TUVALU

HEALTH & CLIMATE CHANGE

COUNTRY PROFILE 2020

Small Island Developing States Initiative

World Health Organization
United Nations Framework Convention on Climate Change

CONTENTS

Acknowledgements

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“If we save Tuvalu, we save the world”

Enele Sosene Sopoaga, former Prime Minister of Tuvalu

EXECUTIVE SUMMARY

Despite producing very little greenhouse gas emissions that cause climate change, people living in small island developing States (SIDS) are at the front line of climate change impacts. Tuvalu, one of the least developed SIDS, is already seeing the devastating effects of climate change on its communities every day – from worsening extreme weather events, to increased spread of infectious diseases, to occupational health risks. Tuvalu faces a range of acute to long-term risks, including extreme weather events such as floods, droughts and cyclones and slower onset events like increased average temperatures and rising sea levels.

Like many other SIDS, Tuvalu already has a high burden of communicable and noncommunicable diseases that are exacerbated by climate change. As is often the case, the nation is among those at greatest risk as it is under-resourced and unprotected in the face of escalating climate and pollution threats. In recent years, Tuvalu’s voice as one of the most vulnerable small island nations, has become a force on the global stage in raising the alarm for urgent global action to safeguard populations everywhere, particularly as its 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. A global action plan has been developed by WHO that 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 and senior health officials from across the Pacific gathered in Fiji to develop a Pacific 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 health and climate change country profile for Tuvalu, developed with WHO as part of a common shared commitment to the UNFCCC, 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 POLICY AND PLANS

Finalize and implement the National Health and Climate Change Plan 2020–2024.

2 ASSESS HEALTH VULNERABILITY, IMPACTS AND ADAPTIVE CAPACITY TO CLIMATE CHANGE

Complete a national assessment of health vulnerability, impacts and adaptive capacity in Tuvalu. Ensure results of the assessment are used to inform policy prioritization and allocation of resources.

3 STRENGTHEN INTEGRATED RISK SURVEILLANCE AND EARLY WARNING SYSTEMS

Integrate heat stress (see page 9) into existing monitoring systems and develop health sector response plans for climate-related events.

4 TAKE ACTION TO ADDRESS BARRIERS TO ACCESSING CLIMATE FINANCE

In Tuvalu, the main barriers have been identified as a lack of information on climate financing opportunities, a lack of connection by health actors to climate change processes and a lack of capacity to prepare country proposals.

5 BUILD CLIMATE RESILIENCE OF HEALTHCARE FACILITIES

Apply measures to prevent the potentially devastating impacts of climate change on health service provision, including: conducting hazard assessments; climate-informed planning and costing; strengthening structural safety; contingency planning for essential systems (electricity, heating, cooling, ventilation, water supply, sanitation services, waste management and communications). A commitment towards low-emission, sustainable practices to improve system stability, promote a healing environment and to mitigate climate change impacts can also be taken.

BACKGROUND

Tuvalu is a sovereign state located in the South Pacific Ocean with a land mass of 26 square kilometres across a group of nine coral atolls and a mean elevation of 2m above sea level *(1)*. Considered one of the smallest and most remote countries on Earth, Tuvalu is both a small island developing state and a least-developed country.

Disasters continue to pose a threat to the Tuvaluan way of life. When Cyclone Pam hit Tuvalu in 2015, around 45% of the population were affected as the country suffered from substantial losses amounting to US$ 10.3 million, equivalent to 26.9% of its GDP *(2)*. All of Tuvalu's atolls experience spring tides and tropical cyclones often with flooding damaging agriculture and infrastructure. Tropical cyclones affect Tuvalu mainly between November and April and are most frequent in El Niño years and least frequent in La Niña years *(3)*.

Climate data indicates that Tuvalu is already experiencing increasing temperatures, sea level rise and ocean acidification consistent with climate change *(3)*. The key health vulnerabilities sensitive to the effects of climate change in Tuvalu include diarrhoeal disease (due to contaminated food and/or water), respiratory disease (infective and obstructive), compromized food security (with impacts on nutrition and noncommunicable diseases (NCDs)), vector-borne diseases, mental health/psychological problems, injuries and deaths from extreme weather events, fish poisoning (ciguatera) and skin infections/infestations *(4)*. Heat stress (see page 9) is increasingly being recognized as a key health threat due to climate change in Tuvalu.

