

MADAGASCAR



HEALTH & CLIMATE CHANGE **COUNTRY PROFILE 2021**

Small Island Developing States Initiative



United Nations
Framework Convention on
Climate Change

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Acknowledgements

This document was developed in collaboration with the Ministry of Health, the World Health Organization (WHO), the WHO Regional Office for Africa and the United Nations Framework Convention on Climate Change (UNFCCC). Financial support for this project was provided by the Norwegian Agency for Development Cooperation (NORAD) and the Wellcome Trust.



EXECUTIVE SUMMARY

Despite producing very little greenhouse gas emissions that cause climate change, people living in small island developing States (SIDS) are on the front line of climate change impacts. These countries face a range of acute to long-term risks, including extreme weather events such as floods, droughts and cyclones, increased average temperatures and rising sea levels. Many of these countries already have a high burden of climate-sensitive diseases that are then exacerbated by climate change. As is often the case, nations at greatest risk are often under-resourced and unprotected in the face of escalating climate and pollution threats. In recent years, the voice of the small island nation leaders has become a force in raising the alarm for urgent global action to safeguard populations everywhere, particularly those whose very existence is under threat.

Recognizing the unique and immediate threats faced by small islands, WHO has responded by introducing the WHO Special Initiative on Climate Change and Health in Small Island Developing States (SIDS). The initiative was launched in November 2017 in collaboration with the United Nations Framework Convention on Climate Change (UNFCCC) and the Fijian Presidency of the COP23 in Bonn, Germany, with the vision that by 2030 all health systems in SIDS will be resilient to climate variability and climate change. It is clear though that building resilience must happen in parallel with the reduction of carbon emissions by countries around the world in order to protect

the most vulnerable from climate risks and to gain the health co-benefits of mitigation policies.

The WHO Special Initiative on Climate Change and Health in SIDS aims to provide national health authorities in SIDS with the political, technical and financial support required to better understand and address the effects of climate change on health.

A global action plan has been developed by WHO which outlines four pillars of action for achieving the vision of the initiative; empowerment of health leaders to engage nationally and internationally, evidence to build the investment case, implementation to strengthen climate resilience, and resources to facilitate access to climate finance. In March 2018, Ministers of Health gathered in Mauritius to develop an action plan to outline the implementation of the SIDS initiative locally and to identify national and regional indicators of progress.

As part of the regional action plan, small island nations have committed to developing a WHO UNFCCC health and climate change country profile to present evidence and monitor progress on health and climate change.

This WHO UNFCCC health and climate change country profile for Madagascar provides a summary of available evidence on climate hazards, health vulnerabilities, health impacts and progress to date in the health sector's efforts to realize a climate-resilient health system.

KEY RECOMMENDATIONS

1

STRENGTHEN IMPLEMENTATION OF MADAGASCAR'S NATIONAL ADAPTATION PLAN FOR THE HEALTH SECTOR TO CLIMATE CHANGE

Madagascar has an adaptation strategic plan for health sector to climate change, which was published in May 2021. Implementation of the health and climate change plan in Madagascar is reported to be low. Assess barriers to implementation of the plan/strategy (e.g. governance, evidence, monitoring and evaluation, finance). Implementation can be supported by exploring additional opportunities to access funds for health and climate change priorities (e.g. GCF readiness proposal).

2

STRENGTHEN COLLABORATION TO CARRY OUT RESEARCH ON HEALTH AND CLIMATE CHANGE IN MADAGASCAR

Madagascar has a health and climate change working group, made up of key players in the health sector and the meteorological sector. This working group is headed jointly by the Director General of Meteorology and the health sector coordinator. Efforts should be made to strengthen collaborations with this health and climate change working group, to undertake and promote research on health and climate change in Madagascar.

3

UPDATE MADAGASCAR'S VULNERABILITY AND ADAPTATION CAPACITY ASSESSMENT

Madagascar published a vulnerability and adaptation capacity assessment in 2015. Efforts should be made to update this assessment.

4

ESTABLISH AN EFFECTIVE EARLY WARNING SYSTEM FOR HEALTH AND CLIMATE CHANGE RISKS AT THE HEALTH DISTRICT LEVEL

Climatic and meteorological information and parameters are used in Madagascar to produce and regularly distribute the climatology health bulletin. Effective early warning systems are required at the health district level regarding health and climate change risks.

