

GRENADA



HEALTH & CLIMATE CHANGE COUNTRY PROFILE 2020

Small Island Developing States Initiative



United Nations
Framework Convention on
Climate Change



PAHO

CONTENTS

1 EXECUTIVE SUMMARY

2 KEY RECOMMENDATIONS

3 BACKGROUND

4 CLIMATE HAZARDS RELEVANT FOR HEALTH

8 HEALTH IMPACTS OF CLIMATE CHANGE

12 HEALTH VULNERABILITY AND ADAPTIVE CAPACITY

14 HEALTH SECTOR RESPONSE: MEASURING PROGRESS

Acknowledgements

This document was developed in collaboration with the Ministry of Health, who together with the World Health Organization (WHO), the Pan American Health Organization (PAHO), and the United Nations Framework Convention on Climate Change (UNFCCC) gratefully acknowledge the technical contributions of the Ministry of Finance, Economic Development, Energy and Foreign Trade; United Nations Development Programme; National Disaster Management Agency; Ministry of Agriculture, Forestry and Fisheries; Grenada Meteorological Office; and St. George's University. Financial support for this project was provided by the Norwegian Agency for Development Cooperation (NORAD).

“The Government of Grenada and the citizens are taking concrete actions to build Grenada’s resilience to climate change events.”

— *National Climate Change Adaptation Plan, 2017–2021*



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 may be exacerbated by climate change. Some of the nations at greatest risk are 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, World Health Organization (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 23rd Conference of the Parties (COP23) to the UNFCCC, held 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, however, that, in order to protect the most vulnerable from climate risks and to gain the health co-benefits

of mitigation policies, building resilience must happen in parallel with the reduction of carbon emissions by countries around the world.

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 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 October 2018, ministers of health gathered in Grenada to develop a Caribbean 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 Grenada provides a summary of available evidence on climate hazards, health vulnerabilities, health impacts and progress to date in health sector efforts to realize a climate-resilient health system.

KEY RECOMMENDATIONS

1 DEVELOP THE INSTITUTIONAL STRUCTURE FOR LEADERSHIP AND GOVERNANCE OF MULTISECTORAL HEALTH AND CLIMATE CHANGE ACTIONS

Institutional structures for developing and coordinating health co-benefits programmes need to be further developed and formalized between the Ministry of Health and individual ministries of different sectors. Establishing an institutionalized governance mechanism is recommended in the Caribbean Action Plan as essential to ensure integrative, deliberate, and sustainable responses. This should also focus on developing a national health and climate change policy to create a supportive environment for developing and implementing health co-benefit actions.

2 DEVELOP A NATIONAL CURRICULUM TO FACILITATE HEALTH AND CLIMATE CHANGE EDUCATION USING AN ECOLOGICAL APPROACH

Education is essential to understanding climate change impacts and appropriate responses. Educational programmes should be incorporated into schools' curriculum, targeting young children, alongside public education. A national curriculum will ensure that the population is targeted along important demographic lines and at critical points.

3 IMPROVE AND EXPAND RISK SURVEILLANCE AND EARLY WARNING SYSTEMS

Creating a knowledge management mechanism for development will contribute to generating and disseminating information on climate-related hazards and risks for the general population. The District Health Information Software (DHIS-2) should be activated as the data collection platform to facilitate health and climate change cross-analysis and dissemination. The system should include the capability to detect multiple hazards, as well as develop an integrated and advanced warning system for vulnerable areas. Training and system tools should be provided to enable continuous data collection from national, regional, and international sources, including meteorological data, analysis and dissemination.

4 IMPROVE RESILIENCE OF HEALTH SECTOR INFRASTRUCTURE AND OPERATIONS

The SMARTing of health care facilities is important to ensure safe and efficient operation. Expansion of the SMART project to include all facilities across the island, including private facilities, will ensure continuity of health services that are responsive to the immediate needs of the population. Health facilities should be upgraded so they can withstand climate-related events. Greening of the facilities should also be targeted to reduce carbon emissions.

5 ADDRESS BARRIERS TO ACCESSING INTERNATIONAL CLIMATE CHANGE FINANCE TO SUPPORT HEALTH ADAPTATION

Financial and technical resources will be secured to develop the climate change mitigation-adaptation project portfolio and local human resource capacity to design projects. This includes providing training and coaching to craft projects addressing mitigation-adaptation gaps identified in the Climate Risk and Vulnerability Assessment Report. Alignment of the projects with the National Climate Change Policy (2017) is essential to secure governmental and public support.

WHO RESOURCES TO SUPPORT ACTION ON THESE KEY RECOMMENDATIONS:

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

BACKGROUND

Grenada is a small tri-island state in the Eastern Caribbean (1). The island lies in the southern belt which has a hurricane season from June to November (2). A mountainous central range stretches from north to south with settlements in the flatter areas and along the coastline. Grenada's economy is primarily driven by tourism while agriculture has declined from being the traditional mainstay (3).

Climatic conditions are significant for the economic and physical well-being of Grenada's population, and vulnerabilities to a changing climate have the potential for both direct and indirect impacts on health (4). While susceptible to long-term climate impacts such as sea level rise and changes in precipitation, Grenada was historically at low risk of tropical storms compared to other Caribbean islands. The need to ensure resilience of the island's infrastructure and health system to extreme weather events became evident with the passages of hurricanes Ivan and Emily in 2004 and 2005, respectively (5). An unprecedented drought in 2010 as well as increasing events of flooding and forest fires highlight the need for affirmative actions for food and nutrition security. The distribution of disease vectors and non-communicable diseases continue to be priority areas for public health (5).

