO (2014) has quantified the health impacts of climate change in terms of mortality caused by heat, diarrhoeal diseases, malaria, dengue and undernutrition (Figure 4). Climate-attributable health impacts are represented as the additional mortality in future years (2030 and 2050) under different climate change scenarios as compared with mortality in the same time periods under the 1961-1990 climate. Under a base-case socioeconomic scenario, approximately 95'000 additional deaths due to undernutrition, 60'000 deaths due to malaria and 48'000 deaths due to diarrhoea are projected for 2030. Health effects will be distributed unequally between regions: Sub-Saharan Africa is expected to have the greatest climate induced health burden. These numbers do not account for potential health effects from economic losses, inland flooding, water scarcity, migration and armed conflicts. Furthermore, a decrease in the annual climate-related mortality has been projected between 2030 and 2050 for some diseases such as a general reduction of malaria mortality due to expected improvements in socioeconomic conditions.

Figure 3. Summary of major effects of climate change on human health
Adapted from IPCC, 2010

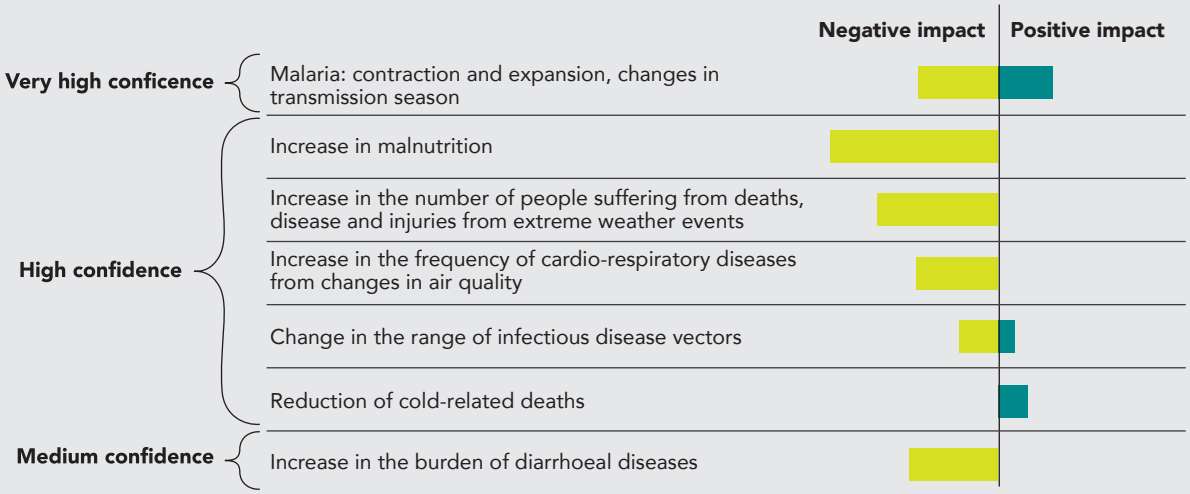
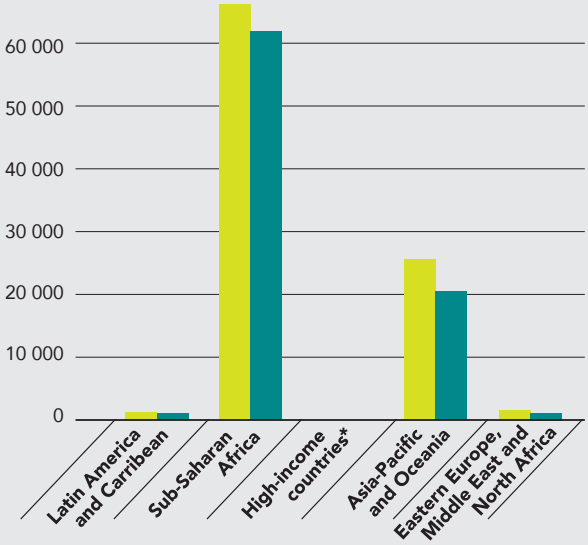


