CLIMATE AND HEALTH COUNTRY PROFILE – 2017

KIRIBATI

World Health Organization

United Nations Framework Convention on Climate Change

OVERVIEW

The Republic of Kiribati, a collection of 32 coral atolls and one raised island in the Pacific Ocean, has a tropical climate with hot, humid temperatures throughout the year. Air temperature on these small, low-lying islands of Kiribati are heavily influenced by the surrounding sea temperature. There are differences in seasonal climate patterns between islands which can be attributed to the South Pacific and Intertropical Convergence Zones. Annual changes in climate, particularly rainfall patterns, are related to the El-Nino-Southern Oscillation, with El Nino years bringing wetter and warmer conditions and El Nina years bringing drier, sometimes, drought-like conditions to the region.[a]

Kiribati is one of the world's most vulnerable nations to climate change. Sea level rise, extreme weather events, increases in annual and seasonal temperatures and changes in precipitation patterns are some of the impacts of climate change that have already been observed in Kiribati.[b] Climate change in Kiribati affects crop production, fisheries, disease outbreaks and freshwater supply for the people of Kiribati.[c] The government of Kiribati implemented a multi-phase adaptation program between 2003-2016 aimed at reducing vulnerability to climate change and protecting critical resources.[d] It is clear, though, that without ambitious global climate mitigation action, climate change threatens the health and well-being of the population of Kiribati. Building on the multi-phase adaptation programme. Kiribati developed the Kiribati Joint Implementation Plan (KJIP) which integrates climate change and disaster risk management, aiming to address vulnerability at different levels including health.

SUMMARY OF KEY FINDINGS

- In Kiribati, under a high emissions scenario, mean annual temperature is expected to rise by about 3.8°C on average between 1990 and 2100. Projections indicate this could be accompanied by increased risk of heat waves and flooding (page 2).
- Rising sea level in Kiribati is expected to put populations at increased risk of storm surges and coastal flooding (page 3).
- In Kiribati, climate change could increase the risk of vector- and water-borne diseases and threaten food safety and security (pages 4, 5).

OPPORTUNITIES FOR ACTION

Kiribati has a national health adaptation strategy and is currently implementing projects on health adaptation to climate change. Additionally, Kiribati has conducted a national assessment of climate change impacts, vulnerability and adaptation for health. Country reported data indicate that there are opportunities for action in the following areas:

1) Adaptation

- Develop integrated disease surveillance and early warning and responses systems for climate-sensitive health risks that include climate information.
- Continue to implement activities that increase the climate resilience of health infrastructure.

2) Mitigation

- Approve a national strategy for climate change mitigation that includes the full consideration of the health co-benefits of climate change in mitigation actions.

DEMOGRAPHIC ESTIMATES	
Population (2017)[e]	116 000
Population growth rate (2013)[e]	1.7%
Population living in urban areas (2017)[f]	44.6%
Population under five (2017)[e]	12.5%
Population 65 years or older (2017)[e]	3.9%
ECONOMIC AND DEVELOPMENT INDICATORS	
GDP per capita (current US$, 2016)[g]	1,449 USD
Total expenditure on health as % of GDP (2014)[h]	10.2 %
Percentage share of income for lowest 20% of population (2010)[g]	NA
Average annual HDI growth % (2010-2015)[i]	0.10
HEALTH ESTIMATES	
Life expectancy at birth (2015)[j]	66 years
Under-5 mortality per 1000 live births (2015)[k]	56

a Current and future climate of Kiribati, Pacific-Australia Climate Change Science and Adaptation Planning Program, Australian Government, 2015. pp 2. http://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/11_PACCSAP-Kiribati-11pp_WEB.pdf

b Current and future climate of Kiribati, Pacific-Australia Climate Change Science and Adaptation Planning Program, Australian Government, 2015. pp 9. http://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/11_PACCSAP-Kiribati-11pp_WEB.pdf

c Office of the President, Republic of Kiribati, Kiribati Climate Change. http://www.climate.gov.ki/category/effects/

d Office of the President, Republic of Kiribati, Kiribati Climate Change. http://www.climate.gov.ki/category/action/adaptation/kiribati-adaptation-program/

e World Population Prospects: The 2017 Revision, UNDESA (2017)

f World Urbanization Prospects: The 2014 Revision, UNDESA (2014)

g World Development Indicators, World Bank (2017)

h Global Health Expenditure Database, WHO (2016)

i United Nations Development Programme, Human Development Reports (2016)

j Global Health Observatory, WHO (2016)

k Levels & Trends in Child Mortality Report 2015, UN Inter-agency Group for Child Mortality Estimation (2015)

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] Modelling uncertainties associated with the relatively coarse spatial scale of the models compared with that of small islands are not explicitly represented.