In its Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), the health sector was identified as being particularly vulnerable to the impacts of climate change (2). The health vulnerability and adaptation assessment identified vulnerable groups to the impacts of climate change, including women, children, elderly people and low-income families (5). This has led the Government and people of Grenada to take concrete actions to build health sector resilience to climatic events.

HIGHEST PRIORITY CLIMATE-SENSITIVE HEALTH RISKS FOR GRENADA

Direct effects	
Health impacts of extreme weather events	✓
Heat-related illness	✓
Indirect effects	
Water security and safety (including waterborne diseases)	✓
Food security and safety (including malnutrition and foodborne diseases)	✓
Vector-borne diseases	✓
Air pollution	✓
Allergies	✓
Diffuse effects	
Mental/psychosocial health	✓
Noncommunicable diseases	✓
Mitigation actions to reduce emissions through sustainable procurement	
Mitigation measures to reduce emissions of health facilities	✓
Mitigation measures by coordinating with other sectors	✓

Source: Adapted and updated from the PAHO Health and Climate Country Survey 2017 (6).

CLIMATE HAZARDS RELEVANT FOR HEALTH

Climate hazard projections for Grenada

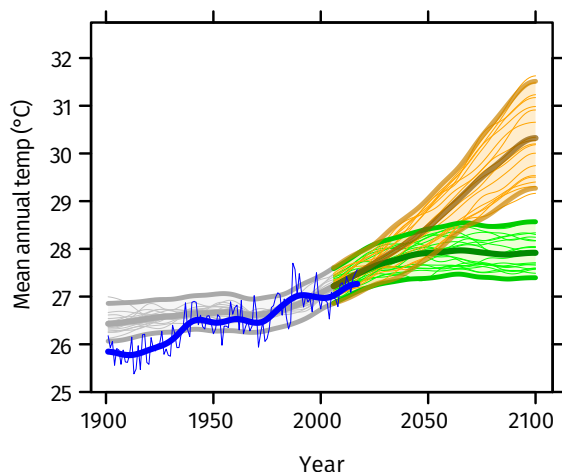
Country-specific projections are outlined up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions (see Figures 1–5).

The climate model projections given 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

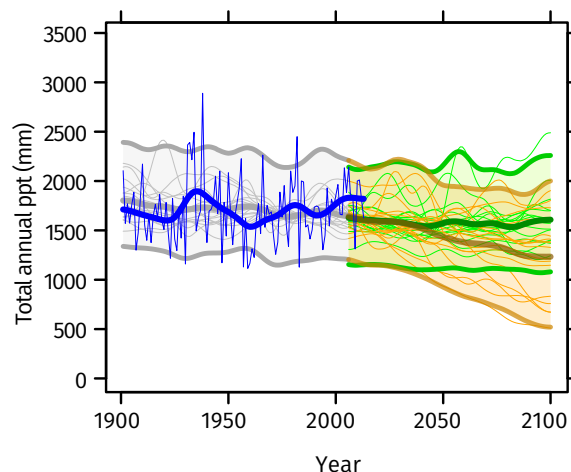
FIGURE 1: Mean annual temperature, 1900–2100



Under a high emissions scenario, the mean annual temperature is projected to rise by about 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. Total annual precipitation is projected to decrease by about 24% on average under a high emissions scenario, although the uncertainty range is large (-55% to +5%). If emissions decrease rapidly there is little projected change on average: a decrease of 6% with an uncertainty range of -22% to +7%.

Decrease in total precipitation

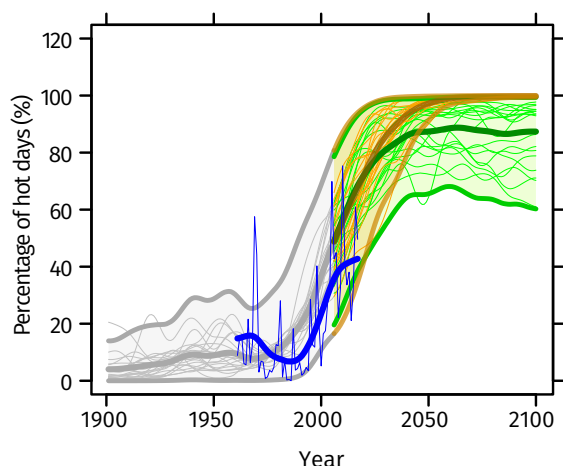
FIGURE 2: Total annual precipitation, 1900–2100



Total annual precipitation is projected to decrease by about 22% on average under a high emissions scenario, although the uncertainty range is large (-52% to +3%). If emissions decrease rapidly there is little projected change on average: a decrease of 5% with an uncertainty range of -15% to +5%. Under a high emissions scenario, the proportion of total annual rainfall from very wet days^e (about 30% for 1981–2010) could decrease a little by the end-of-century (to around 25% on average with an uncertainty range of about 5% to 45%), with little change if emissions decrease rapidly. Total annual rainfall is projected to decrease.