Figure 4. Estimated future annual mortality attributable to climate change in 2030 (yellow bars) and in 2050 (green bars) using A1B emissions scenario by region and health outcome

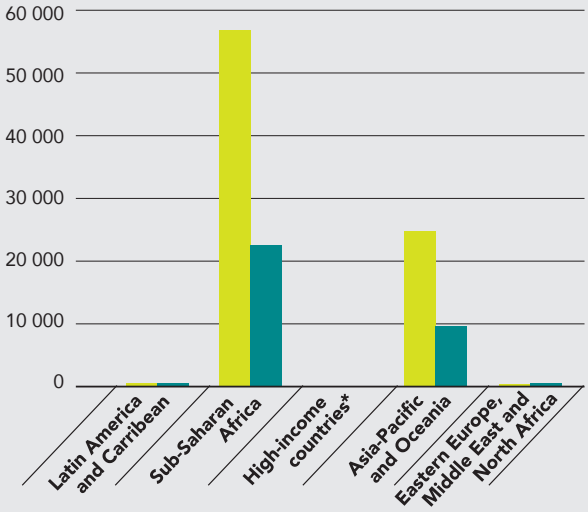
Source: WHO, 2014

Note: Models were run with a consistent set of climate, population and socioeconomic scenarios, as far as was technically possible. Specific novel interventions such as malaria vaccines are not considered.

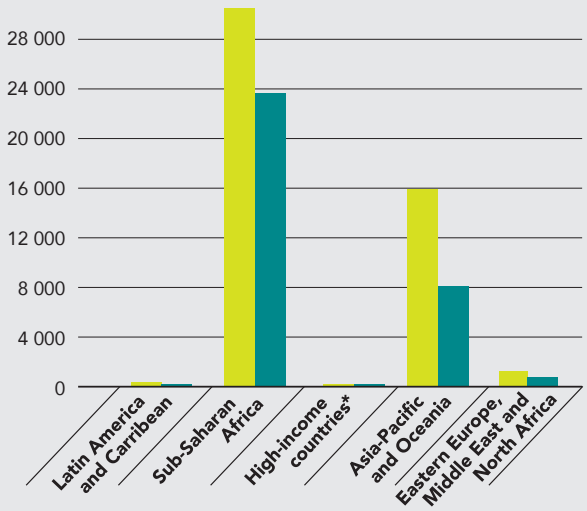
(a) Undernutrition (all-cause mortality in children aged under 5 years)



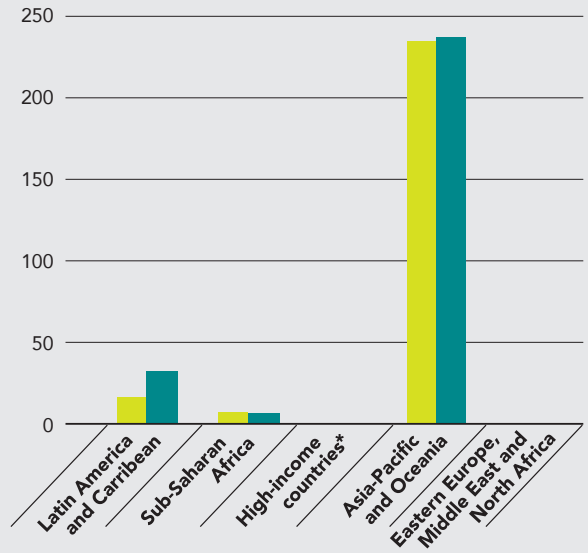
(b) Malaria (mortality in all ages)



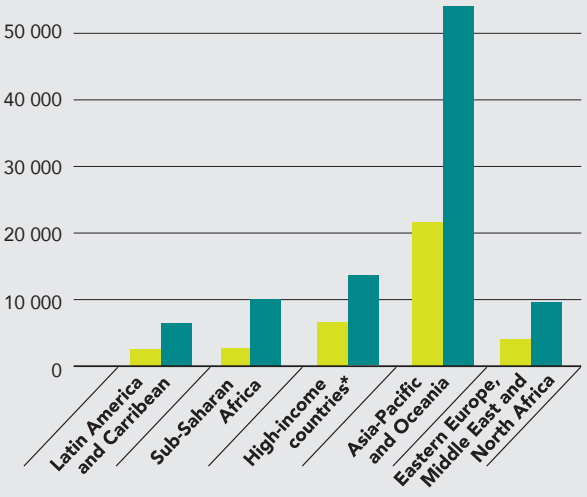
(c) Diarrhoeal disease (mortality in children aged under 15 years)



