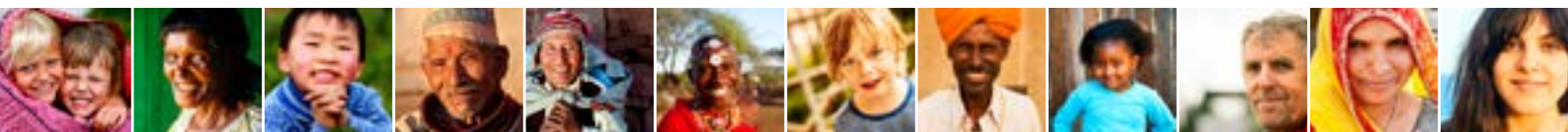


CLIMATE AND HEALTH COUNTRY PROFILE – 2015

TIMOR-LESTE



United Nations
Framework Convention on
Climate Change



OVERVIEW

Timor-Leste occupies the eastern portion of the island of Timor, situated in Southeast Asia. The island is mountainous and has a number of climatic zones. Rainfall is seasonal and influenced by monsoons and cyclones.

In 2002, Timor-Leste emerged from violent conflict and became a sovereign state. The government receives steady revenue from offshore oil and gas, and as such, the International Monetary Fund has identified Timor-Leste as the "most oil-dependent economy in the world" [IMF Timor-Leste Article IV consultation, 2013]. Despite achieving lower middle-income status, poverty levels remain high [World Bank Country Overview, 2015].

As a member of the Alliance of Small Island States, Timor-Leste shares similar vulnerabilities to climate change as other alliance members: more frequent and severe extreme weather events, sea-level rise and saline intrusion, issues of food and water security, heat stress, and increased incidence of vector-borne diseases. Through the National Adaptation Plan of Action, Timor-Leste is specifically targeting health sector capacity to anticipate and respond to the health impacts of climate change [NAPA, 2010].

SUMMARY OF KEY FINDINGS

- In Timor-Leste, 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].
- Under a high emissions scenario, and without large investments in adaptation, an annual average of 7,200 people are projected to be affected by flooding due to sea level rise between 2070 and 2100 in Timor-Leste [page 3].
- Food and nutrition insecurity is a serious problem facing Timor-Leste. Climate change will likely exacerbate this health threat through increased temperatures, higher flood risk, heat waves and their subsequent impacts on agricultural production.

- In Timor-Leste, under a high emissions scenario heat-related deaths in the elderly (65+ years) are projected to increase to about 39 deaths per 100,000 by 2080 compared to no estimated deaths during the baseline period between 1961 and 1990. A rapid reduction in global emissions could limit heat-related deaths in the elderly to about 5.5 deaths per 100,000 in 2080 [page 4].

OPPORTUNITIES FOR ACTION

Timor-Leste has an approved national health adaptation strategy and has conducted a national assessment of climate change impacts, vulnerability and adaptation for health. Country reported data [see section 6] indicate there are further opportunities for action in the following areas:

1) Adaptation

- Take action to implement projects or programmes on health adaptation to climate change.
- Build institutional and technical capacities to work on climate change and health.
- Implement activities to increase climate resilience of health infrastructure.
- Estimate the costs to implement health resilience to climate change.
- Strengthen early-warning system (EWS) and public health preparedness at community level to respond to changes in climate-sensitive diseases [NAPA, 2010].
- Establish systems for monitoring health and nutrition outcomes which incorporates climate data.

2) Mitigation

- Develop a national strategy for climate change mitigation which includes a consideration of the the health implications of climate change mitigation actions.
- Conduct a valuation of co-benefits to health of climate mitigation policies.