More high temperature extremes

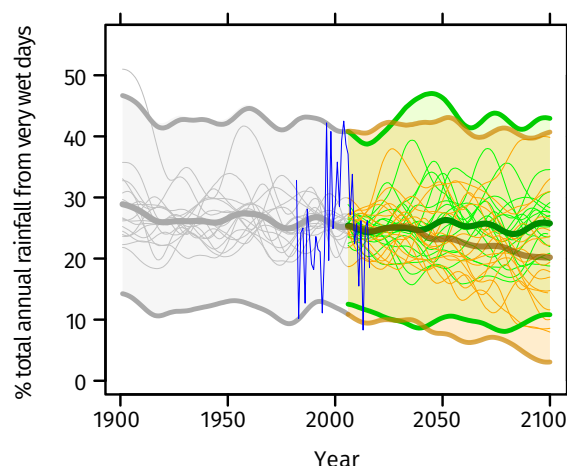
FIGURE 3: Percentage of hot days ('heat stress'), 1900–2100



The percentage of hot days^d is projected to increase substantially from about 23% of all observed 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, almost 90% of days on average are 'hot'. Note that the models tend to overestimate the observed increase in hot days (about 30% of days on average in 1981–2010 rather than 23%). Similar increases are seen in hot nights (not shown).

Little change in extreme rainfall

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

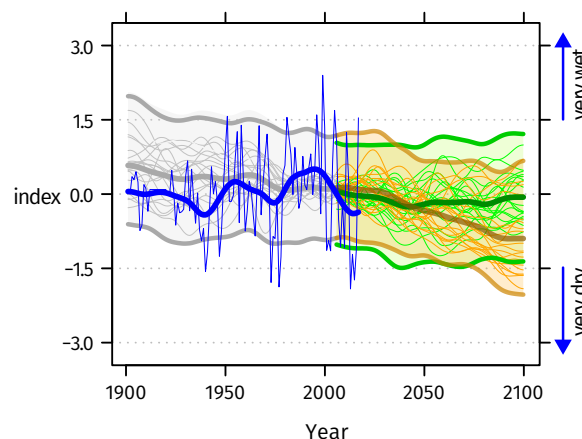


Under a high emissions scenario, the proportion of total annual rainfall from very wet days^e (about 30% for 1981–2010) could decrease a little by the end-of-century (to around 25% on average with an uncertainty range of about 5% to 45%), with little change if emissions decrease rapidly. Total annual rainfall is projected to decrease (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).

Under a high emissions scenario, SPI12 values are projected to decrease to about -0.8 on average by the end of the century (2071–2100), with a number of models indicating substantially larger decreases and hence more frequent and/or intense drought. Year-to-year variability remains large with wet episodes continuing to occur into the future.^f



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 and total precipitation is from CRU-TSv3.26. Observed historical records of extremes are from JRA55 for temperature and from GPCP-FDD for precipitation.

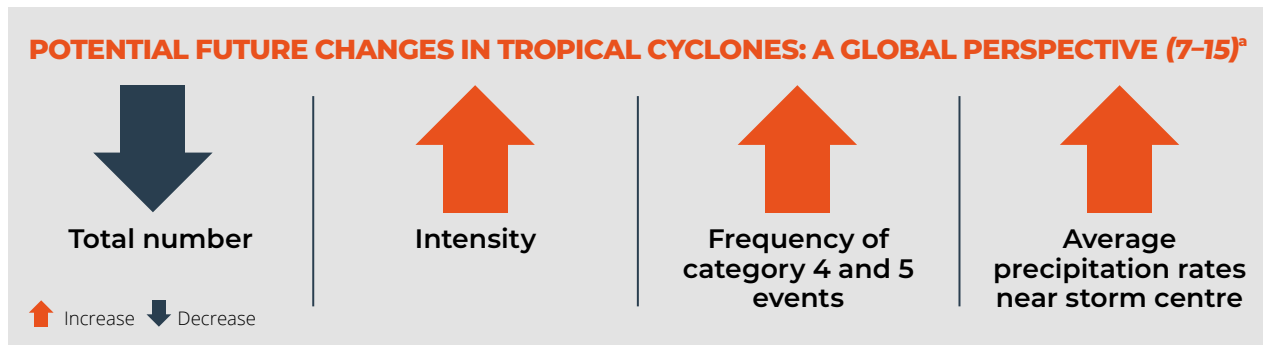
^d A 'hot day' ('hot night') is a day when maximum (minimum) temperature exceeds the 90th percentile threshold for that time of the year.

^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 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). It is probable 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 (7–15).^a



Compared to other Caribbean countries, Grenada was historically at low risk of tropical storms. Since 1955, no major hurricanes affected the island until the passages of hurricanes Ivan and Emily, 10 months apart, in 2004 and 2005, respectively. The total damage from Hurricane Ivan alone was estimated at Eastern Caribbean dollars (XCD) 2.4 billion, twice the value of Grenada's gross domestic product (16). Grenada's location within the Atlantic Ocean's hurricane track could further increase its vulnerability to catastrophic climatic events (16). Hurricane intensity is projected to increase an average 8% for every 1°C rise in the sea surface temperature (17). The official season in Grenada for tropical cyclones is between June and November (2).