(d) Dengue (mortality in all ages)



(e) Heat (mortality in people aged over 65 years)



***** includes Australasia, Central and Western Europe, and North America

The expected tertiary effects of climate change on health, especially the increase in undernutrition, are particularly alarming. It has been widely shown that insufficient nutrition during early child development can have adverse effects beyond childhood including impaired physical and mental development as well as reduced productivity (WHO, 2017). Despite an expected decrease of undernourished children worldwide, about 25 million additional children under 5 years will be affected by undernutrition due to climate change in 2050 with about 40 per cent of these cases occurring in Sub-Saharan Africa (Figure 5). In fact, Sub-Saharan Africa is the only region worldwide where undernutrition is expected to increase during the next decades.

Gender and climate impacts on health

Climate change is expected to affect men and women differently (WHO, 2014b). The IPCC (2014) indicates that for specific regions women's vulnerability to climate hazards is higher due to poorer control over economic assets and differences in nutritional requirements. In fact, according to the FAO, twice as many women suffer from malnutrition as men. Looking at health risks arising through tertiary effects, women are more vulnerable to the risk of nutritional deficiencies especially when breastfeeding or during pregnancy. Furthermore, abrupt collapses of livelihood systems through weather-related disasters can create psychological stress, social tensions and violence to which women are particularly exposed (Bartlett, 2008).

Figure 5. Number of undernourished children younger than 5 years (in millions) in 2000 and 2050 using A2 emission scenario

Adapted from IPCC, 2014 and Nelson et al., 2009

Scenario		South Asia	East Asia / Pacific	Europe and Central Asia	Latin America and Caribbean	Middle East / North Africa	Sub-Saharan Africa	All developing countries
2000		75.6	23.8	4.1	7.7	3.5	32.7	147.9
2050	No climate change	52.3	10.1	2.7	5	1.1	41.7	113.3
	Climate change	59.1	14.5	3.7	6.4	2.1	52.2	138.5

Policy responses

Climate change represents an emerging threat to population health and development. Emissions mitigation efforts can have positive health-related side effects. These so-called co-benefits are particularly relevant regarding the reduction of health-damaging pollutants especially in the energy and transport sectors. In the case of exposure to air pollutants from using biomass for cooking, an activity that is concentrated in the poorest populations, health and climate impacts can be tackled simultaneously by improving household biomass fuel combustion or providing clean alternatives. In terms of relevance for development policies, almost half of the official bilateral climate-related development assistance between 2014 and 2015 has been allocated to pure mitigation projects indicating a considerable potential for health co-benefits (OECD, 2016).

Nevertheless, adaptation measures are inevitable. Most effective health adaptation happens through improved public health functions – clean water and sanitation and vaccinations (IPCC, 2014). Ongoing initiatives to strengthen health systems in developing countries will generally improve the response to climate-related health impacts. In addition, specific interventions can make health systems more climate-resilient. Aiming to develop transformative processes, WHO (2015a) has introduced an operational framework for building climate resilient health systems. The proposed actions target climate-sensitive professional development among health workers to help them cope with climate-related health risks. Additional targets include climate-proof infrastructure of health facilities, responsive social protection systems, adapted surveillance systems to monitor population health and environmental exposure and good practices of health governance.

Table 1. Climate-directed health aid to the 20 most climate vulnerable nations, 2014

Adapted from Gupta et al., 2016

*In millions. US$, ODA= Official development assistance, DAC=Development Assistance Committee. Low-income group classified as GNI per capita of $1025 or less; lower-middle income group classified as GNI per capita between $1026 and $4035 (World Bank).