5

BUILD CLIMATE-RESILIENT AND ENVIRONMENTALLY SUSTAINABLE HEALTH CARE FACILITIES

Measures can be taken to prevent the potentially devastating impacts of climate change on health service provision. A commitment towards climate-resilient, environmentally sustainable health systems can improve system stability, promote a healing environment and mitigate climate change impacts.

WHO RESOURCES TO SUPPORT ACTION ON THESE KEY RECOMMENDATIONS:

<https://www.who.int/activities/building-capacity-on-climate-change-human-health/toolkit/>

BACKGROUND

Madagascar is a large island nation, located off the eastern coast of Africa in the Indian Ocean. The highland plateau across the centre of Madagascar has created diverse ecosystems across the island (1). Whilst the climate is generally tropical, there are significant regional variations. Most notably, it is largely wet in the north and east, and dry in the south and west (2). Madagascar's economy is mostly dependent upon agriculture, fishery and livestock production. There are some development challenges in Madagascar, which make it increasingly vulnerable to climate change (1). Furthermore, it is hit by tropical cyclones annually from December to May (2).

Climate change is expected to cause rising temperatures, changing precipitation patterns (including flood and drought), sea level rise, and extreme weather events (including tropical cyclones). Indeed, many of these impacts are

already being observed in Madagascar (3). For human health, these changes are likely to incur significant burdens, such as food and water insecurity, displacement, and damage to public health systems (1).

As a least developed country, Madagascar's greenhouse gas emissions are very small. Yet in their Nationally Determined Contribution (NDC), they commit to reducing their greenhouse gas emissions by 14% by 2030 compared with its business as usual scenario. Adaptation is a major priority for Madagascar, considering its high vulnerability to climate change. In terms of health adaptation, priority actions in the NDC include evaluating the links between climate change and the migration of vector-borne diseases and evolution of acute respiratory infections, and the implementation of early warning systems for health (3).



CLIMATE HAZARDS RELEVANT FOR HEALTH

Climate hazard projections for Madagascar

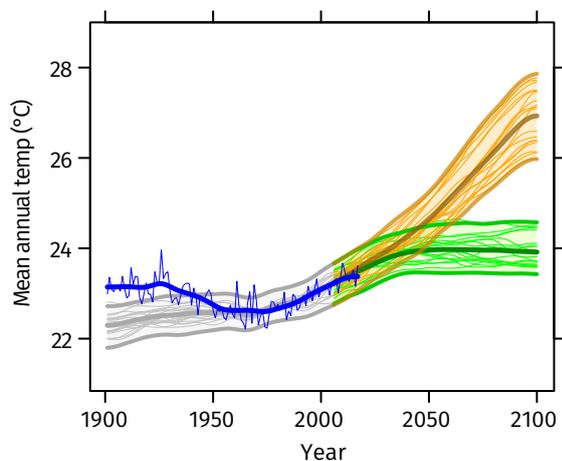
Country-specific projections are outlined up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions (see Figures 1–5).

The climate 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 describes the projected changes averaged across about 20 global climate models (thick line). The figures^b also show each model individually as well as the 90% model range (shaded) as a measure of uncertainty and the annual and smoothed observed record (in blue).^c In the following text the present-day baseline refers to the 30-year average for 1981–2010 and the end-of-century refers to the 30-year average for 2071–2100.

Modelling uncertainties associated with the relatively coarse spatial scale of the models compared with that of small island States are not explicitly represented. There are also issues associated with the availability and representativeness of observed data for such locations.

Rising temperature

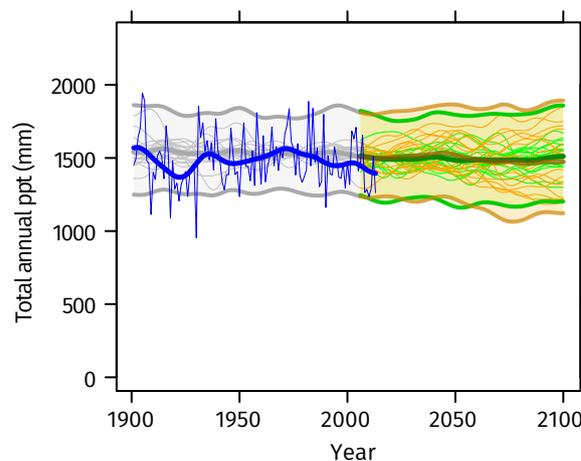
FIGURE 1: Mean annual temperature, 1900–2100



Under a high emissions scenario, the mean annual temperature is projected to rise by about 3.4°C on average by the end-of-century (i.e. 2071–2100 compared with 1981–2010). If emissions decrease rapidly, the temperature rise is limited to about 1°C.