HIGHEST PRIORITY CLIMATE-SENSITIVE HEALTH RISKS FOR TUVALU

Direct effects	
Health impacts of extreme weather events	✔
Heat-related illness (see page 9)	✔
Indirect effects	
Water security and safety (including waterborne diseases)	✔
Food security and safety (including malnutrition and foodborne diseases)	✔
Vector-borne diseases	✔
Zoonoses	
Respiratory illness	✔
Disorders of the eyes, ears, skin and other body systems	✔
Diffuse effects	
Disorders of mental/psychosocial health[1]	✔
Noncommunicable diseases	✔
Health systems problems	✔
Population pressures	✔

Source: Adapted and updated from reference *(4)*.

CLIMATE HAZARDS RELEVANT FOR HEALTH

Climate hazard projections for Tuvalu

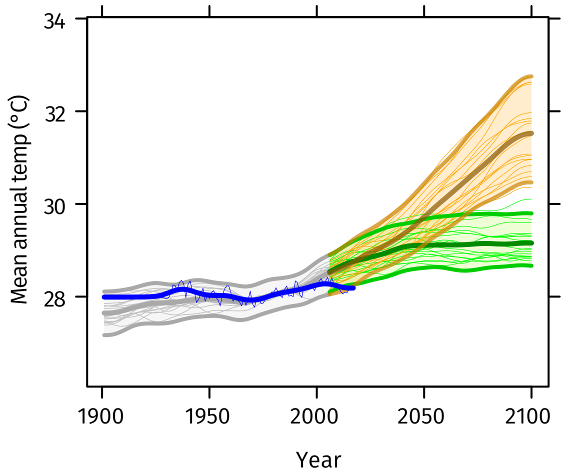
Country-specific projections are outlined up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions (see Figures 1–5).

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

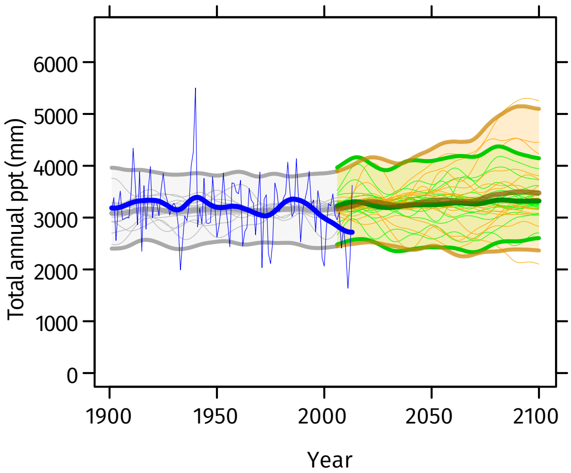
FIGURE 1: Mean annual temperature, 1900–2100



Under a high emissions scenario, mean annual temperature is projected to rise by about 2.9°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 0.9°C.

Small increase in total precipitation

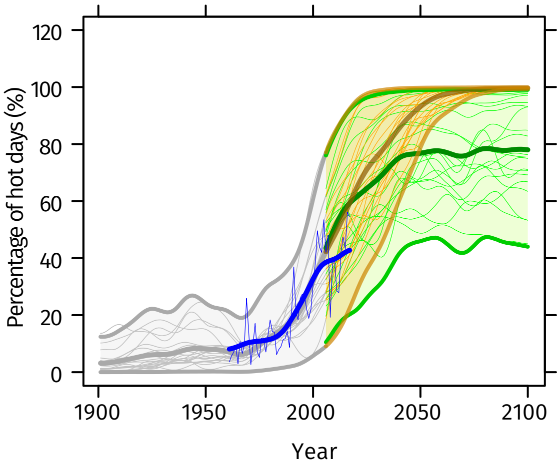
FIGURE 2: Total annual precipitation, 1900–2100



Total annual precipitation is projected to increase by about 9% on average under a high emissions scenario, although the uncertainty range is large (-15% to +48%). If emissions decrease rapidly the increase is smaller: 5% on average with an uncertainty range of -6% to +20%.

