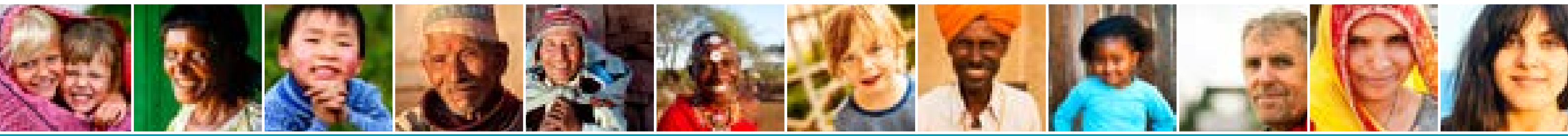
CLIMATE AND HEALTH COUNTRY PROFILE – 2015
MALDIVES

World Health Organization

United Nations Framework Convention on Climate Change



OVERVIEW

The Republic of Maldives is a low-lying archipelago in the Indian Ocean, with a tropical-monsoon climate and distinct dry and rainy seasons. Maldives has experienced rapid economic development in recent years, driven by nature-based tourism and fishing, and is now classified as a middle-income country [World Bank Country Overview, 2015].

The Maldives is extremely vulnerable to the impacts of climate change. Sea-level rise, even by 1 metre, could mean that most of the republic's islands will need to be abandoned. Increases in sea surface temperature and ocean acidification threaten biodiversity and livelihoods. Health threats are similar to those of other small island nations and include higher frequency and intensity of drought, flood and storms, heat stress, and the spread of vector-borne diseases.

Maldives has constitutionally recognized protection of the environment as a key human right [World Bank Country Overview, 2015], and has committed to a low-emission development path alongside energy security and sustainable development [Maldives' INDC, 2015].

SUMMARY OF KEY FINDINGS

- In the Maldives, under a high emissions scenario, mean annual temperature is projected to rise by about 3.6°C on average from 1990 to 2100. If global emissions decrease rapidly, the temperature rise is limited to about 1°C (page 2).
- In the Maldives, under a high emissions scenario, and without large investments in adaptation, an annual average of 31,800 people are projected to be affected by flooding due to sea level rise between 2070 and 2100. If global emissions decrease rapidly and there is a major scale up in protection the annual affected population could be limited to less than 100 people. Adaptation alone will not offer sufficient protection, as sea level rise is a long-term process, with high emissions scenarios bringing increasing impacts well beyond the end of the century (page 3).
- Towards 2070, under both high and low emissions scenarios over 25,000 people are projected to be at risk of malaria (page 3).

OPPORTUNITIES FOR ACTION

The Maldives has an approved national health adaptation strategy and is currently implementing projects on health adaptation to climate change. Additionally, actions are being taken to build institutional and technical capacities to work on climate change and health. Country reported data (see section 6) indicate there are further opportunities for action in the following areas:

1) Adaptation

- Include climate information in an Integrated Disease Surveillance and Response (IDSR) system.
- Estimate the costs to implement health resilience to climate change.

2) Mitigation

- Conduct a valuation of the co-benefits to health of climate change mitigation policies.

3) National Policy Implementation

- National Environment Health Action Plan addresses the impacts of development on human health as a result of environmental degradation.
- The approach to environmental management is adopted in the National Environment Action Plan.
- In relation to legislative action, the environmental protection and preservations act was passed and Environmental Impact Assessment was mandated for all projects in the country.

DEMOGRAPHIC ESTIMATES	
Population (2013)[a]	0.35 million
Population growth rate (2013)[a]	1.8 %
Population living in urban areas (2013)[b]	43.4 %
Population under five (2013)[a]	10.3 %
Population aged 65 or older (2013)[a]	4.8 %
ECONOMIC AND DEVELOPMENT INDICATORS	
GDP per capita (current US$, 2013)[c]	7,101 USD
Total expenditure on health as % of GDP (2013)[d]	10.8 %
Percentage share of income for lowest 20% of population (2012)[c]	NA
HDI (2013, +/- 0.01 change from 2005 is indicated with arrow)[e]	0.698 ▲
HEALTH ESTIMATES	
Life expectancy at birth (2013)[f]	78 years
Under-5 mortality per 1000 live births (2013)[g]	10