Little change in total precipitation

FIGURE 2: Total annual precipitation, 1900–2100



Total annual precipitation is projected to decrease by about 4% on average under a high emissions scenario, although the uncertainty range is large (-20% to +11%). If emissions decrease rapidly, there is little projected change on average: a decrease of 2% with an uncertainty range of -10% to +5%.

NOTES

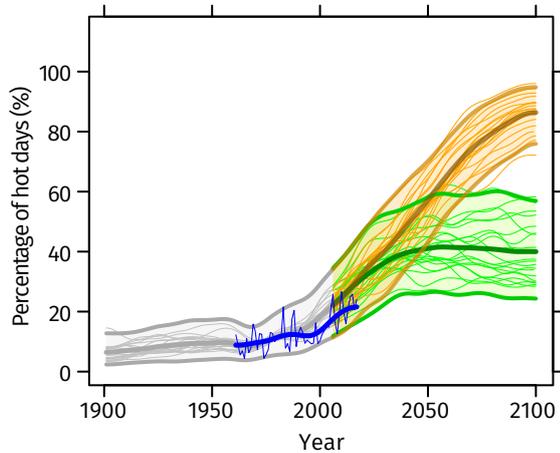
^a Model projections are from CMIP5 for RCP8.5 (high emissions) and RCP2.6 (low emissions). Model anomalies are added to the historical mean and smoothed.

^b Observed historical record of mean temperature is from CRU-TSv3.26 and total precipitation is from GPCC. Observed historical records of extremes are from JRA55 for temperature and from GPCC-FDD for precipitation.

^c Analysis by the Climatic Research Unit, University of East Anglia, 2018.

More high temperature extremes

FIGURE 3: Percentage of hot days ('heat stress'), 1900–2100



The percentage of hot days^d is projected to increase substantially from about 15% of all observed days on average in 1981–2010 (10% in 1961–1990). Under a high emissions scenario, about 80% of days on average are defined as 'hot' by the end-of-century. If emissions decrease rapidly, about 40% of days on average are 'hot'. Note that for the past few years the models tend to over-estimate the observed increase in hot days. Slightly larger increases are seen in hot nights^d (not shown).

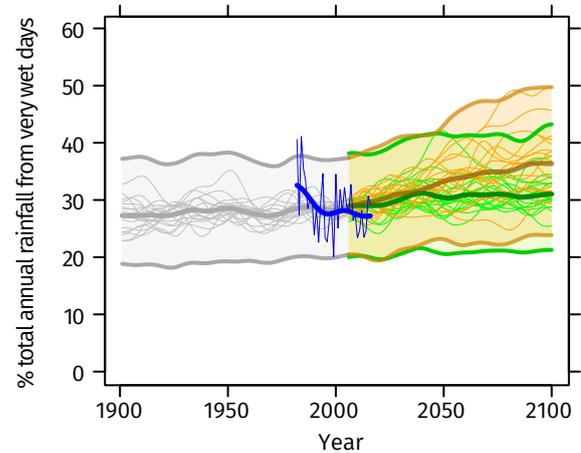
FIGURE 5: Standardized Precipitation Index ('drought'), 1900–2100

The Standardized Precipitation Index (SPI) is a widely used drought index which expresses rainfall deficits/excesses over timescales ranging from 1 to 36 months (here 12 months, i.e. SPI12).^f It shows how at the same time extremely dry and extremely wet conditions, relative to the average local conditions, change in frequency and/or intensity.