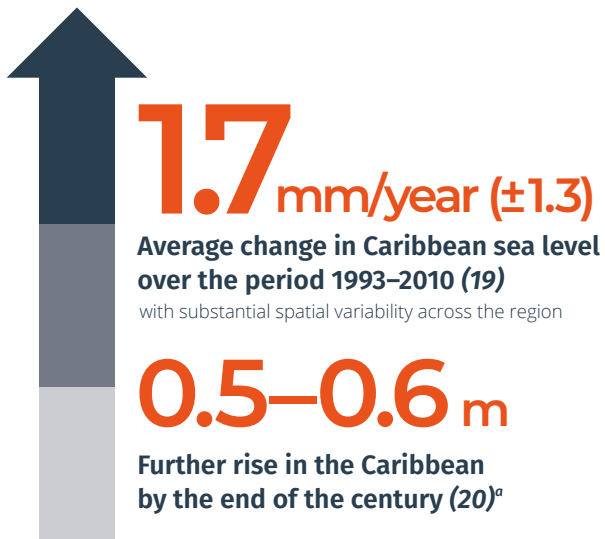
Major event	Year	Number of people affected	Financial loss
Rainstorm	1946	15 persons killed, 13 houses washed away	...
Hurricane Janet	1955	120 persons killed, 6000 dwellings totally destroyed	95% of nutmeg and coconut trees were uprooted
Tropical storm	1975	6 casualties	...
Heavy rain	1975	...	US\$ 4.7 million in losses
Storm (Hurricane Allen)	1980	...	US\$ 5.3 million in losses
Tropical Storm Arthur	1990	1000 people affected	...
Hurricane Lenny	1999	210 people affected	US\$ 5.5 million in damages, 27% of GDP
Tropical Storm Earl	2004	34 houses damaged	...
Hurricane Ivan	2004	39 casualties, 81 553 people affected	Over US\$ 889 million
Hurricane Emily	2005	1 casualty, 1660 persons in shelters	...

Source: Caribbean Handbook on Risk Information Management (18).

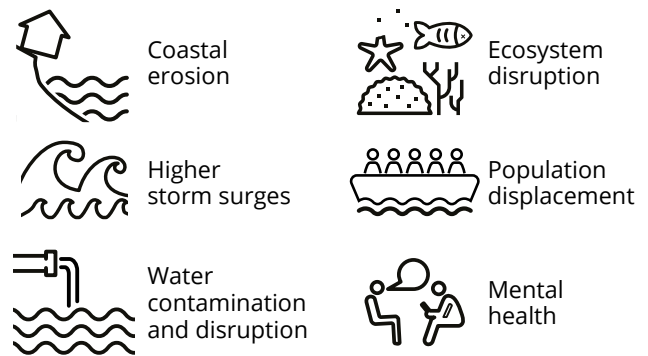
^a Information and understanding about tropical cyclones (including hurricane and typhoons) from observations, theory and climate models has improved in the past few years. It is difficult to make robust projections for specific ocean basins or for changes in storm tracks. Presented here is a synthesis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

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 (19,20). A 0.5 m rise in sea level could lead to 60% of beaches in some areas of Grenada being lost (21).^a



Impacts of sea level rise include



^a Estimates of mean net regional sea level change were evaluated from 21 CMIP5 models and include regional non-scenario components (adapted from WGI AR5 Figure 13-20). The range given is for RCP4.5 annual projected change for 2081-2100 compared to 1986-2005.

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

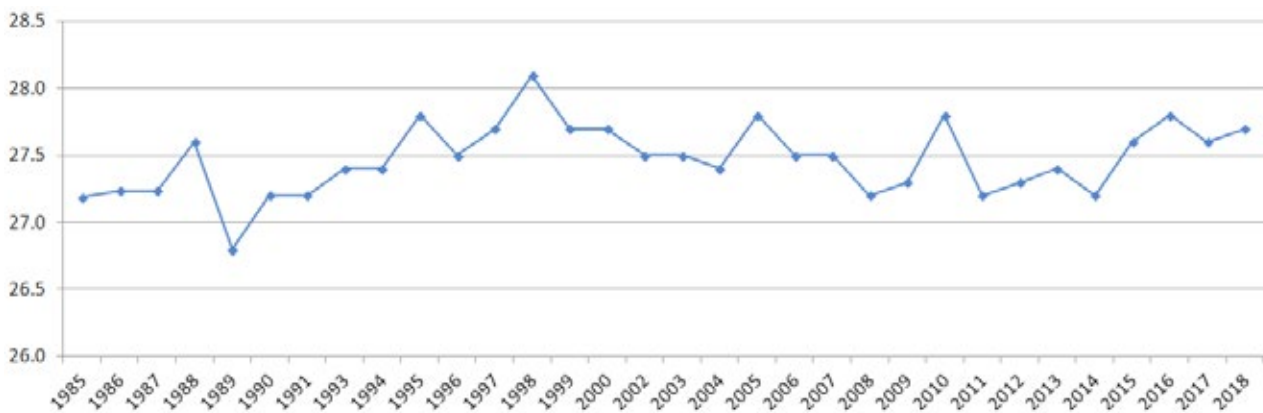
Heat stress impacts include:

- 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.

FIGURE 6: Average annual temperature as recorded at the meteorological office at Point Salines in Grenada for the period 1985–2018^a



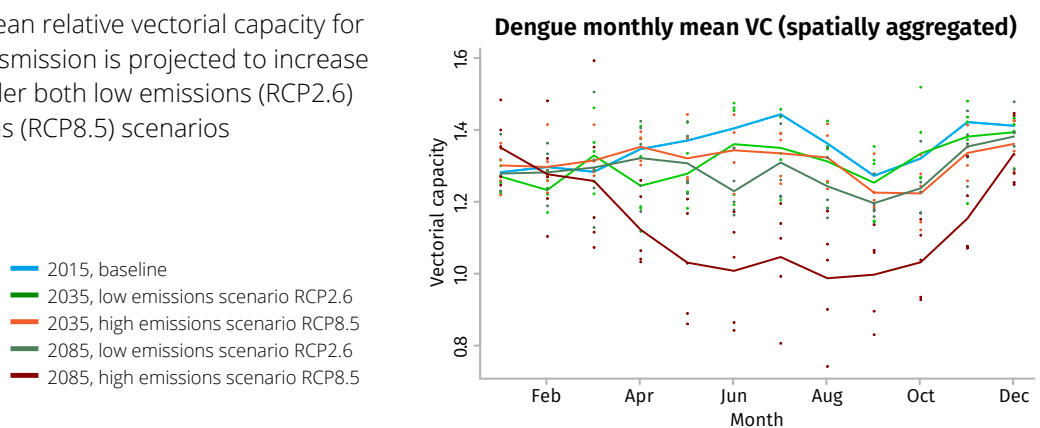
^a The data from the meteorological office at Maurice Bishop International Airport in Grenada show a slight increase in temperature from 1985 to 2017 (22).