MEAN ANNUAL TEMPERATURE

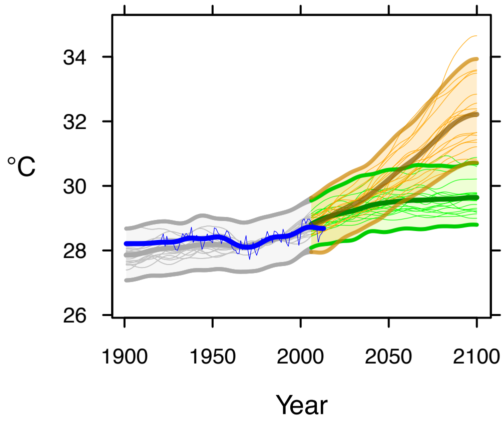


Fig 1.1. Under a high emissions scenario, mean annual temperature is projected to rise by about 3.8°C on average from 1990 to 2100. If global emissions decrease rapidly, the temperature rise is limited to about 1.2°C.

DAYS OF WARM SPELL ('HEAT WAVES')

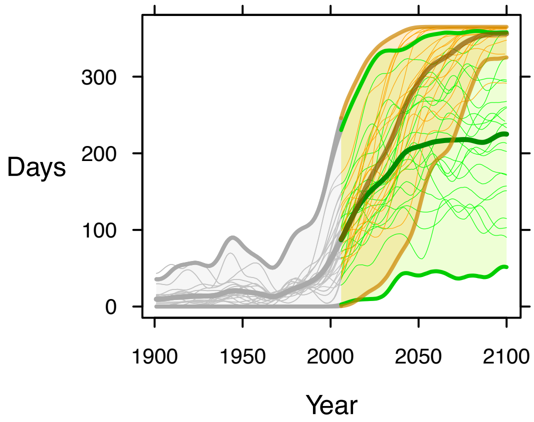


Fig 1.2. Under a high emissions scenario, the number of days of warm spell[d] is projected to increase from about 30 days in 1990 to about 350 days on average in 2100. If global emissions decrease rapidly, the days of warm spell are limited to about 220 on average.

DAYS WITH EXTREME RAINFALL ('FLOOD RISK')

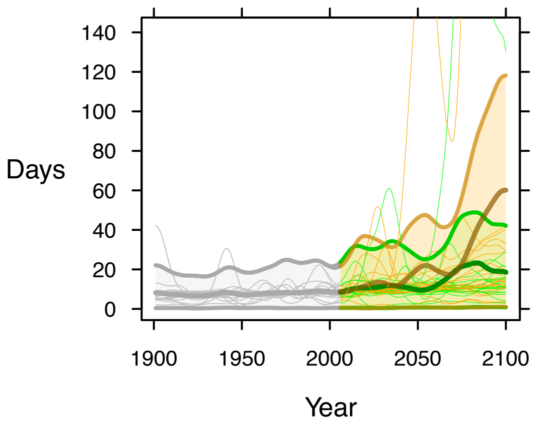


Fig 1.3. Note that one anomalous model included in this plot will be excluded in the final version. If this model is excluded, under a high emissions scenario, the number of days with very heavy precipitation (20 mm or more) could increase by about 10 days on average, increasing the risk of floods. A few models indicate increases outside the range of historical variability, implying even greater risk. If global emissions decrease rapidly, the risk is somewhat decreased.

CONSECUTIVE DRY DAYS ('DROUGHT')

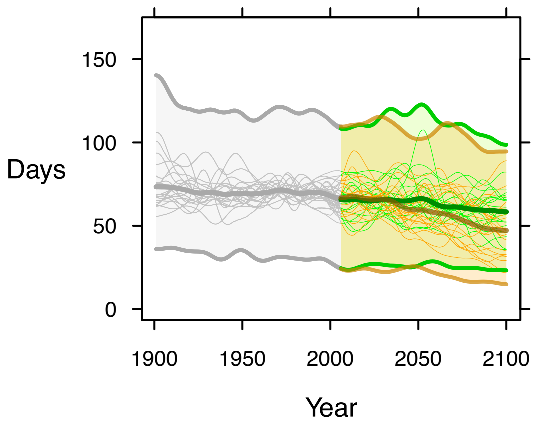


Fig 1.4. Under a high emissions scenario, the longest dry spell is indicated to decrease by about 20 days on average, with continuing large year-to-year variability. If global emissions decrease rapidly, the decrease is about 10 days on average.

