DOMINICA

HEALTH & CLIMATE CHANGE

COUNTRY PROFILE 2020

Small Island Developing States Initiative

World Health Organization

United Nations Framework Convention on Climate Change

Pan American Health Organization World Health Organization PAHO

CONTENTS

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Ministry of Health and Social Services	Dr David Johnson, Chief Medical Officer
Environmental Health Department	Sylvester St Ville, Senior Environmental Health Officer and staff
Dominica Red Cross	Sandra Charter-Rolle
Office of Disaster Management	Fitzroy Pascal
Health Information Unit	Ghislene Paul
National Centre for Testing Excellence (Bureau of Standards)	Lisa Sandy, Lab Supervisor, Microbiology
Green Climate Fund National Programme Coordinator, Ministry of Planning and Economic Development	Michael Savarin
Climate Resilience Execution Agency of Dominica – CREAD	Colin Scaife Glen Laville
Pan American Health Organization	Caroline Allen, Consultant Anneke Wilson, Country Program Specialist Karen Polson-Edwards, Advisor, Climate Change and Environmental Determinants of Health

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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, the 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 the Commonwealth of Dominica 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 AND IMPLEMENT A HEALTH AND CLIMATE CHANGE STRATEGY/ PLAN FOR DOMINICA

Develop a national health and climate change plan, including a Health National Adaptation Plan (H-NAP), ensuring that adaptation priorities are specified, health co-benefits from mitigation and adaptation measures are considered, necessary budget requirements are allocated and regular monitoring and review of progress will support its full implementation.

2 STRENGTHEN INTEGRATED RISK SURVEILLANCE AND EARLY WARNING SYSTEMS

Expand upon existing health monitoring and surveillance systems, ensuring meteorological information is integrated. Dominica is expected to be affected by a range of health threats due to climate change, including heat stress, nutrition challenges, and mental health and well-being issues, which should be added to existing risk surveillance and early warning systems. The system should have the capacity to measure environmental risk. The purpose will be to develop a comprehensive monitoring and surveillance system, linking climate with health information, permitting early warning and tailored responses to health outcomes of climate change and their environmental determinants. Strengthening of environmental risk measurement will also assist in diagnosis and medical treatment.

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

No international funding is currently being accessed to aid with health and climate change initiatives. Additional funding would help to further the development and implementation of policies and to expand risk surveillance and early warning systems.

4 BUILD CLIMATE-RESILIENT HEALTH CARE FACILITIES

Measures can be taken 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; climate-resilient storage of medications; contingency planning and back-up systems for essential services (electricity, heating, cooling, ventilation, water supply, sanitation services, waste management and communications); strengthening transport routes and systems; and developing staff capacity to address climate-related risks in communities surrounding health care facilities. 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.

5 HEALTH WORKFORCE DEVELOPMENT

Community resilience can be enhanced by involving them actively in the design of health care facilities and services and, by strengthening their capacity for health care responses. Dominica State College and other national, regional and international educational institutions and technical support agencies should develop capacity in areas such as surveillance and reporting of climate-sensitive health conditions; computerization and dissemination of surveillance, monitoring and evaluation data; sampling and testing of environmental determinants of health; and environmental impact assessment and psychological support following disasters.

WHO RESOURCES TO SUPPORT ACTION ON THESE KEY RECOMMENDATIONS:

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

BACKGROUND

Dominica is a volcanic island located between the Caribbean Sea and Atlantic Ocean. It has a mountainous terrain, with 90% of Dominica's population of approximately 71 000 people living along the shore *(1–3)*. Dominica's natural park system protects much of the island's biodiversity and rainforests, and promotes eco-tourism. The country is colloquially known as the Nature Island of the Caribbean. Rain-fed agriculture, particularly banana, citrus and coconut production, is a significant proportion of Dominica's income, accounting for 17% of gross domestic product (GDP) and 14% of employment *(2,3)*. However, despite the fertility of the soil, much of Dominica's food consumption comes from imports, creating challenges to food security.

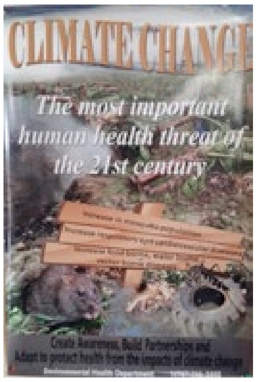
Climate change is projected to result in increased temperatures, rising sea levels, changing precipitation patterns, and more extreme weather events. Dominica is particularly vulnerable to climate change because so much of the population lives along the coast and the country's income is dependent upon agriculture and tourism. Threats to the health of the population include heat stress, food insecurity, vector-borne diseases, salt intrusion of fresh water aquifers, death and injury, and damage to environmental determinants of health from extreme weather events, and loss of marine and terrestrial habitats.

