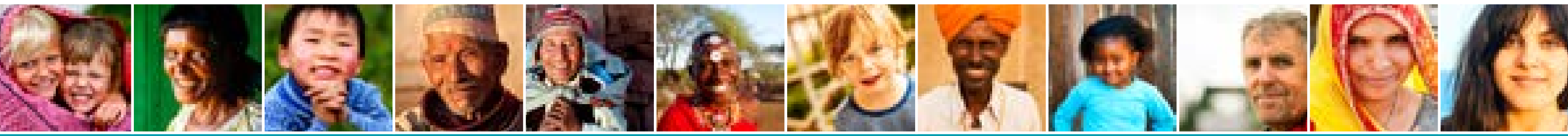
CLIMATE AND HEALTH COUNTRY PROFILE – 2015

EGYPT

World Health Organization

United Nations Framework Convention on Climate Change



OVERVIEW

Egypt, a developing country with a population of 88 million,[a] has achieved measurable success in improving population health over the past few decades (World Bank, 2015).

Egypt, with the Mediterranean coastal region in the North and a very dry climate in other areas, is highly vulnerable to climate change. Much of the population lives on the Nile Delta, and any change in sea level rise threatens agricultural, water and economic security. Furthermore, the country's double burden of disease will be exacerbated by climate change. Increased temperatures could result in increased heat stress and higher rates of diseases such as skin cancers. Infectious and vector-borne diseases could also be exacerbated by changing weather and rainfall patterns.

SUMMARY OF KEY FINDINGS

- Under a high emissions scenario, mean annual temperature is projected to rise by about 5.6°C on average from 1990 to 2100. If emissions decrease rapidly, the temperature rise is limited to about 1.6°C.
- Under a high emissions scenario, and without large investments in adaptation, an annual average of about 2.4 million people are projected to be affected by flooding due to sea level rise between 2070 and 2100. If 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 700 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.
- Under a high emissions scenario heat-related deaths in the elderly (65+ years) are projected to increase to approximately 47 deaths per 100,000 by 2080 compared to the estimated baseline of about one death per 100,000 annually between 1961 and 1990. A rapid reduction in emissions could limit heat-related deaths in the elderly to under 9 deaths per 100,000 in 2080.

OPPORTUNITIES FOR ACTION

Egypt has conducted a financial needs assessment required to implement priority mitigation measures in the energy sector. Egypt has also implemented actions to build institutional and technical capabilities 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

- Conduct a national assessment of climate change impacts, vulnerability and adaptation for health.
- Include climate information in an Integrated Surveillance and Response system with early warning and response systems for climate sensitive health risks.
- Strengthen adaptive capacity by building climate resilient infrastructure, including health infrastructure.
- Conduct further cost estimations for the implementation of heath resilience to climate change.

2) Mitigation

- Conduct valuation of co-benefits to health of climate change mitigation policies.
- Use a multi-sectoral approach to mitigate and adapt to sea-level rise with health-sector integration.

3) National policy implementation

- Develop and approve a national health adaptation strategy.
- Build on existing national climate change policies to ensure adequate human, financial and natural resources for such adaptation and mitigation policies.

DEMOGRAPHIC ESTIMATES	
Population (2013)[a]	88 million
Population growth rate (2013)[a]	2.2 %
Population living in urban areas (2013)[b]	43.0 %
Population under five (2013)[a]	12.7 %
Population aged 65 or older (2013)[a]	5.1 %
ECONOMIC AND DEVELOPMENT INDICATORS	
GDP per capita (current US$, 2013)[c]	3104 USD
Total expenditure on health as % of GDP (2013)[d]	5.1 %
Percentage share of income for lowest 20% of population (2008)[c]	9.3 %
HDI (2013, +/- 0.01 change from 2005 is indicated with arrow)[e]	0.682 ▲
HEALTH ESTIMATES	
Life expectancy at birth (2013)[f]	71 years
Under-5 mortality per 1000 live births (2013)[g]	26

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 on Child Mortality Estimation (2015)