DEMOGRAPHIC ESTIMATES

Population [2013] ^a	1.13 million
Population growth rate [2013] ^a	2.4 %
Population living in urban areas [2013] ^b	31.5 %
Population under five [2013] ^a	15.8 %
Population 65 years or over [2013] ^a	5.3 %

ECONOMIC AND DEVELOPMENT INDICATORS

GDP per capita [current US\$, 2013] ^c	1,118 USD
Total expenditure on health as % of GDP [2013] ^d	1.3 %
Percentage share of income for lowest 20% of population [2007] ^e	9.1 %
HDI [2013, +/- 0.01 change from 2005 is indicated with arrow] ^e	0.620 ▲

HEALTH ESTIMATES

Life expectancy at birth [2013] ^f	67 years
Under-5 mortality per 1000 live births [2013] ^g	57

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]

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CURRENT AND FUTURE CLIMATE HAZARDS

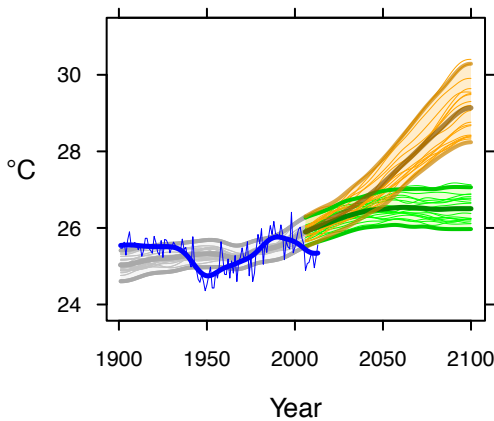
Due to climate change, many climate hazards and extreme weather events, such as heat waves, heavy rainfall and droughts, could become more frequent and more intense in many parts of the world.

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

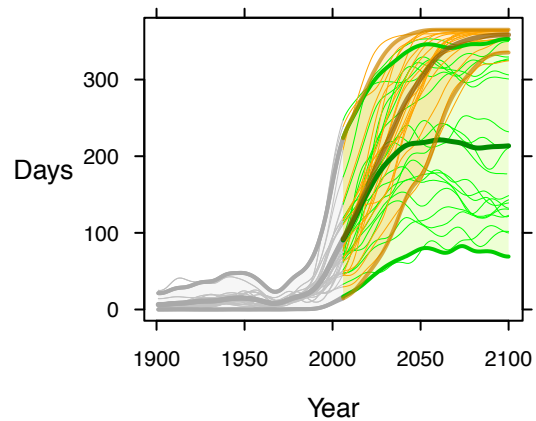
The model projections below present climate hazards under a high emissions scenario, Representative Concentration Pathway 8.5 [RCP8.5] [in orange] and a low emissions scenario, [RCP2.6] [in green].^a The text boxes describe the projected changes averaged across about 20 models (thick line). The figures 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



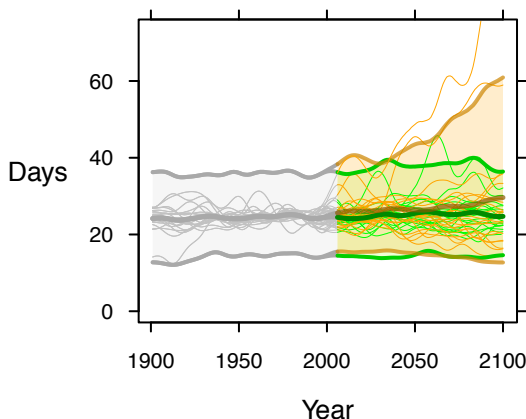
Under a high emissions scenario, mean annual temperature is projected to rise by about 3.6°C on average from 1990 to 2100. If emissions decrease rapidly, the temperature rise is limited to about 1°C.

DAYS OF WARM SPELL ('HEAT WAVES')



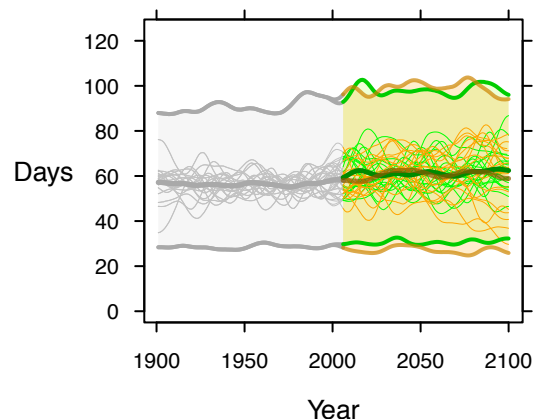
Under a high emissions scenario, the number of days of warm spell^d is projected to increase from less than 30 days in 1990 to almost 360 days on average in 2100. If emissions decrease rapidly, the days of warm spell are limited to about 210 on average.