More high temperature extremes

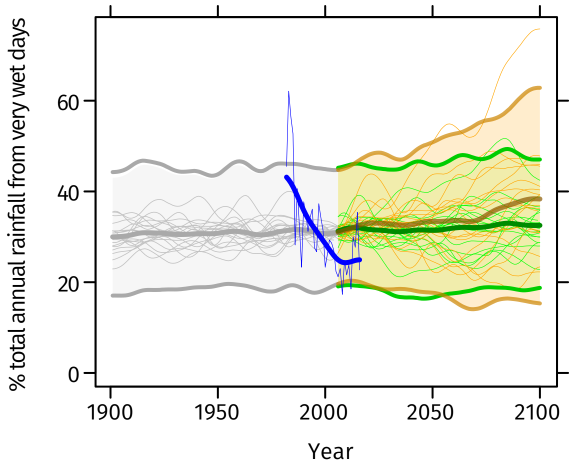
FIGURE 3: Percentage of hot days ('heat stress'), 1900–2100



The percentage of hot days[d] is projected to increase substantially from about 25% of all days on average in 1981–2010 (10% in 1961–1990). Under a high emissions scenario, almost 100% of days on average are defined as 'hot' by the end-of-century. If emissions decrease rapidly, about 75% of days on average are 'hot'. Note that for the last few years the models tend to over-estimate the observed increase in hot days. Similar increases are seen in hot nights[d] (not shown).

Small increase in extreme rainfall

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

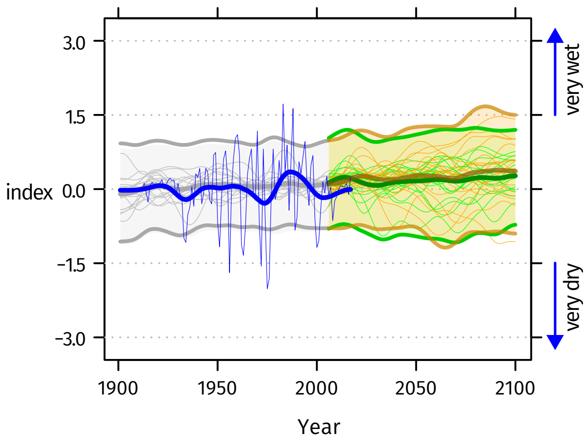


Under a high emissions scenario, the proportion of total annual rainfall from very wet days[e] (about 30% for 1981–2010) could increase a little by the end-of-century (to almost 40% of days on average with an uncertainty range of about 15% to 60%), with little change if emissions decrease rapidly. These projected changes are accompanied by small projected increases in total annual rainfall (see Figure 2).

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.

Under a high emissions scenario, SPI12 values are projected to increase to about 0.4 on average by the end of the century (2071–2100), with a number of models indicating substantially larger increases and hence more frequent and/or intense wet episodes. Year-to-year variability remains large with dry episodes continuing to occur into the future.



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

[c] 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.

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

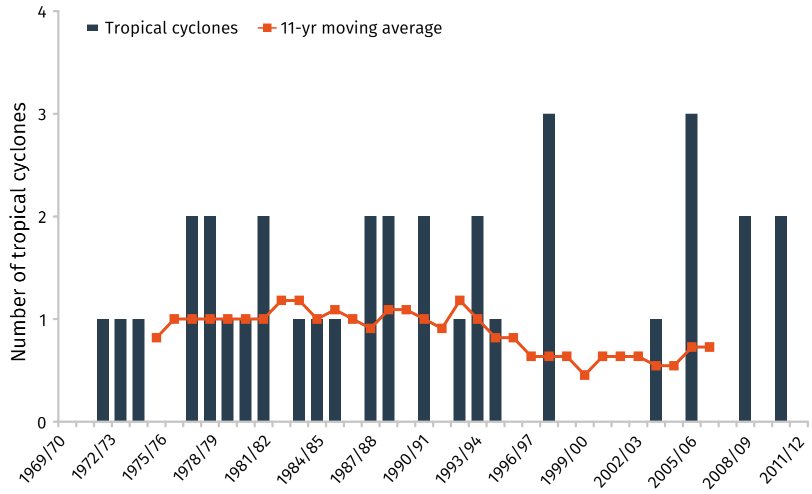
[e] The proportion (%) of annual rainfall totals that falls during very wet days, defined as days that are at least as wet as the historically 5% wettest of all days.