1 CURRENT AND FUTURE CLIMATE HAZARDS

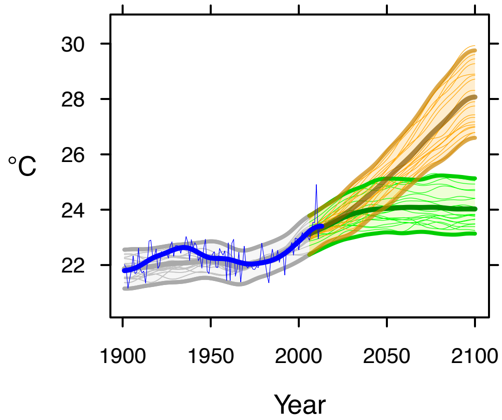
Due to climate change, many climate hazards and extreme weather events, such as heat waves, heavy rainfall and droughts, could become more frequent and more intense in many parts of the world.

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

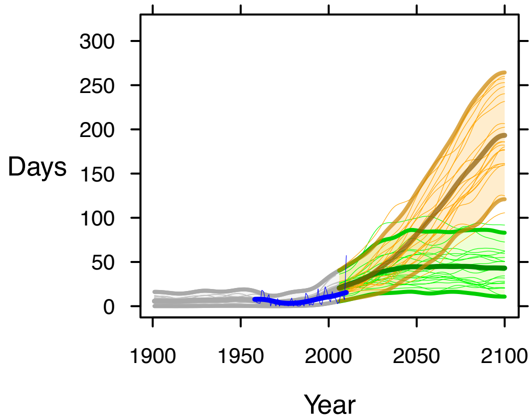
The model projections below present climate hazards under a high emissions scenario, Representative Concentration Pathway 8.5 [RCP8.5] (in orange) and a low emissions scenario, [RCP2.6] (in green).[a] The text boxes describe the projected changes averaged across about 20 models (thick line). The figures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

MEAN ANNUAL TEMPERATURE



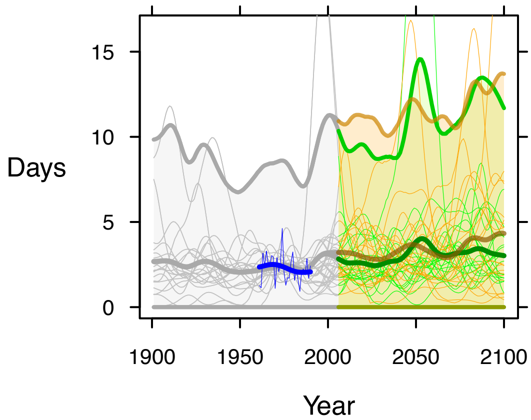
Under a high emissions scenario, mean annual temperature is projected to rise by about 5.6°C on average from 1990 to 2100. If emissions decrease rapidly, the temperature rise is limited to about 1.6°C.

DAYS OF WARM SPELL ('HEAT WAVES')



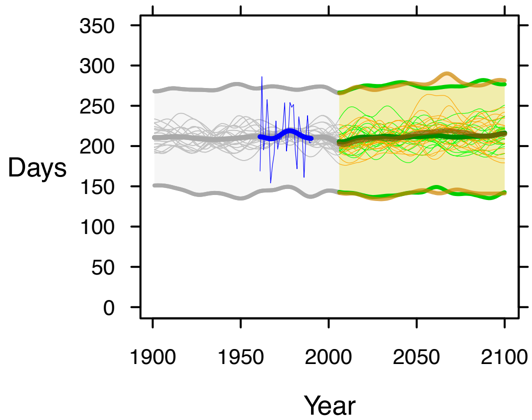
Under a high emissions scenario, the number of days of warm spell[d] is projected to increase from less than 10 days in 1990 to about 195 days on average in 2100. If emissions decrease rapidly, the days of warm spell are limited to about 45 on average.

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 2 days on average from 1990 to 2100, increasing the risk of floods. Some models indicate larger increases but year-to-year variability is very large. Due to this variability, projected changes in flood risk are not very different under a low emissions scenario.