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 5 days on average from 1990 to 2100, increasing the risk of floods. Some models indicate increases outside the range of historical variability, implying even greater risk. If emissions decrease rapidly, the risk is much reduced.

CONSECUTIVE DRY DAYS ('DROUGHT')



Under both high and low emissions scenarios, the longest dry spell is not indicated to change much from an average of about 60 days, with continuing large year-to-year variability.

^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.

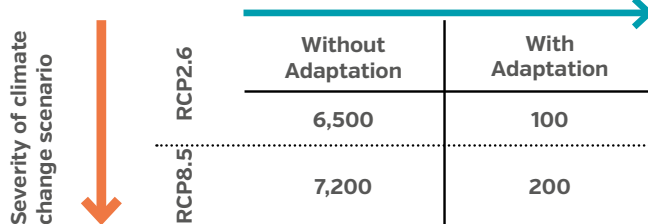
^c Analysis by the Climatic Research Unit and Tyndall Centre for Climate Change Research, University of East Anglia, 2015.

^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.

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)



* Medium ice melting scenario

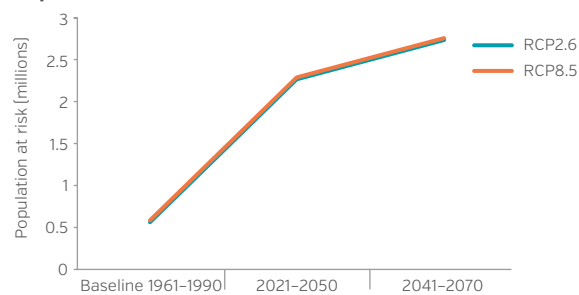
** Values rounded to nearest '00

Under a high emissions scenario, and without large investments in adaptation, an annual average of 7,200 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 about 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.

INFECTIOUS AND VECTOR-BORNE DISEASES

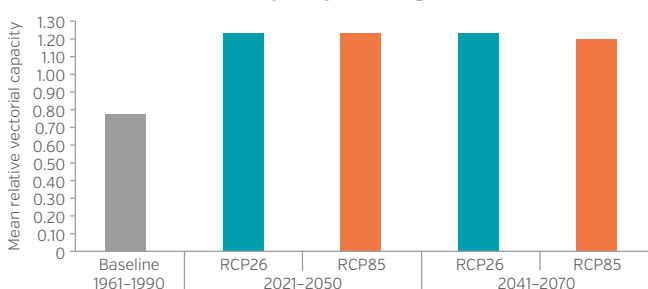
Population at risk of malaria in Timor-Leste (in millions)



By 2070, under both high and low emissions scenarios about 2.76 million people are projected to be at risk of malaria, an increase from about 600,000 people at risk annually during the baseline period of 1961-1990. 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

Mean relative vectorial capacity for dengue fever transmission



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.



KEY IMPLICATIONS FOR HEALTH

Some of the world's 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

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

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

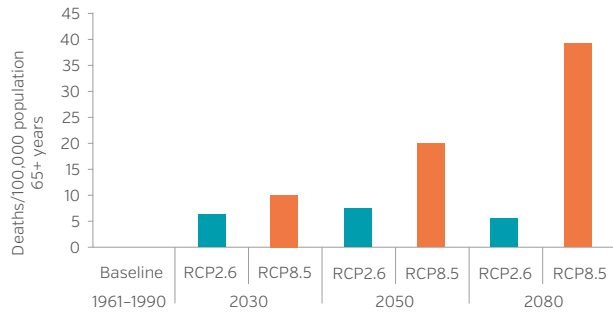
a Atlas of Health and Climate, World Health Organization and World Meteorological Organization, 2012.

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 impact estimates for three global climate models are presented. Models assume continued socioeconomic trends [SSP2 or comparable].

HEAT-RELATED MORTALITY

Heat-related mortality in population 65 years or over, Timor-Leste (deaths / 100,000 population 65+ yrs)



Under a high emissions scenario heat-related deaths in the elderly (65+ years) are projected to increase to about 39 deaths per 100,000 by 2080 compared to no estimated deaths during the baseline period between 1961 and 1990. A rapid reduction in global emissions could limit heat-related deaths in the elderly to about 5 deaths per 100,000 in 2080.

Source: Honda et al., 2015.^a



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.