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 (23,24).

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. Figure 7 presents modelled estimates for Grenada of the potential risk of dengue fever transmission under high and low emission scenarios.^a The seasonality and prevalence of dengue transmission may change with future climate change, but Grenada is consistently highly suitable for dengue transmission under all scenarios and thus vulnerable to outbreaks (25–28).^{b,c}

FIGURE 7: The mean relative vectorial capacity for dengue fever transmission is projected to increase towards 2070 under both low emissions (RCP2.6) and high emissions (RCP8.5) scenarios



^a A suite of mathematical models was systematically developed, then applied and interpreted by a team of researchers at Umeå University (Sweden) to assess the potential for mosquito-borne disease outbreaks (e.g. dengue, chikungunya, Zika and malaria) in terms of climate-dependent VC. The baseline year is 2015, Climatic Research Unit CRU-TSv4.01. Future projections are represented for two emissions futures (Representative Concentration Pathways: RCP2.6, RCP8.5), five climate change projections (Global Climate Models: gfdlesm2m, hadgem2-es, ipsl-cm5a-lr, miroc-esm-chem, noresm1-m). (2018) Umeå University, Sweden.

^b Given the climate dependence of transmission cycles of many vector-borne diseases, seasonality of epidemic risk is common; however, many SIDS, due to tropical latitudes, tend to have less seasonality than more temperate areas.

^c The actual occurrences/severity of epidemics would be quite different for each disease in each setting and could depend greatly on vector- and host-related transmission dynamics, prevention, surveillance and response capacities that are not captured in this model.

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 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 GRENADA

64.7

Healthy life expectancy (2016) (29)

25.2%

Adult population considered **undernourished** (2015) (30)

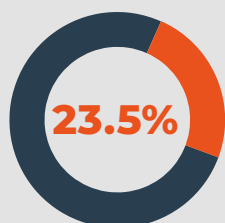
20.2%

Adult population considered **obese** (2016) (31)

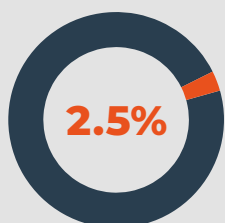
9.8%

Prevalence of **diabetes** in the adult population (2014) (32)

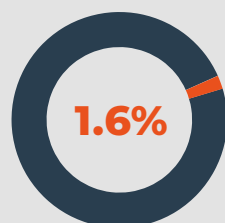
MOTHER AND CHILD HEALTH



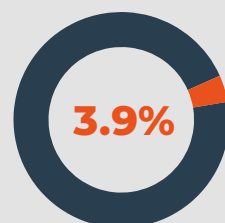
Iron deficiency anaemia in women of reproductive age (2016) (33)



Wasting in children under five years of age (2014) (34)

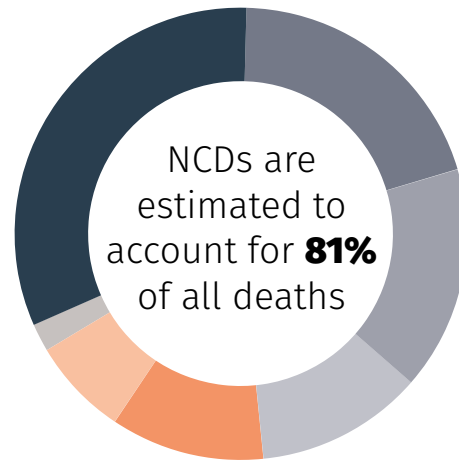
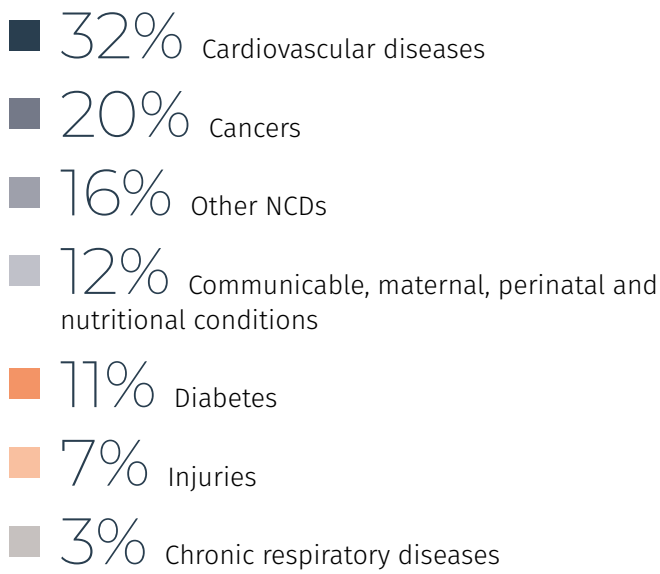