	Income group	Overall DAC health ODA*	DAC climate related ODA*	DAC climate related health ODA in % of DAC health ODA*
Niger	Low	21.12	4.00	18.94%
Timor Leste	Lower-middle	3.36	0.00	0.00%
Central African Republic	Low	8.26	1.80	21.79%
Ethiopia	Low	249.45	0.60	0.24%
Somalia	Low	45.23	6.10	13.49%
Madagascar	Low	34.95	1.33	3.81%
Sierra Leone	Low	29.40	0.13	0.44%
DR Congo	Low	216.11	12.20	5.65%
Mozambique	Low	226.58	0.97	0.43%
Liberia	Low	39.89	0.13	0.33%
Eritrea	Low	1.14	0.00	0.00%
Uganda	Low	136.72	0.13	0.10%
Tanzania	Low	201.69	1.25	0.62%
Mali	Low	74.63	6.47	8.67%
Haiti	Low	35.63	0.00	0.00%
Mauritania	Lower-middle	7.22	5.01	69.39%
Kenya	Lower-middle	124.84	7.70	6.17%
Afghanistan	Low	146.04	0.80	0.55%
Malawi	Low	111.10	0.17	0.15%
São Tome and Principe	Lower-middle	3.56	0.00	0.00%
Total		**1716.92**	**48.79**	**2.84%**

Strengthening the health system and the corresponding policy development requires reliable evidence on the relationship between climate and health.

Intersectoral coordination that includes agriculture, energy, transportation, water supply and sanitation is imperative for leveraging the health benefits of adaptation and mitigation policies.

Among multilateral donors, human health is generally acknowledged as a thematic area of crucial importance in the response to climate change. The Green Climate Fund identifies health, well-being, and food and water security as major impact areas expected to attract substantial resources in the years to come. To date, however, international efforts to adapt health systems to climate change are limited. Globally, WHO (2015b) shows that commitments to health adaptation amount to less than 1 per cent of the projected annual health costs attributable to climate change in 2030. An analysis of country climate change adaptation plans in Sub-Saharan Africa revealed weak health components and existing strategies that focus mainly on agriculture, the environment and fisheries (WHO, 2015b). In terms of development aid, the fraction of funds directed to the support of adaptation projects in the health sector is relatively low. Among the 20 most climate-vulnerable countries as classified by the Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (Table 1), only 2.84 per cent of health official development aid in 2014 was allocated to reduce health impacts of climate change (Gupta et al., 2017).

Key issues

Key Issue 1: Climate change as an emerging threat to public health with implications for sustainable development

Health effects induced by climate change are likely to affect poor nations and population groups disproportionately due to differences in exposure and vulnerability. Adaptation strategies need to consider gender- and age-specific capacities to cope with diseases in order to ensure equitable benefits. The climate-health nexus is interlinked with different dimensions of sustainable development as stipulated in Agenda 2030 including poverty reduction (SDG 1), zero hunger (SDG 2), good health and well-being (SDG 3), clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), climate action (SDG 13), and peace, justice and strong institutions (SDG 16). Timely action to support national strategies in poor countries towards improved climate resilience in the health sector is therefore crucial to maintaining past development achievements and moving towards the sustainable development goals.

Key Issue 2: Tertiary effects particularly relevant for development cooperation

There is a consensus that the main health effects from climate change will be those that are heavily mediated through human systems (McMichael, 2014). These tertiary effects are highly relevant in a development context, in particular with respect to increased risks of food insecurity and undernutrition. The interplay between climate factors, health outcomes and the subsequent impact on social development is at the core of these tertiary effects. Typically, these climate impacts on health entail a self-reinforcing tendency to poor health outcomes: health hazards such as drought-induced undernutrition are amplified through a combination of poverty and weak institutions, and have detrimental ramifications for local economies, which themselves are already susceptible to climate change. As a consequence, the potential impact of future droughts and famines increases (Gupta et al., 2017).

Key Issue 3: Moving towards climate resilient health systems by improving essential public health functions

The most promising adaptation measures for reducing future vulnerabilities are climate-sensitive improvements in essential public health functions including surveillance, monitoring environmental exposures and enhanced disaster risk management. International efforts to strengthen health systems in low- and middle-income countries must therefore increasingly integrate climate-conscious interventions.