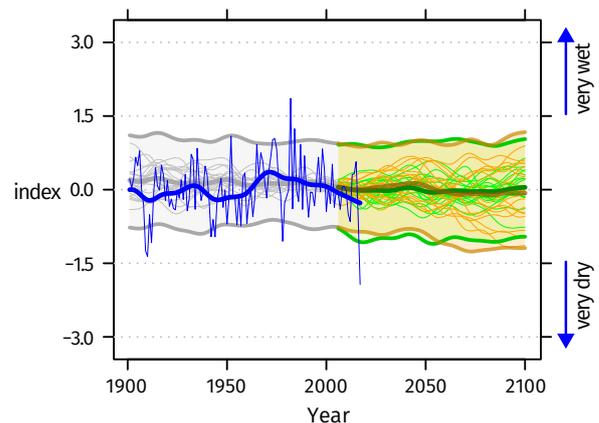
SPI12 values show little projected change from about zero on average, though year-to-year variability remains large. A few models indicate slightly larger decreases (more frequent/intense dry/drought events) or increases (more frequent/intense wet events).^f

Increase in extreme rainfall

FIGURE 4: Contribution to total annual rainfall from very wet days ('extreme rainfall' and 'flood risk'), 1900–2100



Under a high emissions scenario, the proportion of total annual rainfall from very wet days^e (about 30% for 1981–2010) could increase by the end-of-century (to about 35% on average with an uncertainty range of about 25% to 50%), with little change if emissions decrease rapidly. These projected changes are accompanied by little or no change in total annual rainfall (see Figure 2).



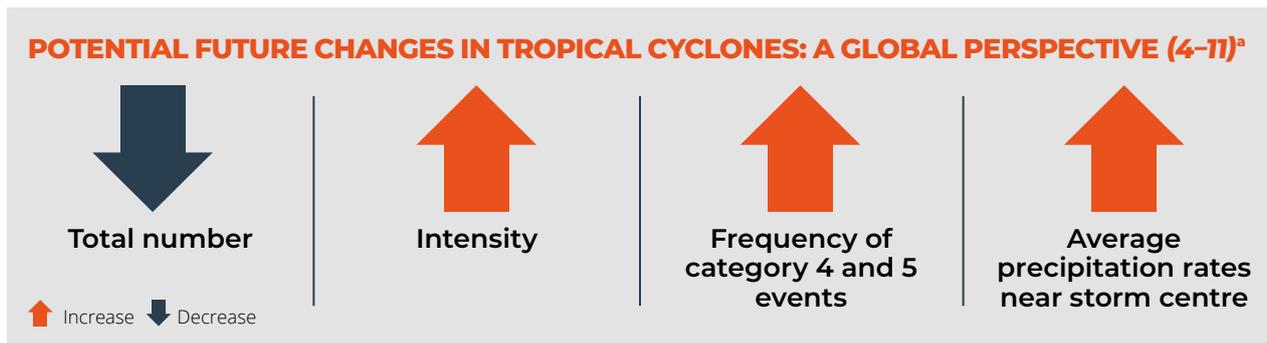
^d A 'hot day' ('hot night') is a day when maximum (minimum) temperature exceeds the 90th percentile threshold for that time of the year.

^e The proportion (%) of annual rainfall totals that falls during very wet days, defined as days that are at least as wet as the historically 5% wettest of all days.

^f SPI is unitless but can be used to categorize different severities of drought (wet): above +2.0 extremely wet; +2.0 to +1.5 severely wet; +1.5 to +1.0 moderately wet; +1.0 to +0.5 slightly wet; +0.5 to -0.5 near normal conditions; -0.5 to -1.0 slight drought; -1.0 to -1.5 moderate drought; -1.5 to -2.0 severe drought; below -2.0 extreme drought.

Tropical cyclones

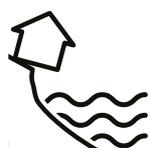
It is anticipated that the total number of tropical cyclones may decrease towards the end of the century. However, it is likely that human-induced warming will make cyclones more intense (an increase in wind speed of 2–11% for a mid-range scenario (i.e. RCP4.5 which lies between RCP2.6 and RCP8.5 – shown on pages 4–5) or about 5% for 2°C global warming). Projections suggest that the most intense events (category 4 and 5) will become more frequent (although these projections are particularly sensitive to the spatial resolution of the models). It is also likely that average precipitation rates within 100 km of the storm centre will increase – by a maximum of about 10% per degree of warming. Such increases in rainfall rate would be exacerbated if tropical cyclone translation speeds continue to slow (4–11).^a



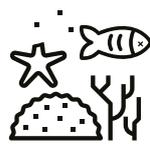
Sea level rise

Sea level rise is one of the most significant threats to low-lying areas on small islands and atolls. Research indicates that rates of global mean sea level rise are almost certainly accelerating as a result of climate change. The relatively long response times to global warming mean that sea level will continue to rise for a considerable time after any reduction in emissions. The continuing rise in sea level means that higher storm surge levels can be expected regardless of any other changes in the characteristics of storm surges.