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.

SEA LEVEL RISE IN KIRIBATI

Fig. 2.1. Observed and projected relative sea-level change near Kiribati

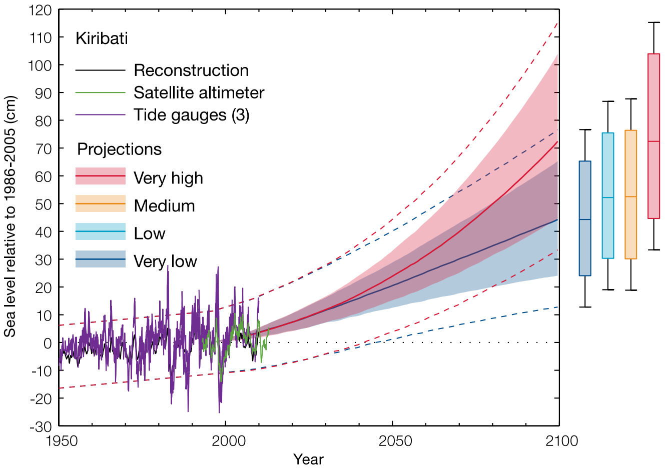


Figure 2.1. Tide-gauge records of relative sea level (since 1950) are indicated in purple, and the satellite record (since 1993) in green. The reconstructed sea-level data at Kiribati (since 1950) is shown in black. Multi-model mean projections from 1995–2100 are given for the very high (red solid line) and very low emissions scenarios (blue solid line), with the 5–95% uncertainty range shown by the red and blue shaded regions. The ranges of projections for the four emissions scenarios by 2100 are also shown by the bars on the right. The dashed lines are an estimate of year-to-year variability in sea level (5–95% uncertainty range about the projections) and indicate that individual monthly averages of sea level can be above or below longer-term averages.

Source: Current and future climate of Kiribati, Pacific-Australia Climate Change Science and Adaptation Planning Program, Australian Government, 2015.[a]

KEY IMPLICATIONS FOR HEALTH

Satellite data indicate the sea level has risen across Kiribati by 1–4mm per year since 1993, compared to the global average of 2.8–3.6 mm per year. Sea level is expected to continue to rise in Kiribati. By 2030, under a high emission scenario, this rise is projected to be in the range of 7–17 cm. The sea-level rise combined with natural year-to-year changes will increase the impact of storm surges and coastal flooding.[a]

Storm surges, over-wash and inundation causes extensive indirect health effects, including impacts on food production, water provision, ecosystem disruption, infectious disease outbreak and changes in vector distribution. Longer term effects of sea level rise may include mental health stresses, lack of access to health services and facilities and population displacement.

OCEAN ACIDIFICATION

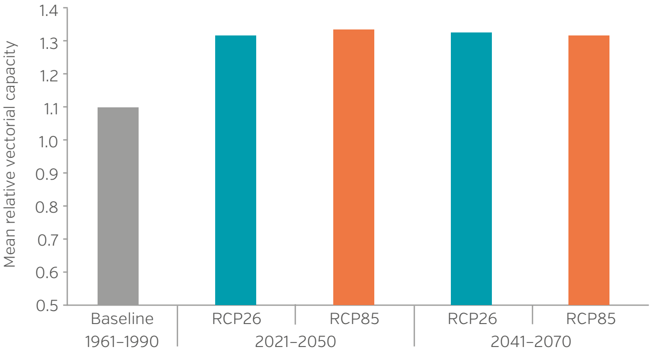
About one quarter of the carbon dioxide emitted from human activities each year is absorbed by the oceans. As the extra carbon dioxide reacts with sea water it causes the ocean to become slightly more acidic. This impacts the growth of corals and organisms that construct their skeletons from carbonate minerals. These species are critical to the balance of tropical reef ecosystems. Data show that since the 18th century the level of ocean acidification has been slowly increasing in Kiribati's waters.[a]