a World Population Prospects: The 2015 Revision, UNDESA (2015)
b World Urbanization Prospects: The 2014 Revision, UNDESA (2014)
c World Development Indicators, World Bank (2015)
d Global Health Expenditure Database, WHO (2014)
e United Nations Development Programme, Human Development Reports (2014)
f Global Health Observatory, WHO (2014)
g Levels & Trends in Child Mortality Report 2015, UN Inter-agency Group for Child Mortality Estimation (2015)

The estimates and projections provided in this document have been derived using standard categories and methods to enhance their cross-national comparability. As a result, they should not be regarded as the nationally endorsed statistics of Member States which may have been derived using alternative methodologies.

1 CURRENT AND FUTURE CLIMATE HAZARDS

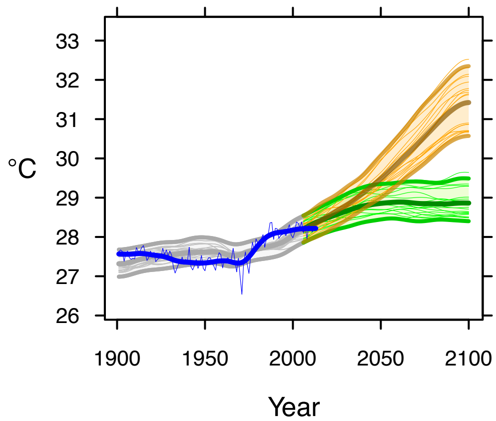
Due to climate change, many climate hazards and extreme weather events, such as heat waves, heavy rainfall and droughts, could become more frequent and more intense in many parts of the world.

Outlined here are country–specific projections up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions. Most hazards caused by climate change will persist for many centuries.

COUNTRY-SPECIFIC CLIMATE HAZARD PROJECTIONS

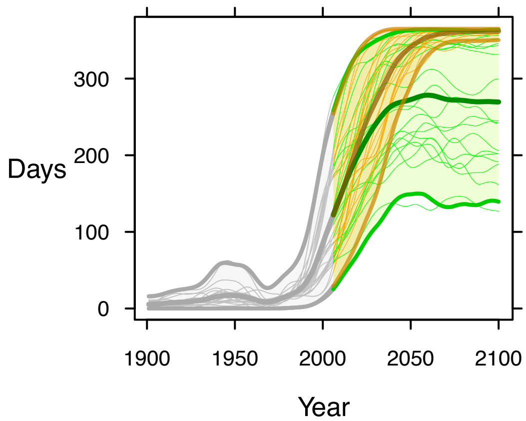
The model projections below present climate hazards under a high emissions scenario, Representative Concentration Pathway 8.5 [RCP8.5] (in orange) and a low emissions scenario, [RCP2.6] (in green).[a] The text boxes describe the projected changes averaged across about 20 models (thick line). The figures also show each model individually as well as the 90% model range (shaded) as a measure of uncertainty and, where available, the annual and smoothed observed record (in blue).[b,c]

MEAN ANNUAL TEMPERATURE



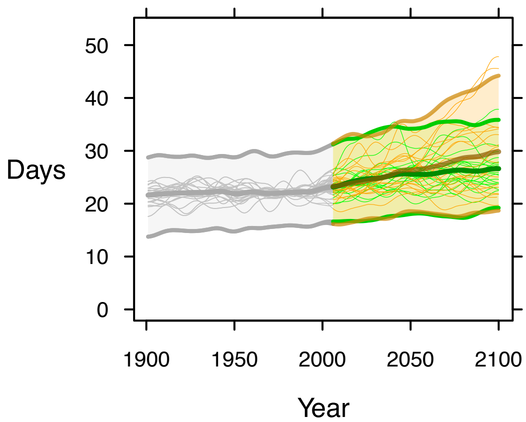
Under a high emissions scenario, mean annual temperature is projected to rise by about 3.6°C on average from 1990 to 2100. If emissions decrease rapidly, the temperature rise is limited to about 1°C.