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 210 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; observed historical records of extremes are from HadEX2.
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.

EXPOSURE TO FLOODING DUE TO SEA LEVEL RISE

Severity of climate change scenario	Without Adaptation	With Adaptation
RCP2.6	566,200	700
RCP8.5	2,420,600	1,500

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

Under a high emissions scenario, and without large investments in adaptation, an annual average of about 2.4 million people are projected to be affected by flooding due to sea level rise between 2070 and 2100. If 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 700 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.

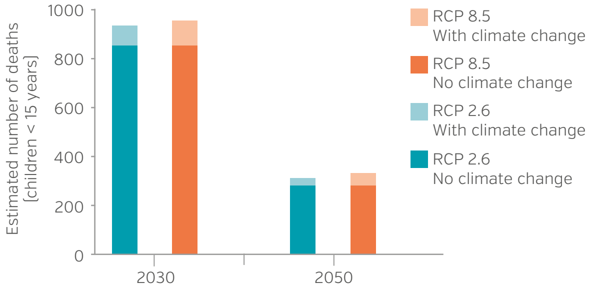
KEY IMPLICATIONS FOR HEALTH

Egypt also faces inland river flood risk due to climate change. Under a high emissions scenario, it is projected that by 2030, 1.1 million additional people may be at risk of river floods annually due to climate change and 839,700 due to socio-economic change above the estimated 986,100 annual affected population in 2010.[a]

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

Estimated number of deaths due to diarrhoeal disease in children under 15 yrs in Egypt (base case scenario for economic growth)



In the baseline year of 2008, there were an estimated 2,700 diarrhoeal deaths in children under 15 years old. Under a high emissions scenario, diarrhoeal deaths attributable to climate change in children under 15 years old is projected to be about 10.9% of about 1,000 diarrheoal deaths projected in 2030. Although diarrheoal deaths are projected to decline to about 300 deaths by 2050, the proportion of deaths attributable to climate change could rise to approximately 15.2%.

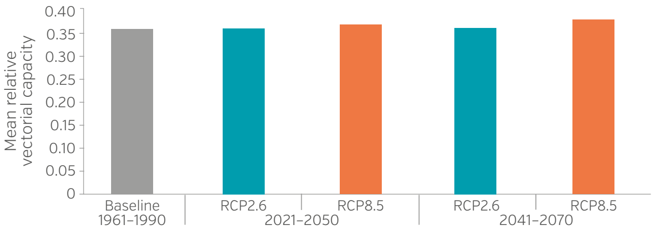
Source: Lloyd, S., 2015.[d]

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]

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.[c]

Mean relative vectorial capacity for dengue fever transmission



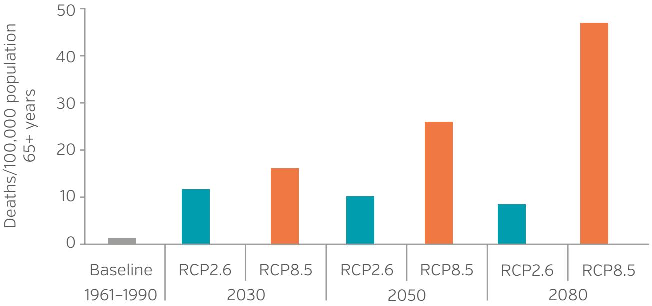
Under both high and low emissions scenarios, the mean relative vectorial capacity for dengue fever transmission is projected to increase only slightly towards 2070. Co-factors such as urbanization, development and population movements may modify the disease burdens associated with dengue, and make the disease cross new sub-national borders.

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

a World Resources Institute, http://www.wri.org Assumes continued current socio-economic trends (SSP2) and a 10-year flood protection.
b Atlas of Health and Climate , WHO & WMO 2012
c Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014.
d 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.

HEAT-RELATED MORTALITY

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



Under a high emissions scenario heat-related deaths in the elderly (65+ years) are projected to increase to approximately 47 deaths per 100,000 by 2080 compared to the estimated baseline of about one death per 100,000 annually between 1961 and 1990. A rapid reduction in emissions could limit heat-related deaths in the elderly to under 9 deaths per 100,000 in 2080.