Under all emissions scenarios the acidity level of sea waters in the Kiribati region will continue to increase past the 21st century, with the greatest change under the high emissions scenario. The impact of increased acidification on the health of reef ecosystems is likely to be compounded by other stressors including coral bleaching, storm damage and fishing pressure.[a]

a Text has been taken directly from: Current and future climate of Kiribati, Pacific-Australia Climate Change Science and Adaptation Planning Program, Australian Government, 2015. http://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/11_PACCSAP-Kiribati-11pp_WEB.pdf

INFECTIOUS AND VECTOR-BORNE DISEASES

Fig. 2.2. Mean relative vectorial capacity for dengue fever transmission in Kiribati



The mean relative vectorial capacity for dengue fever transmission is projected to increase towards mid-century under both a high and low emissions scenario.

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

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.[b]

Pacific island countries are confronted with a triple burden of noncommunicable diseases, infectious diseases and climate change impacts. In some Pacific island states, mortality rates from noncommunicable diseases are already among the highest in the world.[c] Since 2012, there have been over 40 large infectious disease outbreaks in the region: most were caused by climate-sensitive diseases such as dengue, chikungunya and Zika virus infections.[d] There have also been several record-breaking extreme climate events in the Pacific recently. Extreme events often damage or destroy health facilities, disrupting essential health services when they are needed most urgently.

In Kiribati, climate change is expected to increase the risk of infectious and vector-borne diseases, particularly dengue fever, diarrhoeal disease and cholera. Populated areas such as the capital city of Tarawa may be most heavily impacted.[e]

CIGUATERA POISONING

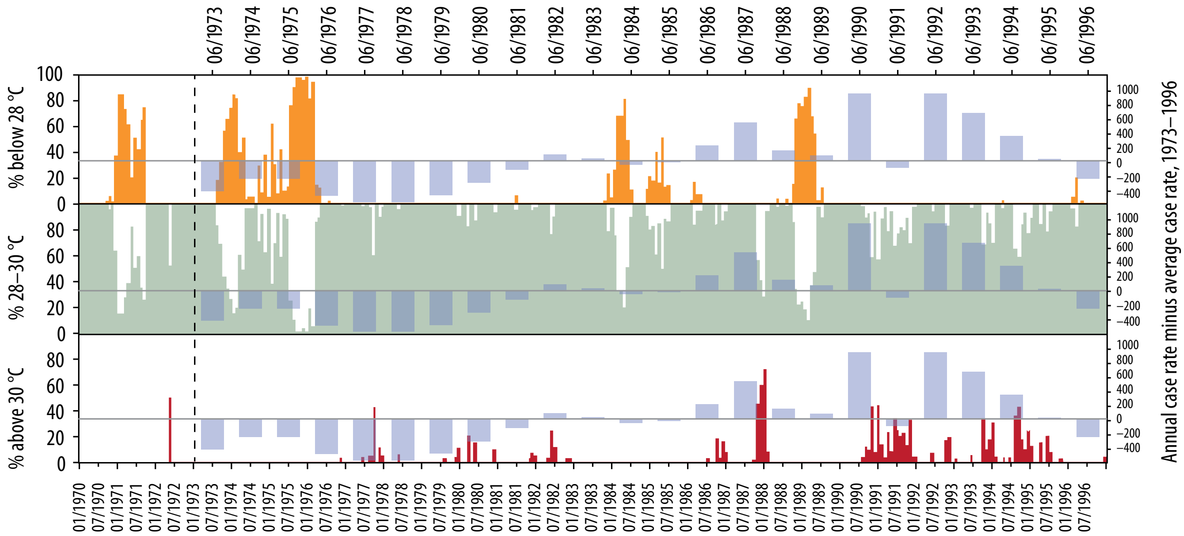
Ciguatera poisoning is contracted by consuming reef fish that have been contaminated by ciguatoxins. Although the relationship between sea surface temperature and ciguatera poisoning is not yet certain, recent studies indicate that warmer sea surface temperatures may be linked to increased incidence of ciguatera poisoning in Kiribati. In addition to the actual increase in incidence, public concern about ciguatera poisoning could also cause the population to change their eating patterns, which could lead to a decrease in protein intake, increased household expenditures, and loss of revenue from fisheries.

A study of data from 1973 to 1996 [see Fig. 2.3] on the relationship between temperature of the ocean and lagoons surrounding Kiribati and incidence of ciguatera poisoning indicated that warmer sea surface temperatures coincided with higher rates of ciguatera cases.