DAYS OF WARM SPELL ('HEAT WAVES')



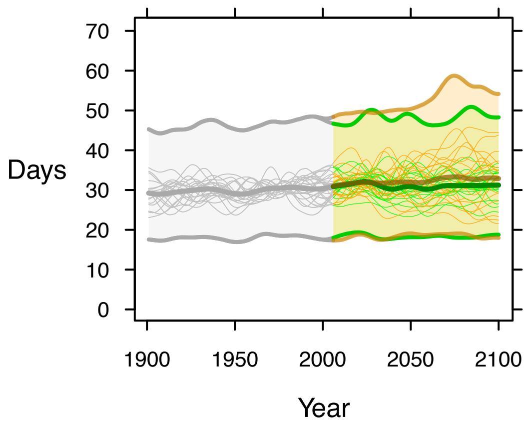
Under a high emissions scenario, the number of days of warm spell[d] is projected to increase from about 30 days in 1990 to about 360 days on average in 2100. If emissions decrease rapidly, the days of warm spell are limited to about 270 on average.

DAYS WITH EXTREME RAINFALL ('FLOOD RISK')



Under a high emissions scenario, the number of days with very heavy precipitation (20 mm or more) could increase by about 8 days on average from 1990 to 2100, increasing the risk of floods. A few models indicate increases well outside the range of historical variability, implying even greater risk. If emissions decrease rapidly, the increase in risk is much reduced.

CONSECUTIVE DRY DAYS ('DROUGHT')



Under a high emissions scenario, the longest dry spell is indicated to increase slightly from an average of about 30 days to about 33 days, with continuing large year-to-year variability. If emissions decrease rapidly, the increase is limited to less than 1 day on average.

a Model projections are from CMIP5 for RCP8.5 (high emissions) and RCP2.6 (low emissions). Model anomalies are added to the historical mean and smoothed.
b Observed historical record of mean temperature is from CRU-TSv.3.22.
c Analysis by the Climatic Research Unit and Tyndall Centre for Climate Change Research, University of East Anglia, 2015.
d A 'warm spell' day is a day when maximum temperature, together with that of at least the 6 consecutive previous days, exceeds the 90th percentile threshold for that time of the year.

2 CURRENT AND FUTURE HEALTH RISKS DUE TO CLIMATE CHANGE

Human health is profoundly affected by weather and climate. Climate change threatens to exacerbate today's health problems – deaths from extreme weather events, cardiovascular and respiratory diseases, infectious diseases and malnutrition – whilst undermining water and food supplies, infrastructure, health systems and social protection systems.

ANNUAL EXPOSURE TO FLOODING DUE TO SEA LEVEL RISE (PERIOD 2070–2100)

Severity of climate change scenario

	Without Adaptation	With Adaptation
RCP2.6	21,800	<100
RCP8.5	31,800	<100

* Medium ice melting scenario ** Values rounded to nearest '00

Under a high emissions scenario, and without large investments in adaptation, an annual average of 31,800 people are projected to be affected by flooding due to sea level rise between 2070 and 2100. If global emissions decrease rapidly and there is a major scale up in protection (i.e. continued construction/raising of dikes) the annual affected population could be limited to less than 100 people. Adaptation alone will not offer sufficient protection, as sea level rise is a long-term process, with high emissions scenarios bringing increasing impacts well beyond the end of the century.

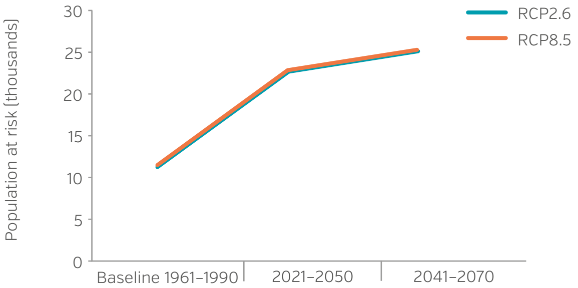
Source: Human dynamics of climate change, technical report, Met Office, HM Government, UK, 2014.