Source: Honda et al., 2015.[a]

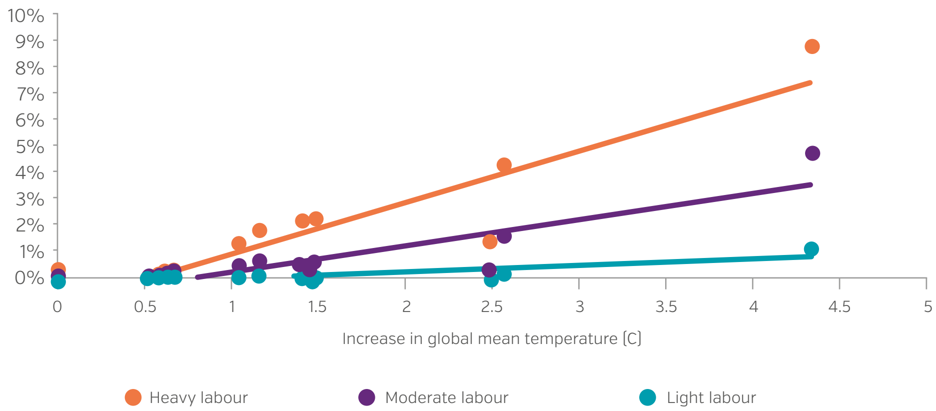
KEY IMPLICATIONS FOR HEALTH

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.

HEAT STRESS AND LABOUR PRODUCTIVITY

Annual daily work hours lost in relation to change in global mean temperature, Egypt (%)



Labour productivity is projected to decline signifcantly under a high emissions scenario. If global mean temperature rises 4 degrees, about 6% of annual daily work hours is projected to be lost by workers carrying out heavy labour (e.g. agricultural and industrial workers).

Source: Kjellstrom, T. et al., 2015. http://www.climatechip.org/

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 disproportionally affect those most vulnerable to hunger and can lead to food insecurity. Vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme weather events.[b]

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

In Egypt, the prevalence of child malnutrition in children under age 5 is 7.0% (2014).[c]

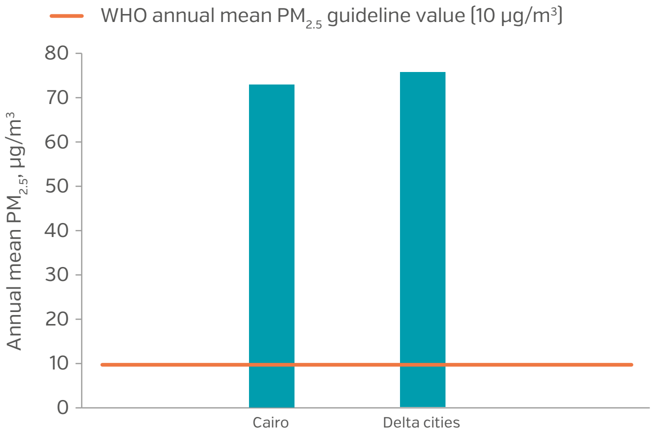
a Country-level analysis, completed in 2015, was based on health models outlined in the Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Geneva: World Health Organization, 2014.
b World Food Project 2015 https://www.wfp.org/content/two-minutes-climate-change-and-hunger
c World Health Organization, Global Database on Child Growth and Malnutrition (2015 edition). Child malnutrition estimates are for % underweight, defined as: Percentage of children aged 0–59 months who are below minus two standard deviations from median weight-for-age of the World Health Organization (WHO) Child Growth Standards.

3 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 EXPOSURE

Outdoor air pollution in cities in Egypt annual mean $PM_{2.5}$ (μg/m³) 2011*



In 2011, Cairo and Delta cities, for which there was air quality data available, had annual mean $PM_{2.5}$ levels that were above the WHO guideline value of 10 μg/m³.

Source: Ambient Air Pollution Database, WHO, May 2014.