According to WHO (2015), "a climate resilient health system is one that is capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stress, so as to bring sustained improvements in population health, despite unstable climate." This involves additional capacity development in order to prepare health systems to tackle climate change. Interventions must focus on ensuring the technical capacity of health workers to deal with the health risks of climate change, and on the adaptation of current infrastructure and technology – such as water and sanitation services – that may be affected by floods. Appropriate leadership and governance structures are also needed.

Key Issue 4: Increasing intersectoral collaboration to leverage political responses to climate change

The SDGs have introduced a paradigm shift that requires the international community to take a more holistic view on health and well-being, and calls for greater intersectoral coherence and interdisciplinary and trans-disciplinary thematic development. As for the climate-health nexus, inter-sectoral collaboration is required to improve the management of the environmental and social determinants of health in the face of climate change. As health effects are mediated through determinants that are not under direct control of health ministries, health-related policies must be integrated into other sectors. Collaborations with agricultural ministries, for example, may improve food security forecasting, nutritional screening and vector management (WHO, 2015a). Furthermore, policies that address the reduction of air pollution must draw on intersectoral synergies arising from mutual benefits to the environment and human health in order to widen the stakeholder engagement and to leverage international support.

Along the same lines, current scientific initiatives such as Planetary Health call for more trans-disciplinary research that situates human health within human and natural systems in order to better identify the social and environmental drivers of health.

Key issue 5: Investing in climate-conscious public health interventions in the poorest countries in the interest of global security

Political instability is frequently amplified through climate-induced health hazards. Many of the world's poorest and most fragile nations suffer from recurring nutrition crises caused by droughts and amplified by conflicts. The recent drought-induced health emergencies in politically fragile settings including northern Nigeria, South Sudan, Somalia and Yemen are examples of this dynamic.

Climate change is putting a strain on already weak health systems and political stability worldwide. In the interest of global security, international support should therefore increasingly target health systems in politically fragile and climate-vulnerable countries focusing on increased resilience to climate stresses in order to cope with this climate-health-security nexus.

Key Issue 6: Improving information for better planning and responses

A better understanding of how climate alters health risks is at the core of improving policy responses in the health sector. The IPCC acknowledges that there are research gaps, particularly in low-income countries, calling for more support for research capacities (WHO, 2015b).

At the level of national health systems, WHO is promoting integrated risk monitoring (including a combination of epidemiological and environmental surveillance) and early warning for improving health systems' anticipation and response to climate-related shocks. Timely warnings regarding extreme events or disease outbreaks, when effectively communicated to health decision makers and the population, can reduce negative health impacts through increased preparedness. In this context, the Third World Climate Conference in 2009 organized by the World Meteorological Organization (WMO) established the Global Framework for Climate Services (GFCS), and identified health as a priority alongside disaster risk reduction, agriculture and water resources. Health impact and vulnerability assessments increase the understanding of climate variability and its influence on societies and public health, and offer opportunities to develop effective early warning systems to protect human health. The health workforce capacity must be built to enable utilization of climate information for better health decision-making.

Relevance for SDC

The Swiss Agency for Development and Cooperation (SDC) is active in various regions where climate change is expected to adversely affect health, namely, Sub-Saharan Africa, Asia and Latin America. At the same time, SDC activities cover several sectors – including agriculture, forestry, education and energy supply – directly or indirectly affected by the climate-health nexus.

Although several climate-related adaptation and mitigation projects are currently implemented, protecting health from climate change has not yet been an explicit focus. Indirectly, health co-benefits stemming from SDC-related activities, particularly in the Global Programme Climate Change and Environment, are expected from various mitigation projects in sustainable forestry, energy supply and air pollution control. In addition, some adaptation projects in agriculture and disaster risk reduction entail positive health effects ranging from improved food security to averted injuries and deaths from improved disaster preparedness.

