

CLIMATE CHANGE AND HUMAN HEALTH

Climate and Impacts Factsheet Series, Factsheet 5 of 7

THE LONG-TERM ADAPTATION SCENARIOS FLAGSHIP RESEARCH PROGRAMME (LTAS) FOR SOUTH AFRICA

The LTAS aims to respond to the South African National Climate Change Response White Paper (NCCRP, para 8.8) by developing national and sub-national adaptation scenarios for South Africa under plausible future climate conditions and development pathways. This will be used to inform key decisions in future development and adaptation planning.

The first phase, completed in June 2013, developed a consensus view of climate change trends and projections for South Africa. It summarised key climate change impacts and potential response options identified for primary sectors, namely water, agriculture and forestry, human health, marine fisheries, and biodiversity.

The second phase will use an integrated assessment approach and model to develop adaptation scenarios for future climate conditions using the information, data and models from Phase 1 and inputs from a range of stakeholder consultations and task-team workshops.

The **Climate and Impacts Factsheet Series** has been developed to communicate key messages emerging from LTAS Phase 1, and to complement the LTAS Phase 1 technical reports and the summary for policy-makers.

This factsheet has been developed specifically to provide policy- and decision-makers, researchers, practitioners and civil society with up-to-date information on the climate change impacts, adaptation responses and future research needs for human health in South Africa. The information is built upon past and current research, including the Department of Health's National Climate Change and Health Adaptation Plan which is currently under development.

The relationship between climate change impacts and health risks is not yet well-understood. In particular, research is not at a stage where the health impacts stemming from climate change can be accurately projected spatially and temporally. As a result, the LTAS Phase 1 adopted a narrative, theoretical approach to analysing the likely impacts of climate change on human health in South Africa. For further details see the LTAS Phase 1 full technical report entitled *Climate Change Implications for Human Health in South Africa*.

1. Background

South Africa faces complex and pressing public health challenges exacerbated by adverse socio-economic conditions including dense informal settlements which constrain effective service delivery. These health challenges include a disease complex with the highest global prevalence of Human Immunodeficiency Virus (HIV) and tuberculosis (TB), complicated by water-borne and chronic respiratory disease. Under-nutrition and socio-economic stress are important contributors to poor human resilience and contribute to conditions that facilitate the emergence and propagation of disease. Malnutrition and disease interact strongly, and there is a key relationship between environmental quality, food security, and the disease burden of communities. Adaptation to the potential effects of climate change on human health is usefully viewed in this context. However, significant knowledge and information gaps are preventing well supported quantitative projections of human health impacts in South Africa.

2. Climate change impacts on human health in South Africa

Health risks in South Africa that climate change would aggravate over the next few decades include heat stress; vector-borne diseases (such as malaria, dengue fever and yellow fever); extreme weather events; air pollution; communicable diseases (such as HIV/AIDS, TB and cholera), and non-communicable diseases (such as cardio-vascular and respiratory diseases). Climate change could also have deleterious effects on mental and occupational health, and its adverse impacts would be worsened by food insecurity, hunger and malnutrition.

Potential health impacts from climate change may result from direct exposures, such as extreme temperature and precipitation, storms, cyclones and other extreme weather events; and indirect exposures, such as worsening air pollution and increasing pollen production. Over time, a changing climate would also lead to changes in the distribution of vectors of disease. A critical indirect constraint may emerge through detrimental impacts on the agricultural sector leading to food shortages and malnutrition. Ecosystem changes could also lead to loss of ecosystem goods and services that currently support healthy environmental conditions. Finally, social and economic disruptions resulting from climate change impacts could have implications for mental health and well-being.

non-climate effects, for human health can be effectively developed and therefore the health impacts directly derived from climate change are not being accurately projected. Including adaptation measures that support the health sector in other sector policies will ensure that health-climate considerations are included in future development and adaptation planning, and so as to strengthen the climate resilience of vulnerable communities in South Africa. Malnutrition and extreme weather events are key climate-related health risks and have a number of cross-sectoral linkages in particular with the water and agriculture sectors. Multi-sectoral collaboration is therefore essential in conducting research and in developing and implementing adaptation plans.