* A standard conversion has been used, please see source for further details.

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.

OUTDOOR AIR POLLUTION AND SHORT LIVED CLIMATE POLLUTANTS

KEY IMPLICATIONS FOR HEALTH

Short-lived climate pollutants such as black carbon, methane and tropospheric ozone – released through inefficient use and burning of biomass and fossil fuels for transport, housing, power production, waste disposal (municipal and agricultural), industry and forest fires – are responsible for a substantial fraction of global warming as well as air-pollution related deaths and diseases.

Since short-lived climate pollutants persist in the atmosphere for weeks or months while CO_2 emissions persist for years, significant reductions of SLCP emissions could reap immediate health benefits and health cost savings, and generate very rapid climate benefits – helping to reduce near-term climate change by as much as 0.5°C before 2050.[a]

In Egypt, it is estimated that a reduction in SLCPs* could prevent about 13,200 premature deaths attributed to outdoor air pollution per year, from 2030 onwards (Shindell, D., Science, 2012).

* Through implementation of 14 reduction measures: 7 targeting methane emissions and the rest, emissions from incomplete combustion. See source for further detail.

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

Current patterns of electricity generation in many parts of the world, particularly the reliance on coal combustion in highly polluting power plants, contribute heavily to poor local air quality, causing cancer, cardiovascular and respiratory disease. Outdoor air pollution is responsible for 3.7 million premature deaths annually. High-income countries still have work to do in transitioning to cleaner and healthier energy sources.

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.

Food and Agriculture

Agricultural emissions account for some 5.0–5.8 $GtCO_2eq$ annually, with food and nutrition constituting an important determinant of health. Many high-income countries are feeling the burden of poor diet and obesity-related diseases, with some 1.9 billion adults overweight globally.

A wide range of interventions designed to reduce emissions from agriculture and land-use will also yield positive benefits for public health. For example, policy and behavioural interventions to encourage a reduction in red meat consumption and a shift towards local and seasonal fruit and vegetables, which tend to have lower carbon emissions associated with their production, will improve diets and result in reductions in cardiovascular disease and colorectal cancer.

Healthcare Systems

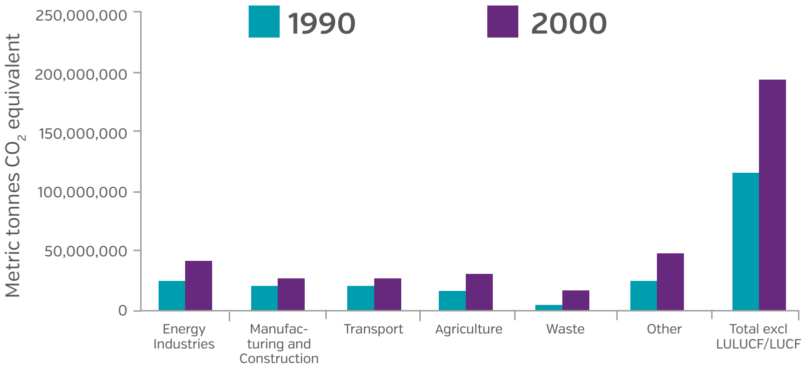
Health care activities are an important source of greenhouse gas emissions. In the US and in EU countries, for example, health care activities account for between 3–8% of greenhouse gas (CO_2-eq) emissions. Major sources include procurement and inefficient energy consumption. Modern, on-site, low-carbon 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 footprint, particularly when coupled with building and equipment energy efficiency measures. Where electricity access is limited and heavily reliant upon diesel generators, or in the case of emergencies when local energy grids are damaged or not operational, such solutions can also improve the quality and reliability of energy services. In this way, low carbon energy for health care could not only mitigate climate change, it could enhance access to essential health services and ensure resilience.

a For a complete list of references used in the health co-benefits text please see the Climate and Health Country Profile Reference Document, http://www.who.int/globalchange/en/

5 EMISSIONS AND COMMITMENTS

Global carbon emissions increased by 80% from 1970 to 2010, and continue to rise.[a,b] Collective action is necessary, but the need and opportunity to reduce greenhouse gas emissions varies between countries. Information on the contribution of different sectors, such as energy, manufacturing, transport and agriculture, can help decision-makers to identify the largest opportunities to work across sectors to protect health, and address climate change.