Potential impacts of sea level rise include



Coastal erosion



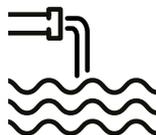
Ecosystem disruption



Higher storm surges



Population displacement



Water contamination and disruption



Mental health

^a Information and understanding about tropical cyclones (including hurricane and typhoons) from observations, theory and climate models have improved in the past few years. It is difficult to make robust projections for specific ocean basins or for changes in storm tracks. Presented here is a synthesis of the expected changes at the global scale.

HEALTH VULNERABILITY AND ADAPTIVE CAPACITY

SDG indicators related to health and climate change

Many of the public health gains that have been made in recent decades are at risk due to the direct and indirect impacts of climate variability and climate change. Achieving Sustainable Development Goals (SDGs) across sectors can strengthen health resilience to climate change.

1. NO POVERTY



Proportion of population living below the national poverty line (2012) (12)

70.7%

3. GOOD HEALTH AND WELL-BEING



28

Universal Health Coverage Service Coverage Index (2017)^a (13)

6%

Current health expenditure as percentage of gross domestic product (GDP) (2016) (14)

44.2

Under-five mortality rate (per 1000 live births) (2017) (15)

6. CLEAN WATER AND SANITATION



Proportion of total population using at least basic drinking-water services (2017)^b (16)

54%

Proportion of total population using at least basic sanitation services (2017)^b (16)

11%



13. CLIMATE ACTION

National disaster risk reduction strategy in place (2016) (17)

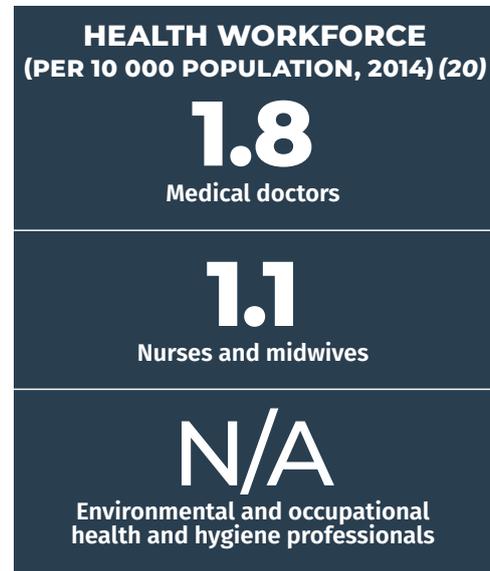
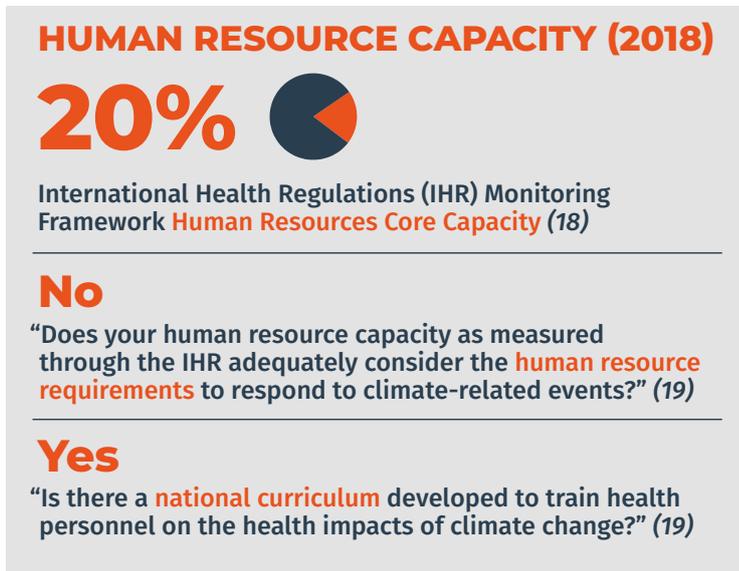
YES

^a The index is based on 'medium' data availability. Values greater than or equal to 80 are presented as ≥ 80 as the index does not provide fine resolution at high values; 80 should not be considered a target.