[f] SPI is unitless but can be used to categorise 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

Tropical cyclones affect Tuvalu mainly between November and April. An average of eight cyclones per decade developed within or crossed the Tuvalu Exclusive Economic Zone (EEZ) between the 1969/70 and 2010/11 cyclone seasons (see Figure 6). Tropical cyclones were most frequent in El Niño years and least frequent in La Niña years *(3)*.

FIGURE 6: Time series of the observed number of tropical cyclones developing within and crossing the Tuvalu EEZ per season. The 11-year moving average is in orange.



Source: Australian Bureau of Meteorology and CSIRO. Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports, 2014 *(3)*.

POTENTIAL FUTURE CHANGES IN TROPICAL CYCLONES: A GLOBAL PERSPECTIVE *(5–12)*[a]

Total number (Decrease)	Intensity (Increase)	Frequency of category 4 and 5 events (Increase)	Average precipitation rates near storm centre (Increase)

Increase   Decrease

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 global mean sea level rise rates 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.

0.4–0.9 m

Further rise in Tuvalu by 2090 *(3)*

High emissions scenario (RCP8.5). With variation in models and emissions scenarios.

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 has improved in the last few years. Despite this, robust projections for specific ocean basins or for changes in storm tracks are difficult. As such, presented here is a synthesis of the expected changes at the global scale.

HEALTH VULNERABILITY TO CLIMATE CHANGE

SDG indicators related to health and climate change

Many of the public health gains we have made in recent decades are at risk due to the direct and indirect impacts of climate variability and climate change. Sustainable development across sectors can strengthen health resilience to climate change.

1. NO POVERTY

Proportion of population living below the national poverty line (2010) *(13)*

26.3%

3. GOOD HEALTH AND WELL-BEING

64

Universal Health Coverage Service Coverage Index (2017)[a] *(14)*

15.5%

Current health expenditure as percentage of gross domestic product (GDP) (2016) *(15)*

24.9

Under-five mortality rate (per 1000 live births) (2017) *(16)*

6. CLEAN WATER AND SANITATION

Proportion of total population using **at least basic drinking-water services** (2017)[b] *(17)*

99%

Proportion of total population using **at least basic sanitation services** (2017)[b] *(17)*

78%

13. CLIMATE ACTION

Total number of tropical cyclones recorded between 2000–2016[c] *(18)*

13

Highest total number of persons affected by a single weather-related disaster between 2000–2018 (2015)[c] *(18)*

4613

(approx. 42% of population)

[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 SDG6 safely managed drinking-water and sanitation services are not consistently available for all SIDS at this time, therefore 'at least basic services' has been reported on for comparability.

[c] Data for SDG13.1 are currently not available. Alternative indicators and data sources are presented.

NOTE: Estimates presented here may differ from national estimates.

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.

HUMAN RESOURCE CAPACITY (2018)

80%

International Health Regulations (IHR) Monitoring Framework Human Resources Core Capacity *(19)*

Partially

Human resource capacity as measured through IHR considers the human resource requirements to respond to climate-related events *(20)*

Under development

National curriculum developed to train health personnel on the health impacts of climate change *(20)*

HEALTH WORKFORCE (PER 10 000 POPULATION, 2014) *(21)*

9.2
Medical doctors

37.6
Nursing and midwifery personnel

1
Environmental and occupational health and hygiene professionals (total)

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 insight 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), Sustainable Development Goals (SDGs) and other health objectives. The purpose of the NHWA is to facilitate the standardization and interoperability of health workforce information. More information on 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 small island developing states, health care facilities are often in low-lying areas, subject to flooding and storm surges making them particularly vulnerable.

11
Health centres[a]

Medical services per approx. 11 000 population (2017) *(22)*

1
National hospital

[a] Tuvalu has two health centres on Funafuti, two health centres on Vaitupu and one health centre on each of the other seven outer islands.