The Government of Dominica is committed to sustainability and established the Environmental Coordinating Unit in 1999. Dominica's nationally determined contribution (NDC) recognizes the climate risks posed to human health, especially via extreme weather events. The implementation of climate change policies is the joint responsibility of the Ministries of Health and Social Services, and Environment, providing excellent opportunities for maximizing health co-benefits of mitigation and health adaptation actions *(4)*.

HIGHEST PRIORITY CLIMATE-SENSITIVE HEALTH RISKS FOR DOMINICA

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 (5).*



Poster depicting climate and health links, by the Environmental Health Department, Dominica. This poster from the Dominica Ministry of Health and Social Services echoes the statement by the World Health Organization prior to the United Nations Climate Change Conference (COP-21) in Paris in December 2015, "Climate change is the greatest threat to global health in the 21st century." *(6)*

Photo credit: Dominica Ministry of Health and Social Services, 2018 *(7)*

CLIMATE HAZARDS RELEVANT FOR HEALTH

Climate hazard projections for Dominica

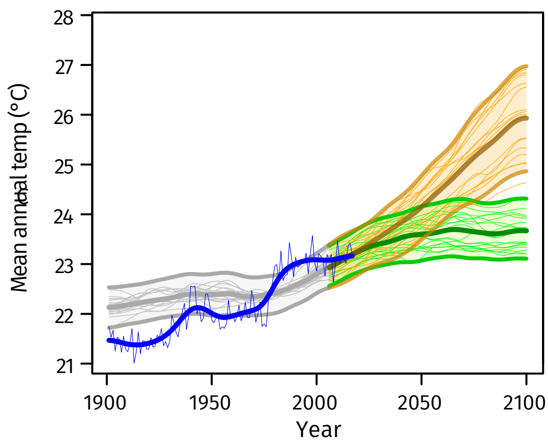
Country-specific projections are outlined up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions (see Figures 1–5).

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

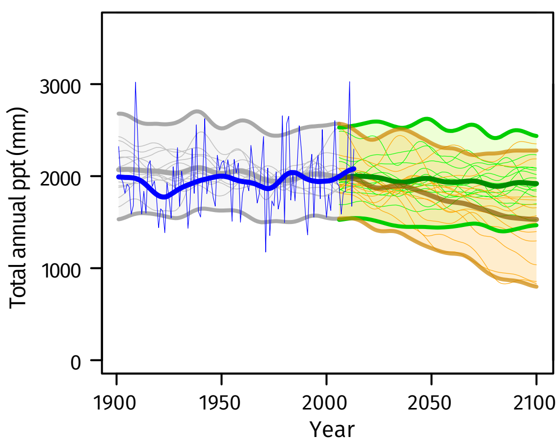
FIGURE 1: Mean annual temperature, 1900–2100



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.

Decreasing total precipitation

FIGURE 2: Total annual precipitation, 1900–2100



Total annual precipitation is projected to decrease by about 20% on average under a high emissions scenario, although the uncertainty range is large (-50% to +6%). If emissions decrease rapidly there is little projected change on average: a decrease of about 4% with an uncertainty range of -15% to +8%.

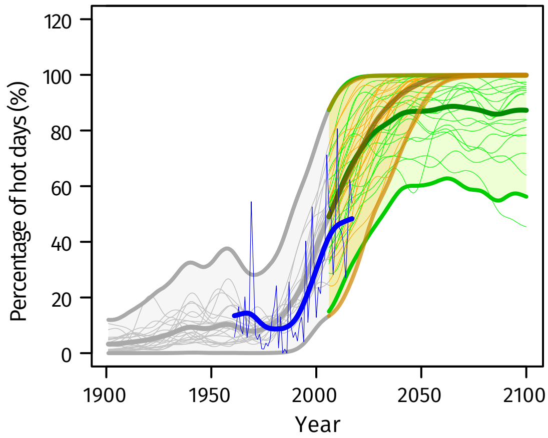
NOTES

[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.

More high temperature extremes

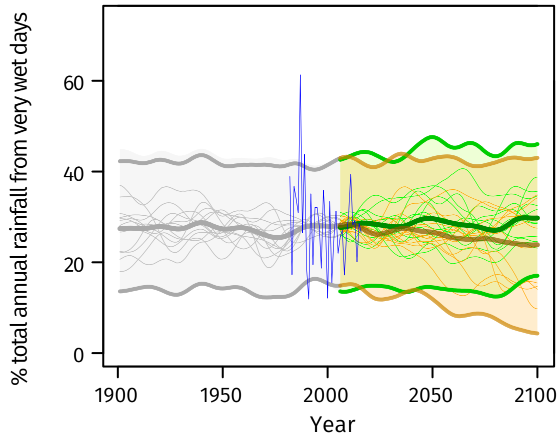
FIGURE 3: Percentage of hot days ('heat stress'), 1900–2100