FACTSHEET SERIES PRODUCED BY

SANBI, DEA and GIZ in consultations with relevant sector stakeholders

OTHER FACTSHEETS IN THIS SERIES:

- LTAS Phase 1 Methodology
- Climate Trends and Scenarios for South Africa
- Climate Change and the Water Sector
- Climate Change and the Agriculture Sector
- Climate Change and Marine Fisheries
- Climate Change and Biodiversity

4. Future research needs

Gaps in research prevent a full understanding of the potential climate change impacts on the health sector and its vulnerability to climate change. Models and/or methodologies exist to begin projecting the impacts of climate change on human health in South Africa including effects on heat stress, cholera and malaria, with modelling of the latter being the most robust. Research does not yet allow for accurate projection of direct health impacts from climate change and research is required to determine correlations and cause-effect relationships as far as possible between risk factors and health impacts. Health data and data on non-climatic factors, which play a significant role in the spread of disease and impact on health risks, need to be improved to inform impact modelling and vulnerability and risk assessments.

The Department of Health, in collaboration with the World Health Organisation (WHO), is in the early stages of developing the first vulnerability assessment of the health sector in South Africa. This could be expanded to include vulnerability and risk assessments of specific diseases to climate change, and impact modelling (including consideration of non-climatic factors) to determine risk factors and health impacts that need to be addressed through adaptation.

5. Conclusion and linkages

The impacts of climate change on human health are complex and include multiple pathways and interactions within and across sectors. Research is not yet at the stage where climate change projections, incorporating





HEAT STRESS

Little is known about the health impacts of high temperatures on the South African population. However, there is anecdotal evidence of direct health impacts due to extreme heat. Increases in average temperatures and extreme events (such as heat waves) are projected to induce heat stress, increase morbidity, and result in respiratory and cardiovascular diseases. Vulnerability to heat stress depends on existing health status as well as socio-economic and environmental factors.

VECTOR-BORNE DISEASES

Mosquitos and ticks are vectors for a number of diseases in South Africa and their numbers are affected by climatic and non-climatic factors. For example, mosquito populations increase proportionally with rainfall. Climate change induced changes in rainfall could change the distribution of such vectors. This may change the distribution of diseases like malaria and Lyme disease (tick bite fever). Little is known about which vectors may be more responsive to climate change impacts (see Box 1).

BOX 1: MALARIA

Climate is known to affect malaria transmission but the impacts are not yet fully understood. Malaria is projected to spread within regions bordering current malaria areas, which are presently too cold for transmission. However, malaria is also strongly impacted by non-climatic factors. To characterise the impact of climate change on malaria adequately, both spatially and temporally resolved climate projections are needed as well as projections of non-climatic factors, such as land use, control measures, and socio-economic, demographic and vulnerability information. Another critical research need is to better understand other existing disease vectors in South Africa and how climate change may affect them.

FOOD INSECURITY, HUNGER AND MALNUTRITION

Climate change is expected to increase the frequency, duration and intensity of droughts and high temperatures and increase rainfall variability in many areas. This would affect food systems, compromising food availability, access and utilisation, leading to food insecurity. Climate change related rainfall projections remain uncertain, but plausibly indicate that the western and northern Cape could tend to become drier, while the central and eastern plateau and the Drakensberg region could tend to experience increased rainfall. In the absence of effective adaptation, such a change in rainfall distribution could reduce crop yields, especially if temperatures become much hotter, leading to food shortages and potential increases in food prices. This could compromise access to food by vulnerable households, ultimately leading to malnutrition. On the other hand, incorporating appropriate adaptation and development responses could maintain or even increase agricultural production, which could contribute to reducing adverse outcomes.

EXTREME WEATHER EVENTS

The frequency and intensity of extreme weather events is likely to increase in certain areas of South Africa as a result of climate change. Increases in extreme weather events have a number of possible health impacts (Table 1) that are influenced by both climatic and non-climatic factors. These impacts are hard to predict and compute since there are many secondary effects and delayed outcomes. Social support mechanisms as well as the availability of basic social services greatly influence the effect of extreme weather events on communities. For example, the spread of water related diseases, such as cholera after a flooding episode, will be more prevalent in communities with limited social services and support mechanisms.

Table 1. Health impacts resulting from extreme weather events that are likely to increase in certain areas of South Africa under future climatic conditions.

Floods and Storms	Drought	Fire
<ul style="list-style-type: none"> Increased or decreased vector (e.g. mosquito) abundance (e.g. if breeding sites are washed away). Increased risk of respiratory and diarrhoeal diseases. Drowning. Injuries. Health effects associated with population displacement. Impacts on food supply. Mental health impacts. 	<ul style="list-style-type: none"> Changes in abundance of vectors that breed in dried up river beds. Food shortages. Illness. Malnutrition. Increased risk of infections. Death (starvation). Health impacts associated with population displacements. 	<ul style="list-style-type: none"> Burns and smoke inhalation. Soil erosion and increased risks of landslides. Increased mortality and morbidity. Increased risk of hospital and emergency admissions.