KEY IMPLICATIONS FOR HEALTH

In addition to deaths from drowning, flooding causes extensive indirect health effects, including impacts on food production, water provision, ecosystem disruption, infectious disease outbreak and vector distribution. Longer term effects of flooding may include post-traumatic stress and population displacement.

INFECTIOUS AND VECTOR-BORNE DISEASES

Population at risk of malaria in Maldives (in thousands)



Towards 2070, under both high and low emissions scenarios about 25,000 people are projected to be at risk of malaria. Population growth can also cause increases in the population at-risk in areas where malaria presence is static in the future.

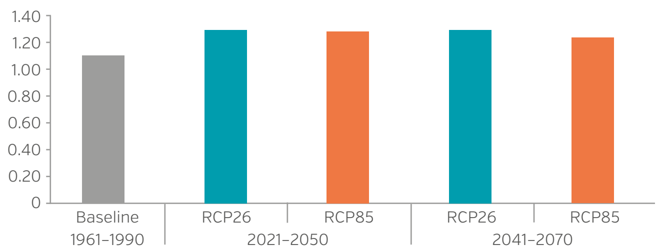
Source: Rocklöv, J., Quam, M. et al. 2015.[c]

KEY IMPLICATIONS FOR HEALTH

Some of the worlds most virulent infections are also highly sensitive to climate: temperature , precipitation and humidity have a strong influence on the life-cycles of the vectors and the infectious agents they carry and influence the transmission of water and food-borne diseases.[a]

Socioeconomic development and health interventions are driving down burdens of several infectious diseases, and these projections assume that this will continue. However, climate conditions are projected to become significantly more favourable for transmission, slowing progress in reducing burdens, and increasing the populations at risk if control measures are not maintained or strengthened.[b]

Mean relative vectorial capacity for dengue fever transmission in Maldives



The mean relative vectorial capacity for dengue fever transmision is projected to increase from the baseline under both a high and low emissions scenario.

Source: Rocklöv, J., Quam, M. et al., 2015.[c]

a Atlas of Health and Climate, World Health Organization and World Meteorological Organization, 2012.
b Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014.
c Country-level analysis, completed in 2015, was based on health models outlined in the Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014. The mean of the impact estimates across three global climate models are presented. Models assume continued socioeconomic trends (SSP2 or comparable).

HEAT-RELATED MORTALITY

KEY IMPLICATIONS FOR HEALTH

Climate change is expected to increase mean annual temperature and the intensity and frequency of heat waves resulting in a greater number of people at risk of heat-related medical conditions.

The elderly, children, the chronically ill, the socially isolated and at-risk occupational groups are particularly vulnerable to heat-related conditions.

Due to the methodological specification, the projected number of heat- related deaths for grids in which sea area is dominant becomes zero. The Maldives, which has very small land areas surrounded by sea, constitutes some of these grids. Based on the climate projections [page 2], however, it is safe to say that the number of heat-related deaths is likely to increase in the Maldives [Source: Honda et al., 2015].[a]

UNDERNUTRITION

KEY IMPLICATIONS FOR HEALTH

Climate change, through higher temperatures, land and water scarcity, flooding, drought and displacement, negatively impacts agricultural production and causes breakdown in food systems. These disproportionally affect those most vulnerable people at risk to hunger and can lead to food insecurity. Vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme climate events.[b]

Without considerable efforts made to improve climate resilience, it has been estimated that the global risk of hunger and malnutrition could increase by up to 20 percent by 2050.[b]

In the Maldives, the prevalence of stunting in children under age 5 was 20.3% in 2009, the prevalence of underweight children and wasting in children under 5 was 17.8% and 10.2%, respectively, in 2009.[c]

AIR POLLUTION

KEY IMPLICATIONS FOR HEALTH

Many of the drivers of climate change, such as inefficient and polluting forms of energy and transport systems, also contribute to air pollution. Globally, air pollution is now one of the largest global health risks, causing approximately seven million deaths every year. There is an important opportunity to promote policies that both protect the climate at a global level, and also have large and immediate health benefits at a local level.