HEALTH IMPACTS OF CLIMATE CHANGE

Heat stress

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. 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 (e.g. air quality, soil, water supply).

Heat stress impacts include:

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

Particularly vulnerable groups include:

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

Infectious and vector-borne diseases

Vector-borne diseases are highly sensitive to climate, with increased temperature potentially leading to faster mosquito breeding and viral replication and rainfall leading to wider availability of mosquito breeding habitats, up to the point where flooding flushes breeding sites away *(23,24)*. In Tuvalu, there are currently two main vector-borne diseases of concern: dengue fever and lymphatic filariasis (LF) *(25).* Increased temperatures, expected higher tides, inundations and tropical cyclones due to climate change threaten to increase the risk of vector- and waterborne disease in the coming decades. A recent study has also investigated the effect of drought on diarrhea transmission in Tuvalu *(26).* The findings demonstrated the need to better understand the link between severe drought and disease outbreaks.

As climate conditions are projected to become significantly more favourable for the transmission of infectious disease, there is a risk that recent progress in reducing the burden of infectious disease will slow. As a result, there will be an increase in populations at risk if control measures are not maintained or strengthened.

Case study: Dengue-1 Outbreak, Tuvalu, 2019

Data from a recent dengue-1 outbreak in Tuvalu demonstrates the association between weekly rainfall and incidence of dengue-1 cases over the period of January to June, 2019 (see Figure 7) *(27).* Although only a short time period is presented, the data illustrate how periods of high rainfall (blue line) can be followed by peaks in confirmed dengue-1 cases (red line). Children were particularly vulnerable to contracting the dengue-1 virus during this outbreak, with a majority of the 210 confirmed cases being in children between the ages of 5 and 9 years old (see Figure 8) *(27).*

FIGURE 7: Confirmed dengue-1 cases and weekly rainfall data for Tuvalu, January–June, 2019

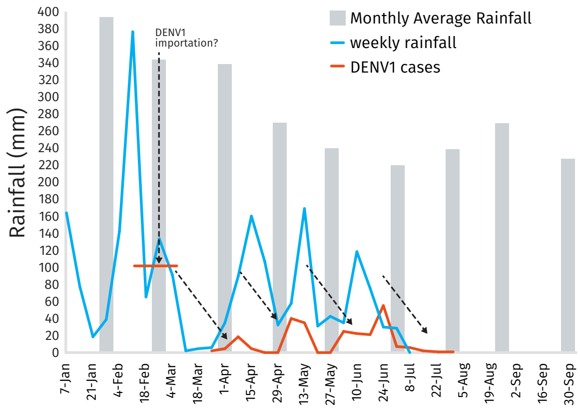
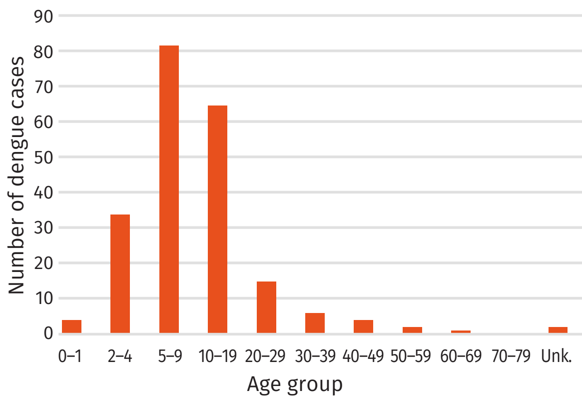


FIGURE 8: Dengue cases by age group, Tuvalu, March 25 to July 28, 2019



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 populations; large rural/maritime populations; fragile natural environments and lack of arable land; high vulnerability to climate change, external economic shocks, 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.