A more recent study found a statistically significant relationship between sea surface temperatures and the reported incidence of ciguatera fish poisoning in Kiribati (Hales and others 1999). This relation was used to model the projected increases in ciguatera poisoning. The model shows that a rise in temperatures is expected to increase the incidence of ciguatera poisoning from 35–70 per thousand people in 1990 to about 160–430 per thousand by 2050.[f]

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 Atlas of Health and Climate, World Health Organization and World Meteorological Organization, 2012.
c Climate change and health in Pacific island states. 2015. http://www.who.int/bulletin/volumes/93/12/15-166199/en/
d Cao-Lormeau VM, Musso D. Emerging arboviruses in the Pacific. Lancet. 2014 Nov 1;384(9954):1571–2. http://dx.doi.org/10.1016/S0140-6736(14)61977-2 pmid: 25443481. As cited in Climate change and health in Pacific island states. 2015. http://www.who.int/bulletin/volumes/93/12/15-166199/en/
e Office of the President, Republic of Kiribati, Kiribati Climate Change. http://www.climate.gov.ki/category/effects/health/
f Office of the President, Republic of Kiribati, Kiribati Climate Change. http://www.climate.gov.ki/2012/03/28/ciguatera-poisoning-highest-in-the-pacific/
Note: These results should be interpreted cautiously, as the model is based on many uncertainties and limited data.

Fig. 2.3. Relationship between sea surface temperature (SST) and ciguatera rates in Kiribati



Rates of ciguatera fish poisoning (shown as grey bars) in Kiribati from the 1970s to 1990s. Ciguatera was reported less frequently in Kiribati between 1973 and 1985 (a period of relatively cooler ocean temperatures, shown as blue lines in the upper part of the graph) than in the following decade. In the 1980s and early 1990s, the seas were more commonly in the "warm" category (above 30°C – red bars in the lower part of the graph), with a corresponding increase in ciguatera cases.

Source: Llewellyn, 2010 as cited in WHO, Western Pacific Region (2015). Human health and climate change in the Pacific island countries.

FOOD SECURITY AND NUTRITION

Climate change, through higher temperatures, land and water scarcity, sea water intrusion/inundation/overwash, long periods of dryness/dry spells 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.

Kiribati's economy is heavily dependent on copra, the dried meat of a coconut which is used to produce coconut oil. This crop, which comprises a majority of the agricultural exports, is highly sensitive to rainfall making it vulnerable to the impacts of climate change and the influences of La Niña years when droughts can be experienced. Other crops important to the subsistence farmers are breadfruit, pandanus and Te babai (giant taro) which are all impacted by loss of land due to inundation, contamination of groundwater and storm surges or overwash.[a]

CLIMATE CHANGE & HEALTH PROJECT-GCCA: PSIS

Kiribati is one among the nine Pacific small islands to receive funding assistance from European Union Funded Initiative through the Global Climate Change Alliance: Pacific Small Island States (GCCA:PSIS) project. The objective of the project was to support the Kiribati government in their efforts to tackle the adverse effects of climate change in the Public Health Sector.The end products of the project were capacity building within the Environmental Health Unit (EHU) in Kiribati's Ministry of Health & Medical Services (MHMS) to undertake surveillance of climate sensitive diseases. Key areas where capacity was built include vector, food and water borne disease surveillance. The refurbishment of laboratories, purchase of new laboratory equipment and vehicle to facilitate more water-borne, food borne and vector-borne disease testing. A new Health Information System database with GIS functionality has sped up the entry of accurate data related to incidences of climate sensitive diseases and water quality. Data can now be analysed to identify disease outbreaks and target potential sources of the outbreaks. A National Environmental Health Action Plan (NEHAP) 2015-2019 was created and endorsed that provides guidance on priority objectives and actions to progress environmental health in Kiribati. A behaviour change programme was designed and implemented to introduce the use of hands-free tippy-tap hand washing stations and Solar Water Disinfection System (SODIS). Whilst some project impacts will not be known or proven until one or more years into the future, some noted short term impacts have been observed:

- Improved health and environmental benefits through using SODIS
- Reduced household expenditure
- Improved decision making
- Public Utility Board (PUB) and communities better informed about water quality

a Office of the President, Republic of Kiribati, Kiribati Climate Change. http://www.climate.gov.ki

4 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