^b Data for safely managed drinking-water and sanitation services are not consistently available for all SIDS at this time, therefore 'at least basic services' has been given for comparability.

Health workforce

Public health and health care professionals require training and capacity building to have the knowledge and tools necessary to build climate-resilient health systems. This includes an understanding of climate risks to individuals, communities and health care facilities, and approaches to protect and promote health given the current and projected impacts of climate change.



While there are no specific WHO recommendations on national health workforce densities, the ‘Workload Indicators of Staffing Need’ (WISN) is a human resource management tool that can be used to provide insights into staffing needs and decision-making. Additionally, the National Health Workforce Accounts (NHWA) is a system by which countries can progressively improve the availability, quality and use of health workforce data through monitoring of a set of indicators to support achievement of universal health coverage (UHC), SDGs and other health objectives. The purpose of the NHWA is to facilitate the standardization and interoperability of health workforce information. More details about these two resources can be found at: <https://www.who.int/activities/improving-health-workforce-data-and-evidence>.

Health care facilities

Climate change poses a serious threat to the functioning of health care facilities. Extreme weather events increase the demand for emergency health services but can also damage health care facility infrastructure and disrupt service provision. Increased risks of climate-sensitive diseases will also require greater capacity from often already strained health services. In SIDS, health care facilities are often in low-lying areas, subject to flooding and storm surges making them particularly vulnerable.

0.27
Health centres* (18)

0.47
Hospitals* (18)

* Total density per 100 000 population (2013) (22)

HEALTH IMPACTS OF CLIMATE CHANGE

Heat stress

Climate change is expected to increase the 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. Heat waves, i.e. prolonged periods of excessive heat, can pose a particular threat to human, animal and even plant health, resulting in loss of life, livelihoods, socioeconomic output, reduced labour productivity, rising demand for and cost of cooling options, as well as contribute to the deterioration of environmental determinants of health (air quality, soil, water supply).

Heat stress impacts include:

- heat rash/heat cramps
- dehydration
- heat exhaustion/heat stroke
- death.

Particularly vulnerable groups are:

- the elderly
- children
- individuals with pre-existing conditions (e.g. diabetes)
- the socially isolated.

Infectious and vector-borne diseases

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 foodborne diseases (21,22).

Small island developing States (SIDS) are vulnerable to disease outbreaks. Climate change could affect the seasonality of such outbreaks, as well as the transmission of vector-borne diseases (23–26).



Noncommunicable diseases, food and nutrition security

Small island developing States (SIDS) face distinct challenges that render them particularly vulnerable to the impacts of climate change on food and nutrition security including: small, and widely dispersed, land masses and population; large rural populations; fragile natural environments and lack of arable land; high vulnerability to climate change, external economic shocks, and natural disasters; high dependence on food imports; dependence on a limited number of economic sectors; and distance from global markets. The majority of SIDS also face a “triple-burden” of malnutrition whereby undernutrition, micronutrient deficiencies and overweight and obesity exist simultaneously within a population alongside increasing rates of diet-related NCDs.

Climate change is likely to exacerbate the triple-burden of malnutrition and the metabolic and lifestyle risk factors for diet-related NCDs. It is expected to reduce short- and long-term food and nutrition security both directly, through its effects on agriculture and fisheries, and indirectly, by contributing to underlying risk factors such as water insecurity, dependency on imported foods, urbanization and migration and health service disruption. These impacts represent a significant health risk for SIDS, with their particular susceptibility to climate change impacts and already over-burdened health systems, and this risk is distributed unevenly, with some population groups experiencing greater vulnerability.