Household air pollution for example, is largely a result of the burning of solid fuels (biomass or coal) and kerosene for cooking.

In the Maldives, it is estimated that approximately 9% percent of the population in rural areas use primarily solid fuels for cooking (WHO, 2013) thereby increasing the risk of ischaemic heart disease, stroke, lung cancer, chronic obstructive pulmonary disease and acute lower respiratory due to household air pollution, (WHO 2012).

Women and children are at a greater risk for disease from household air pollution. Consequently, household air pollution is responsible for a larger proportion of the of total number of deaths from ischaemic heart disease, stroke, lung cancer and COPD in women compared to men.[d]

a Country-level analysis, completed in 2015, was based on health models outlined in the Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014. The mean of the impact estimates across three global climate models are presented. Models assume continued socioeconomic trends [SSP2 or comparable].
b World Food Project 2015 https://www.wfp.org/content/two-minutes-climate-change-and-hunger
c World Health Organization, Global Database on Child Growth and Malnutrition [2015 edition]. Please see reference for definitions of child malnutrition measures.
d Annu. Rev. Public. Health. 2014.35:185-206. http://www.who.int/phe/health_topics/outdoorair/databases/HAP_BoD_results_March2014.pdf?ua=1

3 CO-BENEFITS TO HEALTH FROM CLIMATE CHANGE MITIGATION: A GLOBAL PERSPECTIVE

Health co-benefits are local, national and international measures with the potential to simultaneously yield large, immediate public health benefits and reduce the upward trajectory of greenhouse gas emissions. Lower carbon strategies can also be cost-effective investments for individuals and societies.

Presented here are examples, from a global perspective, of opportunities for health co-benefits that could be realised by action in important greenhouse gas emitting sectors.[a]

Transport

Transport injuries lead to 1.2 million deaths every year, and land use and transport planning contribute to the 2–3 million deaths from physical inactivity. The transport sector is also responsible for some 14% (7.0 $GtCO_2e$) of global carbon emissions. The IPCC has noted significant opportunities to reduce energy demand in the sector, potentially resulting in a 15%–40% reduction in CO_2 emissions, and bringing substantial opportunities for health: A modal shift towards walking and cycling could see reductions in illnesses related to physical inactivity and reduced outdoor air pollution and noise exposure; increased use of public transport is likely to result in reduced GHG emissions; compact urban planning fosters walkable residential neighborhoods, improves accessibility to jobs, schools and services and can encourage physical activity and improve health equity by making urban services more accessible to the elderly and poor.

Electricity Generation

Reliable electricity generation is essential for economic growth, with 1.4 billion people living without access to electricity. However, current patterns of electricity generation in many parts of the world, particularly the reliance on coal combustion in highly polluting power plants contributes heavily to poor local air quality, causing cancer, cardiovascular and respiratory disease. Outdoor air pollution is responsible for 3.7 million premature deaths annually, 88% of these deaths occur in low and middle income countries. The health benefits of transitioning from fuels such as coal to lower carbon sources, including ultimately to renewable energy, are clear: Reduced rates of cardiovascular and respiratory disease such as stroke, lung cancer, coronary artery disease, and COPD; cost-savings for health systems; improved economic productivity from a healthier and more productive workforce.

Household Heating, Cooking and Lighting

Household air pollution causes over 4.3 million premature deaths annually, predominantly due to stroke, ischaemic heart disease, chronic respiratory disease, and childhood pneumonia. A range of interventions can both improve public health and reduce household emissions: a transition from the inefficient use of solid fuels like wood and charcoal, towards cleaner energy sources like liquefied petroleum gas (LPG), biogas, and electricity could save lives by reducing indoor levels of

Healthcare Systems

Health care activities are an important source of greenhouse gas emissions. In the US and in EU countries, for example, health care activities account for between 3–8% of greenhouse gas (CO_2-eq) emissions. Major sources include procurement and inefficient energy consumption. Modern, on-site, low-carbon energy solutions (e.g. solar, wind, or hybrid solutions) and the development of combined heat and power generation capacity in larger facilities offer significant potential to lower the health sector's carbon