AIR POLLUTION

Criteria (air) pollutants, including particulate matter (PM), sulphur dioxide, ozone, carbon monoxide, benzene, lead and nitrogen dioxide, are a concern for public health, and their concentration in ambient air is regulated in South Africa. Climate change will influence the concentration of criteria pollutants by affecting weather patterns. This is because meteorological factors such as temperature, precipitation, clouds, atmospheric water vapour, wind speed, and wind direction influence atmospheric chemical processes. Health impacts in South Africa resulting from exposure to these pollutants include eye irritation, acute respiratory infection, chronic respiratory diseases and TB, and sometimes death.

NON-COMMUNICABLE DISEASES

Non-communicable diseases, such as cardiovascular and respiratory diseases (asthma and bronchitis), are the leading cause of death in South Africa. Climate change will impact non-communicable diseases directly (for example by increasing temperatures and air pollution concentrations) and indirectly (for example by adversely impacting agricultural yields resulting in food insecurity).

COMMUNICABLE DISEASES

Communicable diseases, such as TB and cholera, are those resulting from infection from a host with transmission usually due to direct contact with an infectious person, contaminated foods, beverages or body fluids, or being bitten by an infected animal host. Climate plays a major role in the size and age composition of host populations and, hence, in the distribution of these diseases. Common climatic factors related to the spread of communicable diseases are rainfall, temperature and wind. Many non-climatic factors also influence their spread (see Box 2).

BOX 2. CHOLERA

Cholera is a well-known example of a communicable, diarrhoeal and water-borne disease in South Africa. The transmission of cholera is linked to rainfall and temperature (air and sea surface) and is likely to be affected by climate change induced changes in rainfall and temperature regimes. Non-climatic factors such as water insecurity, lack of proper sanitation and population density also influence cholera transmission.

MENTAL HEALTH

Climate change could disrupt social and biophysical support systems by, for example, displacing communities, destroying homes and resulting in loss of life. This would have serious implications for mental health and human well-being. Acute climate events such as high temperatures and heat waves have been associated with diminished mental capacity and increased hospital admissions for mental disorders, mood disorders, somatoform disorders (mental symptoms suggesting physical illness or injury), senility and psychological development disorders. Extreme weather events may render certain areas temporarily uninhabitable and unproductive, and cause

environmental distress and a disturbed sense of place. This can worsen mental health through increasing anxiety, apathy, helplessness, depression and chronic psychological distress.

OCCUPATIONAL HEALTH

Common occupational health impacts (impacted by both climatic and non-climatic factors) include heat stress, dehydration and injuries sustained while at the workplace. Temperature is a common climatic factor that affects occupational health (for example, agricultural labourer's productivity) by causing heat stress and dehydration. Results generated with projected future climate scenarios over South Africa display marked increases in thermal discomfort on more days of the year, especially in summer months (see LTAS Factsheet 4 and technical report: *Climate Change Implications for the Agriculture and Forestry Sector in South Africa*). This will have serious implications for the productivity of workers in particular in the agriculture and mining sectors.

3. Adaptation responses

A quantitative vulnerability and risk assessment for the health sector is an important first step to identify the most critical climate change impacts and the most vulnerable populations and communities in South Africa. Approaches to reducing the impacts of climate change on public health are likely to be area-specific and linked to the demographic profiles of affected communities. Therefore, health vulnerability assessments need to be area-specific and need to be informed by vulnerability assessments of other sectors.

Understanding the effectiveness of current policies and programmes, and shaping new ones to manage future climate change impacts, requires effective surveillance of public health including high-quality observations of diseases and risk factors. Improving data and enhancing access to it, including building and strengthening the current system for reporting notifiable diseases run by the Epidemiology and Surveillance directorate in South Africa, could allow for high-quality surveillance of diseases and risk factors to ensure successful adaptation planning.

South Africa's National Climate Change Response Policy has advocated the following adaptation measures for reducing the impacts of climate change on human health: reducing certain criteria pollutants (PM, ozone and sulphur dioxide); developing and strengthening existing public awareness campaigns; developing heat-health action plans; improving biosafety; developing a spatial and temporal health data capture system; and integrating food security and sound nutritional policies into all adaptation strategies.