Stunting in children under five years of age (2018) (35)



Overweight in children under five years of age (2004) (34)

FIGURE 8: Proportional mortality in Grenada by noncommunicable diseases (34)



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 (N/A) (36)

N/A

3. GOOD HEALTH AND WELL-BEING



72

Universal Health Coverage
Service Coverage Index (2017)^a (37)

5.2%

Current health expenditure as percentage of gross domestic product (GDP) (2016) (38)

16.7

Under-five mortality rate (per 1000 live births) (2017) (39)

6. CLEAN WATER AND SANITATION



Proportion of total population using at least basic drinking-water services (2015)^b (34)

97%

Proportion of total population using at least basic sanitation services (2017)^b (40)

91%



13. CLIMATE ACTION

Total number of weather-related disasters recorded between 2000 and 2018^c (18)

8

Highest total number of persons affected by a single weather-related disaster between 2000 and 2018^c (2018)(18)

81 553

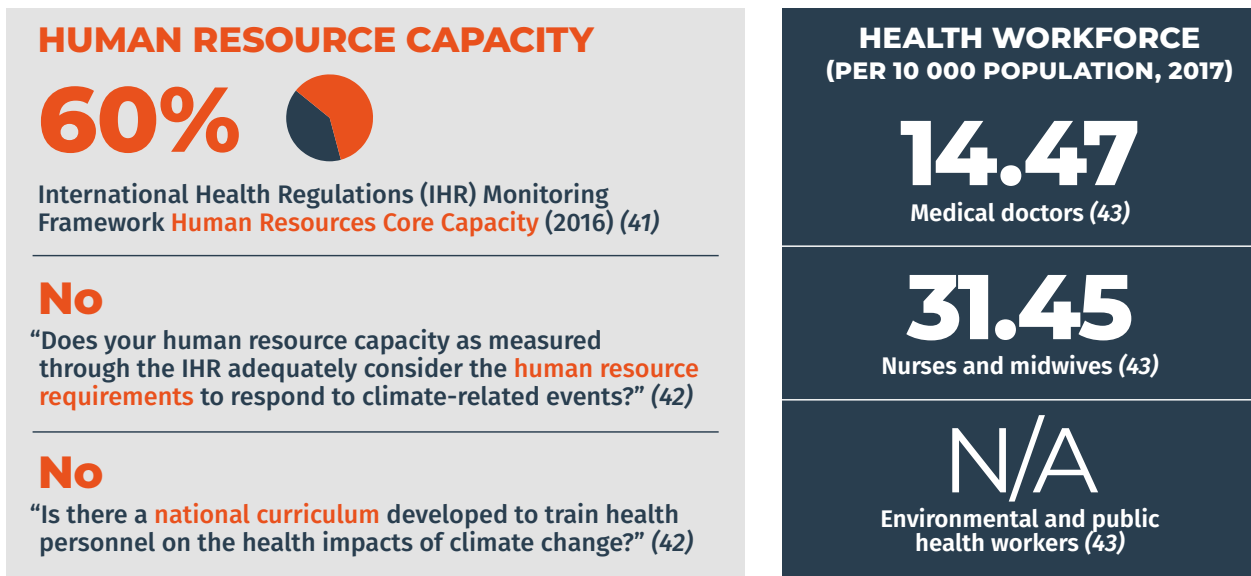
^a The index is based on low data availability. Values greater than or equal to 80 are presented as ≥ 80 as the index does not provide fine resolution at high values; 80 should not be considered a target.

^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.

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

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 the provision of services. Increased risks of climate-sensitive diseases will 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.



^a See SMART Hospitals Toolkit - Health care facilities are smart when they link their structural and operational safety with green interventions, at a reasonable cost-to-benefit ratio. https://www.paho.org/disasters/index.php?option=com_content&view=article&id=1742:smart-hospitals-toolkit&Itemid=1248&lang=en

HEALTH SECTOR RESPONSE: MEASURING PROGRESS

The following section measures progress in the health sector in responding to climate threats based on country reported data collected in the 2018 WHO health and climate country survey (42). 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		X
Title: N/A		
Year: N/A		
Content and implementation		
Are health adaptation priorities identified in the strategy/plan?		N/A
Are the health co-benefits of mitigation action considered in the strategy/plan?		N/A
Performance indicators are specified		N/A
Level of implementation of the strategy/plan		N/A
Current health budget covers the cost of implementing the strategy/plan		N/A

✓=yes, X=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).

National progress

The National Adaptation Plan (NAP) 2018–2028 is the overarching strategic document to guide in the development of sector-specific implementation of mitigation–adaptation plans. For the health sector, an H-NAP will be developed, including the specific strategies to address potential and current climate change impacts on the sector. Grenada’s National Designated Authority (NDA), in collaboration with the Ministry of Health, will prepare a concept note for the development of the H-NAP.