NONCOMMUNICABLE DISEASES IN TUVALU

[Data not available]

Healthy life expectancy *(28)*

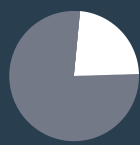
[Data not available]

Adult population considered **undernourished** *(29)*

51%

Adult population considered **obese** (2016) *(30)*

23.1%

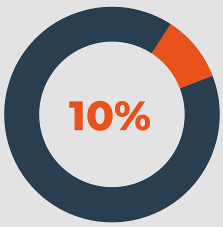


Prevalence of **diabetes** in the adult population (2014) *(31)*

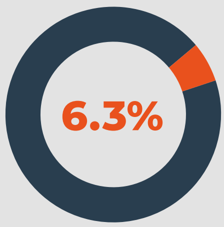
MOTHER AND CHILD HEALTH

Iron deficiency anaemia in women of reproductive age *(32)*

Wasting in children under five years of age *(33)*



Stunting in children under five years of age (2012) *(33)*



Overweight rate in children under five years of age (2012) *(33)*

Note: Estimates for child malnutrition presented here are taken from the UNICEF-WHO-The World Bank Joint Child Malnutrition Estimates *(33)* and may differ from national estimates or other publications. For example, refer to: World Bank. 2018. How Are Tuvalu's Children Developing? Evidence-Based Policy Recommendations For Better Early Childhood Development Of Tuvaluan Children.

HEALTH SECTOR RESPONSE: MEASURING PROGRESS

The following section depicts progress in terms of the health sector response to threats. The data is based on country reported data collected in the 2018 WHO health and climate change country survey *(20)*. Key indicators are aligned with those identified in the Small Island Developing State Action Plan.

Empowerment: Supporting health leadership

National planning for health and climate change

Has a national health and climate change strategy or plan been developed?[a]	UNDER DEVELOPMENT
Title: Government of Tuvalu National Health and Climate Change Plan, 2020–2024	
Content and implementation	
Are health adaptation priorities identified in the strategy/plan?	TBA
Are the health co-benefits of mitigation action considered in the strategy/plan?	TBA
Performance indicators are specified	TBA
Level of implementation of the strategy/plan	N/A
Current health budget covers the cost of implementing the strategy/plan	N/A

✓=yes, ✗=no, O=unknown, N/A=not applicable, TBA=to be advised

[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 & 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.

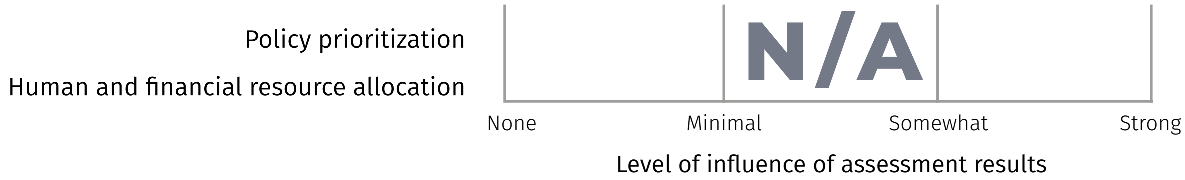
Evidence: Building the investment case

Vulnerability and adaptation assessments for health

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

STATUS: Assessment has been started in 2018 but process of review and validation is ongoing

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?



Implementation: Preparedness for climate risks

Integrated risk monitoring and early warning

Climate-sensitive diseases and health outcomes	Monitoring system is in place[a]	Monitoring system includes meteorological information[b]	Early warning and prevention strategies in place to reach affected population?
Thermal stress (e.g. heat waves)	✗	N/A	✗
Vector-borne diseases	✓	✓	✓
Foodborne diseases	✓	✓	✓
Waterborne diseases	✓	✓	✓
Nutrition (e.g. malnutrition associated with extreme climatic events)	✓	✗	O
Injuries (e.g. physical injuries or drowning in extreme weather events)	✗	✗	O
Mental health and well-being	✗	✗	✓

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

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

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

Although health and meteorological data is available for some health outcomes, this data is currently not being fully integrated due to limited resources and limited in-country capacity.

Emergency preparedness

Climate hazard	Early warning system in place?	Health sector response plan in place?	Health sector response plan includes meteorological information?
Heat waves	✗	✗	N/A
Storms (e.g. hurricanes, monsoons, typhoons)	✓	O	O
Flooding	N/A	N/A	N/A
Drought	✓	✗	N/A

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

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 to 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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Most estimates and projections provided in this document have been derived using standard categories and methods to enhance their cross-national comparability. As a result, they should not be regarded as the nationally endorsed statistics of Member States which may have been derived using alternative methodologies. Published official national statistics, if presented, are cited and included in the reference list.

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