UNDERNUTRITION

Climate change, through higher temperatures, land and water scarcity, flooding, drought and displacement, negatively impacts agricultural production and causes breakdown in food systems. These disproportionately affect those most vulnerable people at risk to hunger and undernutrition and can lead to food and nutrition insecurity. Vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme climate events,^b reduced nutritional value of foods such as rice and maize in response to higher CO₂ levels,^c and increased food prices which promote a financial incentive towards convenience foods.

Undernutrition is already a significant problem in Timor-Leste and will likely be exacerbated by climate change. The prevalence of underweight children under five years old was 45.3% in 2010;^d rates of stunting and wasting were 57.7% and 18.9% respectively in 2010.^{d,e}



KEY IMPLICATIONS FOR HEALTH

Malnutrition is a key risk factor for morbidity and mortality worldwide. Undernutrition, particularly in the early years of life, can lead to irreversible damage including poor cognitive development and school achievement, shorter adult height and micronutrient deficiencies. Furthermore, undernutrition remains the single biggest contributor to under-five mortality worldwide and is a significant factor limiting socioeconomic growth and human development potential.

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

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 impact estimates for 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 Myers, SS, A Zanobetti, I Kloog, P Huybers, AD Leakey, AJ Bloom, E Carlisle, et al., 2014. "Increasing CO2 threatens human nutrition." Nature 510: 139-42.

d World Health Organization, Global Database on Child Growth and Malnutrition [2015 edition]. Please see source for definitions of child malnutrition measures.

e Please note that more recent national level estimates [not reported here] have been published. For more information please see, 'Timor-Leste and Nutrition Survey 2013', UNICEF and Timor-Leste Ministry of Health Report, 2015.

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CURRENT EXPOSURES AND HEALTH RISKS DUE TO AIR POLLUTION

Many of the drivers of climate change, such as inefficient and polluting forms of energy and transport systems, also contribute to air pollution. 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.

OUTDOOR AIR POLLUTION



KEY IMPLICATIONS FOR HEALTH

Outdoor air pollution can have direct and sometimes severe consequences for health.

Fine particles which penetrate deep into the respiratory tract subsequently increase mortality from respiratory infections, lung cancer and cardiovascular disease.

Data on annual mean particulate matter (PM_{2.5}) in Timor-Leste was not available in the WHO Ambient Air Pollution Database, 2014.

HOUSEHOLD AIR POLLUTION

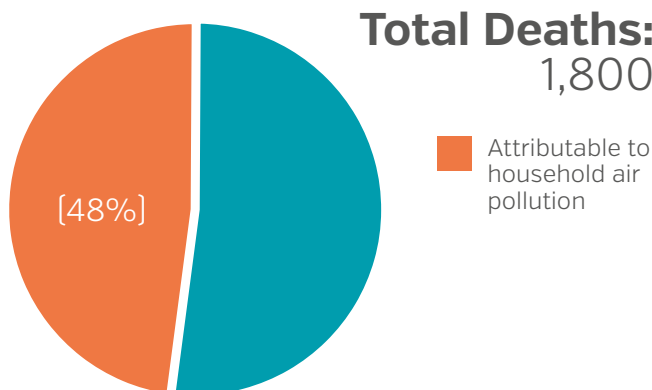
TIMOR-LESTE

Percentage of population primarily using solid fuels for cooking (%), 2013



Source: Global Health Observatory, data repository, World Health Organization, 2013.

Percent of total deaths from ischaemic heart disease, stroke, lung cancer, chronic obstructive pulmonary disease (18 years +) and acute lower respiratory infections (under 5 years) attributable to household air pollution, 2012



Source: Global Health Observatory, data repository, World Health Organization, 2012



KEY IMPLICATIONS FOR HEALTH

Air pollution in and around the home is largely a result of the burning of solid fuels (biomass or coal) for cooking.

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.^a

In Timor-Leste, 62% percent of an estimated 500 child deaths due to acute lower respiratory infections is attributable to household air pollution (WHO, 2012).

^a Annu. Rev. Public. Health. 2014.35:185-206.http://www.who.int/phe/health_topics/outdoorair/databases/HAP_BoD_results_March2014.pdf?ua=1

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 GtCO₂e] 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 CO₂ 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 [CO₂-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



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