EGYPT ANNUAL GREENHOUSE GAS EMISSIONS
(metric tonnes CO_2 equivalent)



The most recent emissions data for Egypt is from the year 2000. At that time, carbon emissions were increasing across most sectors. Through intersectoral collaboration, the health community can help to identify the best policy options not only to eventually stabilize greenhouse gas emissions, but also to provide the largest direct benefits to health.

Source: UNFCCC Greenhouse Gas Data Inventory, UNFCCC (2015).

A 2°C upper limit of temperature increase relative to pre-industrial levels has been internationally agreed in order to prevent severe and potentially catastrophic impacts from climate change. Reductions are necessary across countries and sectors. In order to stay below the 2°C upper limit it is estimated that global annual CO_2-energy emissions, currently at 5.2 tons per capita, need to be reduced to 1.6 tons per capita.[c]

NATIONAL RESPONSE[d]

1992	EGYPT SIGNED THE UNFCCC
1999	EGYPT SIGNED THE KYOTO PROTOCOL
2010	NATIONAL ENVIRONMENTAL, ECONOMIC AND DEVELOPMENT STUDY (NEEDS) FOR CLIMATE CHANGE
2011	NATIONAL STRATEGY FOR ADAPTATION TO CLIMATE CHANGE AND DISASTER RISK REDUCTION

a Boden, T.A., G. Marland, and R.J. Andres (2010). Global, Regional, and National Fossil-Fuel CO_2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2010.
b IPCC (2014) Blanco G., R. Gerlagh, S. Suh, J. Barrett, H.C. de Coninck, C.F. Diaz Morejon, R. Mathur, N. Nakicenovic, A. Ofosu Ahenkora, J. Pan, H. Pathak, J. Rice, R. Richels, S.J. Smith, D.I. Stern, F.L. Toth, and P. Zhou, 2014: Drivers, Trends and Mitigation. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom
c Pathways to deep decarbonization, Sustainable development Solutions Network, 2014 report.
d Columbia Law School, 'Climate Change Laws Of The World'. N.p., 2015.

6 NATIONAL POLICY RESPONSE

The following table outlines the status of development or implementation of climate resilient measures, plans or strategies for health adaptation and mitigation of climate change (reported by countries).[a]

GOVERNANCE AND POLICY	
Country has identified a national focal point for climate change in the Ministry of Health	✓
Country has a national health adaptation strategy approved by relevant government body	✗
The National Communication submitted to UNFCCC includes health implications of climate change mitigation policies	✓
HEALTH ADAPTATION IMPLEMENTATION	
Country is currently implementing projects or programmes on health adaptation to climate change	✗
Country has implemented actions to build institutional and technical capacities to work on climate change and health	✓
Country has conducted a national assessment of climate change impacts, vulnerability and adaptation for health	✗
Country has climate information included in Integrated Disease Surveillance and Response (IDSR) system, including development of early warning and response systems for climate-sensitive health risks	✗
Country has implemented activities to increase climate resilience of health infrastructure	✗
FINANCING AND COSTING MECHANISMS	
Estimated costs to implement health resilience to climate change included in planned allocations from domestic funds in the last financial biennium	✗
Estimated costs to implement health resilience to climate change included in planned allocations from international funds in the last financial biennium	✗
HEALTH BENEFITS FROM CLIMATE CHANGE MITIGATION	
The national strategy for climate change mitigation includes consideration of the health implications (health risks or co-benefits) of climate change mitigation actions	✗
Country has conducted valuation of co-benefits of health implications of climate mitigation policies	✗

a Supporting monitoring efforts on health adaptation and mitigation of climate change: a systematic approach for tracking progress at the global level. WHO survey, 2015.

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World Health Organization

United Nations Framework Convention on Climate Change

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