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?^a


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

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

^a 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: Grenada Climate Change and Health Vulnerability and Adaptation Assessment																
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?																
<table border="0"> <tr> <td style="padding-right: 20px;">Policy prioritization</td> <td style="border: 1px solid black; background-color: #f4a460; width: 20%;"></td> <td style="border: 1px solid black; width: 20%;"></td> <td style="border: 1px solid black; width: 20%;"></td> <td style="border: 1px solid black; width: 20%;"></td> </tr> <tr> <td>Human and financial resource allocation</td> <td style="border: 1px solid black; background-color: #f4a460; width: 20%;"></td> <td style="border: 1px solid black; width: 20%;"></td> <td style="border: 1px solid black; width: 20%;"></td> <td style="border: 1px solid black; width: 20%;"></td> </tr> <tr> <td></td> <td style="text-align: center;">None</td> <td style="text-align: center;">Minimal</td> <td style="text-align: center;">Somewhat</td> <td style="text-align: center;">Strong</td> </tr> </table>	Policy prioritization					Human and financial resource allocation						None	Minimal	Somewhat	Strong	
Policy prioritization																
Human and financial resource allocation																
	None	Minimal	Somewhat	Strong												
	Level of influence of assessment results															

Implementation: Preparedness for climate risks

Integrated risk monitoring and early warning

Climate-sensitive diseases and health outcomes	Monitoring system 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)	✗	✗	✗
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 monitoring 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.