NONCOMMUNICABLE DISEASES IN MADAGASCAR

58.3

Healthy life expectancy (2016) (27)

43.1%



Adult population considered **undernourished** (2015–2017, 3-year average) (28)

4.5%



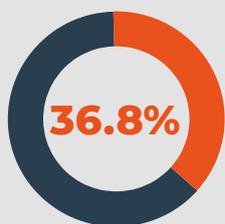
Adult population considered **obese** (2016) (29)

3.9%

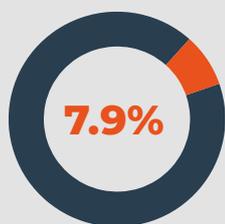


Prevalence of **diabetes** in the adult population (2014) (30)

MOTHER AND CHILD HEALTH



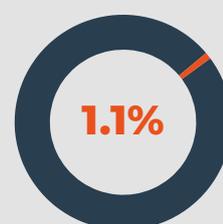
Iron deficiency anaemia in women of reproductive age (2016) (31)



Wasting in children under five years of age (2013) (32)



Stunting in children under five years of age (2013) (32)



Overweight in children under five years of age (2013) (32)

HEALTH SECTOR RESPONSE: MEASURING PROGRESS

The following section measures progress in the health sector in responding to climate threats based on country reported data (19). Key indicators are aligned with those identified in the Small Island Developing State Action Plan.

Empowerment: Progress in leadership and governance

National planning for health and climate change

Has a national health and climate change strategy or plan been developed?^a	
Title: Plan stratégique d'adaptation du secteur santé au changement climatique Year: 2021	
Content and implementation	
Are health adaptation priorities identified in the strategy/plan?	
Are the health co-benefits of mitigation action considered in the strategy/plan?	
Performance indicators are specified	
Level of implementation of the strategy/plan	Low
Current health budget covers the cost of implementing the strategy/plan	

=yes, =no, O=unknown, N/A=not applicable

^a In this context, a national strategy or plan is a broad term that includes national health and climate strategies as well as the health component of national adaptation plans (H-NAPs).

Intersectoral collaboration to address climate change

Is there an agreement in place between the ministry of health and other sectors in relation to health and climate change policy?

Sector ^b	Agreement in place
Transportation	
Electricity generation	
Household energy	
Agriculture	
Social services	
Water, sanitation and wastewater management	

=yes, =no, O=unknown, N/A=not applicable

^b Specific roles and responsibilities between the national health authority and the sector indicated are defined in the agreement.

Evidence: Building the investment case

Vulnerability and adaptation assessments for health

Has an assessment of health vulnerability and impacts of climate change been conducted at the national level?

TITLE: Rapport de l'Etude d'évaluation de la vulnérabilité et des capacités d'adaptation du secteur santé au changement climatique à Madagascar

YEAR: 2015

Have the results of the assessment been used for policy prioritization or the allocation of human and financial resources to address the health risks of climate change?

Policy prioritization

Human and financial resource allocation

Level of influence of assessment results

Implementation: Preparedness for climate risks

Integrated risk monitoring and early warning

Climate-sensitive diseases and health outcomes	Health surveillance system exists ^a	Health surveillance system includes meteorological information ^b	Climate-informed health early warning system (EWS) in place
Thermal stress (e.g. heat waves)	✗	✗	✗
Vector-borne diseases	✓	✓	✓
Foodborne diseases	✓	✗	✓
Waterborne diseases	✓	✓	✓
Nutrition (e.g. malnutrition associated with extreme climatic events)	✓	✗	✓
Injuries (e.g. physical injuries or drowning in extreme weather events)	✓	✓	✓
Mental health and well-being	✗	✗	✗
Airborne and respiratory diseases	✓	✓	✓

✓=yes, ✗=no, O=unknown, N/A=not applicable

^a A positive response indicates that the surveillance system is in place, it will identify changing health risks or impacts AND it will trigger early action.

^b Meteorological information refers to either short-term weather information, seasonal climate information OR long-term climate information.

Resources: Facilitating access to climate and health finance

International climate finance

Are international funds to support climate change and health work currently being accessed?
✕

If yes, from which sources?

Green Climate Fund (GCF)

Global Environment Facility (GEF)

Other multilateral donors

Bilateral donors

Other: _____

Funding challenges

Greatest challenges faced in accessing international funds

Lack of information on the opportunities		Lack of country eligibility	
Lack of connection by health actors with climate change processes		Lack of capacity to prepare country proposals	✓
Lack of success in submitted applications	✓	None (no challenges/ challenges were minimal)	
Other (please specify):		Not applicable	



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WHO/HEP/ECH/CCH/21.01.08

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