In the framework of the Global Programme Health, SDC activities cover a wide range of projects that promote strengthening the health systems in low- and middle-income countries. Climate change adaptation and increased climate resilience have not been a strategic components of these initiatives, but efforts to strengthen existing health systems represent an entry door to move towards improved climate resilience in the health sector by introducing climate-conscious adaptation strategies tailored to the local context.

What is SDC already doing?

Jigjiga University One Health Initiative
SDC is helping establish local healthcare services by supporting an interdisciplinary centre of excellence at Jigjiga University in the Ethiopian Somali Regional State. Ethiopia has about 9 million pastoralists (approximately 10 per cent of the total population), half of whom are in the Somali Regional State. This region is one of the least developed parts of the country, severely underserved in terms of basic infrastructure, exposed to harsh climate, and plagued by chronic water scarcity. In order to increase the resilience of the people and animals living in these conditions, the project supports the research, teaching and development capacity of Jigjiga University related to systems knowledge of human and animal health. This initiative will contribute to innovative integrated health systems for the improvement of health and well-being of pastoralist communities in the region.

Climate and Clean Air in Latin America's Cities
The Programme for Climate and Clean Air in Latin America's Cities supports an alliance among cities to encourage rapid action to mitigate climate change and air pollution at the same time. By supporting the use of diesel particulate filters, it fosters the effective and speedy reduction of air pollutants harmful to human health, and reduces greenhouse gas emissions.

This initiative contributes to the objectives of the Climate and Clean Air Coalition, an international platform created to reduce short-lived climate pollutants. To date, Chile, Colombia, Peru and Switzerland are coalition members.

Air Pollution, Climate and Health (AiPoCH)
High-quality data on air pollution and the climate system are prerequisites for setting up a basis for measures in the health sector, as well as for actions to mitigate climate change. AiPoCH supports concrete measures to improve human health through climate and air pollution data and services. The project will implement a pilot high-quality observation system that sustainably delivers data on greenhouse gases and targeted co-emitted air pollutants. Furthermore, the project supports the development of exemplary services regarding air pollution and climate for the health sector with tangible benefits for the population.

Tackling health and climate impacts simultaneously, AiPoCH is at the forefront of the latest developments as the UN Environment, WMO and WHO join forces behind a single health, environment and climate change plan.

Further reading

The One UN Climate Change Learning Partnership developed a Resource Guide for Advanced Learning on "Understanding the Climate Change and Health Interface". Targeting decision makers and technical staff in the health or other sectors, the guide has been produced to facilitate access to existing state-of-the-art material relevant for climate change and health.

http://www.uncclearn.org/sites/default/files/images/resource_guide_on_understanding_the_cc_and_health_interface.pdf

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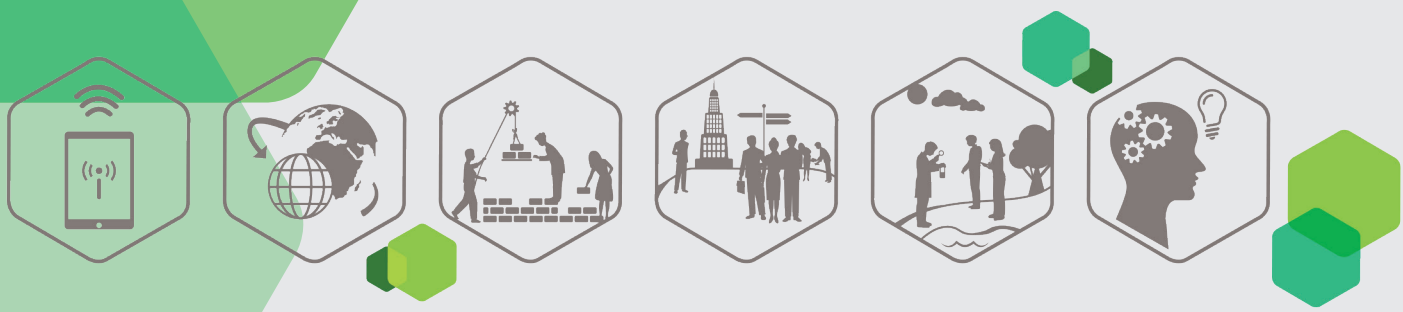

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