Emergency preparedness

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

✓=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: EDF, DFID and GIZ

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	

REFERENCES

1. Grenada. Health in the Americas, 2012 Edition: Country Volume. Pan American Health Organization, 2012.
2. Grenada's initial communication to the UNFCCC. St. George's: Government of Grenada; 2000 (<https://unfccc.int/resource/docs/natc/grnnc1.pdf>, accessed 03 September 2020).
3. Campo KRK, Robinson A, Isaac WAP, Ganpat W. Connecting small farmers in the Caribbean to knowledge, networks, and institutions through ICTs. *Journal of Agricultural and Food Information*. 2017;18:81–95.
4. Strategic plan for health, 2016–2025. St. George's: Ministry of Health and Social Security, Government of Grenada; 2016 (http://www.gov.gd/moh/ced/mofa/sites/moh/files/grenada_health_sector_strategic_plan_2016-2015_approved.pdf, accessed 03 September 2020).
5. Grenada climate change and health vulnerability and adaptation assessment. Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); 2016 (http://www.iccas.gd/sites/default/files/resources/VA%20Grenada_Formatted_GIZ_FinalApril.pdf, accessed 03 September 2020).
6. PAHO (2017). Health and Climate Country Survey.
7. Bender M, Knutson T, Tuleya R, Sirutis J, Vecchi G, Garner S et al. Modeled impact of anthropogenic warming on the frequency of intense Atlantic hurricanes. *Science (New York)*. 2010;327:454–8.
8. Christensen JH, Krishna Kumar K, Aldrian E, An S-I, Cavalcanti IFA, de Castro M et al. Climate phenomena and their relevance for future regional climate change. In: Stocker TF, Qin D, Plattner G-K, Tignor M, Allen SK, Boschung J et al., editors. *Climate change 2013: the physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge and New York: Cambridge University Press; 2013.
9. Knutson TR, Sirutis JJ, Zhao M, Tuleya RE, Bender M, Vecchi GA et al. Global projections of intense tropical cyclone activity for the late twenty-first century from dynamical downscaling of CMIP5/RCP4.5 scenarios. *J Clim*. 2015;28:7203–24.
10. Kossin JP, Emanuel KA, Vecchi GA. The poleward migration of the location of tropical cyclone maximum intensity. *Nature*. 2014;509:349–52. doi: 10.1038/nature13278.
11. Kossin JP. A global slowdown of tropical-cyclone translation speed. *Nature*. 2018;558:104–8.
12. Sobel AH, Camargo SJ, Hall TM, Lee CY, Tippett MK, Wing AA. Human influence on tropical cyclone intensity. *Science*. 2016;353:242–6. doi: 10.1126/science.aaf6574.
13. Sugi M, Murakami H, Yoshida K. Projections of future changes in the frequency of intense tropical cyclones. *Clim Dyn*. 2017;49:619–32.
14. Walsh KJE, McBride JL, Klotzbach PJ, Balachandran S, Camargo SJ, Holland G et al. Tropical cyclones and climate change. *WIREs Climate Change*. 2016;7:65–89.
15. Yoshida K, Sugi M, Mizuta R, Murakami H, Ishii M. Future changes in tropical cyclone activity in high-resolution large-ensemble simulations. *Geophysical Res Lett*. 2017;44:9910–17.
16. National climate change adaptation plan for Grenada, Carriacou and Petite Martinique (2017–2021). St. George's: Government of Grenada; 2017 (https://www4.unfccc.int/sites/NAPC/Documents/Parties/Grenada_National%20Climate%20Change%20Policy%202017-2021.pdf, accessed 03 September 2020).
17. National climate change policy for Grenada, Carriacou and Petite Martinique, 2017–2021. St. George's: Government of Grenada; 2017.
18. Caribbean Handbook on Risk Information Management. ACP-EU natural disaster risk reduction program [website]; 2016 (<http://www.charim.net/grenada/historical>, accessed 13 July 2020).
19. Torres RR, Tsimplis MN. Sea-level trends and interannual variability in the Caribbean Sea. *Journal of Geophysical Research: Oceans*. 2013;118:2934–47.
20. Nurse LA, McLean RF, Agard J, Briguglio LP, Duvat-Magnan V, Pelesikoti N et al. Small islands. In: Barros VR, Field CB, Dokken DJ, Mastrandrea MD, Mach KJ, Bilir TE et al., editors. *Climate Change 2014: Impacts, adaptation, and vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press; 2014: pp. 1613–54 (https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartB_FINAL.pdf, accessed 03 September 2020).
21. Climate Change, Small Island Developing States. Bonn: Climate Change Secretariat (UNFCCC); 2005 (https://unfccc.int/resource/docs/publications/cc_sids.pdf, accessed 13 July 2020).
22. Meteorological Office at Maurice Bishop International Airport, Grenada [website] (<https://gaa.gd/grenada-meteorological-office/>, accessed 03 September 2020).
23. Atlas of health and climate [website]. Geneva: World Health Organization and World Meteorological Organization; 2012 (<https://www.who.int/globalchange/publications/atlas/report/en/>, accessed 03 September 2020).
24. Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. In: Hales S, Kovats S, Lloyd S, Campbell-Lendrum D, editors. *World Health Organization; 2014* (https://apps.who.int/iris/bitstream/handle/10665/134014/9789241507691_eng.pdf?sequence=1&isAllowed=y, accessed 03 September 2020).
25. Quam, Mikkel B. Imported infections' importance: global change driving dengue dynamics [dissertation]. Umeå: Umeå University; 2016 (<https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A914952&dswid=7070>, accessed 03 September 2020).
26. Liu-Helmersson J. Climate change, dengue and Aedes mosquitoes: past trends and future scenarios [dissertation]. Umeå: Umeå University; 2018 (<http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1172083&dswid=9830>, accessed 03 September 2020).
27. Liu-Helmersson J, Quam M, Wilder-Smith A, Stenlund H, Ebi K, Massad E et al. Climate change and Aedes vectors: 21st century projections for dengue transmission in Europe. *EBioMedicine*. 2016;7:267–77. doi: 10.1016/j.ebiom.2016.03.046.
28. Rocklöv J, Quam MB, Sudre B, German M, Kraemer MU, Brady O et al. Assessing seasonal risks for the introduction and mosquito borne spread of Zika virus in Europe. *EBioMedicine*. 2016;9:250–6. doi: 10.1016/j.ebiom.2016.06.009.
29. Global Health Observatory data repository. Healthy life expectancy (HALE) at birth [website]. Geneva: World Health Organization; 2019 (https://www.who.int/gho/mortality_burden_disease/life_tables/hale/en/, accessed 13 July 2020).
30. PAHO/WHO data – Visualization. PLISA health information platform for the Americas. Washington D.C.: Pan American Health Organization; 2018 (<https://www.paho.org/data/index.php/en/indicators/visualization.html>, accessed 13 July 2020).
31. Global Health Observatory data repository. Prevalence of obesity among adults, BMI ≥30, crude estimates by country. Geneva: World Health Organization; 2017 (<http://apps.who.int/gho/data/node.main.BMI30C?lang=en>, accessed 13 July 2020).
32. Global report on diabetes. Geneva: World Health Organization; 2016 (https://apps.who.int/iris/bitstream/handle/10665/204871/9789241565257_eng.pdf?sequence=1, accessed 13 July 2020).
33. Global Health Observatory. Prevalence of anaemia in women [website]. Geneva: World Health Organization; 2019 (<http://apps.who.int/gho/data/node.main.ANEMIA3?lang=en>, accessed 13 July 2020).
34. Health in the Americas [website]. Washington D.C.: Pan American Health Organization (https://www.paho.org/salud-en-las-americas-2017?page_id=125, accessed 13 July 2020).
35. Pre-school nutrition survey. St. George's: Grenada Food and Nutrition Council; 2018.
36. Poverty data [website]. Washington D.C.: World Bank Group; 2019 (<https://data.worldbank.org/topic/poverty>, accessed 13 July 2020).
37. Global Health Observatory, Universal health coverage portal [website]. Geneva: World Health Organization; 2017 (<http://apps.who.int/gho/portal/uhcoverview.jsp>, accessed 13 July 2020).
38. Global Health Expenditure Database [website]. Geneva: World Health Organization; 2019 (<https://apps.who.int/nha/database>, accessed 13 July 2020).
39. UN Inter-agency Group for Child Mortality Estimation. Child mortality estimates. New York: United Nations Children's Fund; 2018 (<http://www.childmortality.org>, accessed 13 July 2020).
40. WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). Geneva/New York: World Health Organization/United Nations Children's Fund; 2019 (<https://washdata.org/data>, accessed 13 July 2020).
41. International Health Regulations (2005) Monitoring Framework. State Party Self-Assessment Annual Reporting tool (e-SPAR). Geneva: World Health Organization; 2019 (<https://extranet.who.int/e-spar>, accessed 13 July 2020).
42. WHO Climate and Health Country Survey as part of the WHO UNFCCC Health and Climate Change Country Profile Initiative [website]. Geneva: World Health Organization; 2018 (<https://www.who.int/globalchange/resources/countries/en/>, accessed 04 September 2020).
43. WHO Global Health Workforce Statistics, December 2018 update [website]. Geneva: World Health Organization; 2018 (<http://www.who.int/hrh/statistics/hwfstats/>, accessed 14 May 2019).
44. Ministry of Health, Government of Grenada [website] (<http://www.gov.gd/moh/>, accessed 04 September 2020).

WHO/HEP/ECH/CCH/20.01.05

© World Health Organization and the United Nations Framework Convention on Climate Change, 2020

Some rights reserved. This work is available under the CC BY-NC-SA 3.0 IGO licence

All reasonable precautions have been taken by WHO and UNFCCC to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO and UNFCCC be liable for damages arising from its use.

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.

Design by Inis Communication from a concept by N. Duncan Mills

Photos: Cover: Lee Coursey, Flickr – Attribution 2.0 Generic (CC BY 2.0). Pages 1 and 7: Grenada Ministry of Health. Page 11: Shutterstock.