The percentage of hot days[d] is projected to increase substantially from about 25% of all 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, about 85% 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 25%). Similar increases are seen in hot nights[d] (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

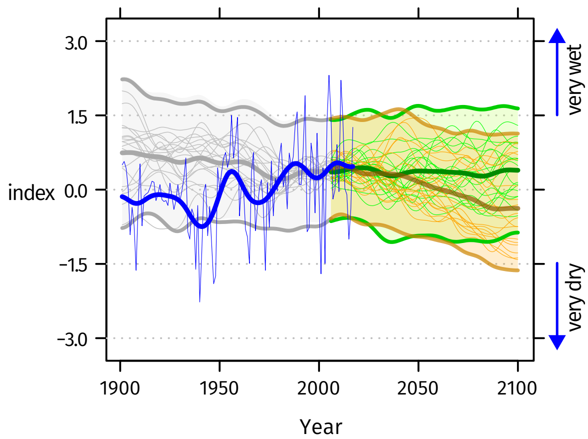


The proportion of total annual rainfall from very wet days[e] (about 28% for 1981–2010) could decrease a little by the end-of-century (to around 25% on average with an uncertainty range of about 5% to 40%), with little change if emissions decrease rapidly. Total annual rainfall is projected to decrease (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 -0.3 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]

Dominica has already experienced severe drought conditions. The 2010 drought led to: loss of 18% of GDP and 27% of employment; 43% drop in banana exports in the first 11 weeks of 2010; 160 fires in the first quarter of 2010; and damage to 23 000 hectares of agricultural land *(8)*.



[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 categorize different severities of drought (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

Hurricanes and tropical storms have repeatedly set back economic development in Dominica, notably Hurricane David in 1979, in which around 75% of the population was rendered homeless *(9).* Particularly damaging are events associated with excessive or prolonged rainfall, which provokes flooding and landslide activity. Within the past four years there have been two major tropical cyclones with devastating impacts on human development, the health system, the economy and infrastructure: Tropical Storm Erica (27 August, 2015) and Hurricane Maria (18 September, 2017). The following table shows that the damage caused by Hurricane Maria cost more than double the annual GDP of the country. The figures on mortality account only for immediate deaths from injury or drowning; total mortality resulting from Hurricane Maria is likely to be higher if deaths resulting from reduced access to health care and sanitation are taken into account *(10).*

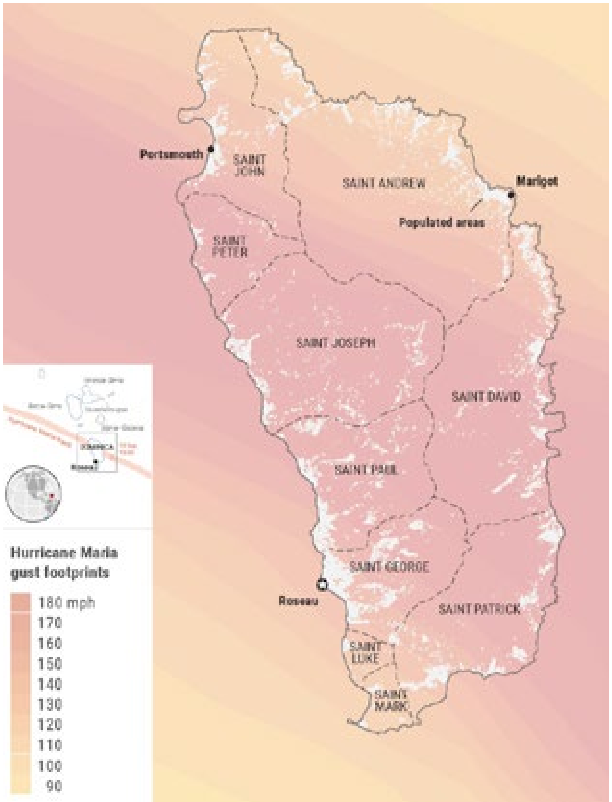
TABLE 1: Mortality, displacement and impact on GDP of Tropical Storm Erika (2015) and Hurricane Maria (2017) in Dominica

Event	Dead	Homeless/ displaced	Losses as percentage of GDP
Tropical Storm Erika	11	574	90%
Hurricane Maria	27	1862	226%

Sources: Government of Dominica, 2017 and 2015 *(11,12).*

Photo credit: Tomás Ayuso/Irin. Impact of Hurricane Maria flood waters on a house In Dominica, September 2017.

FIGURE 6: Wind gusts of Hurricane Maria as it passed over Dominica



Source: United Nations, 2017 *(13)*

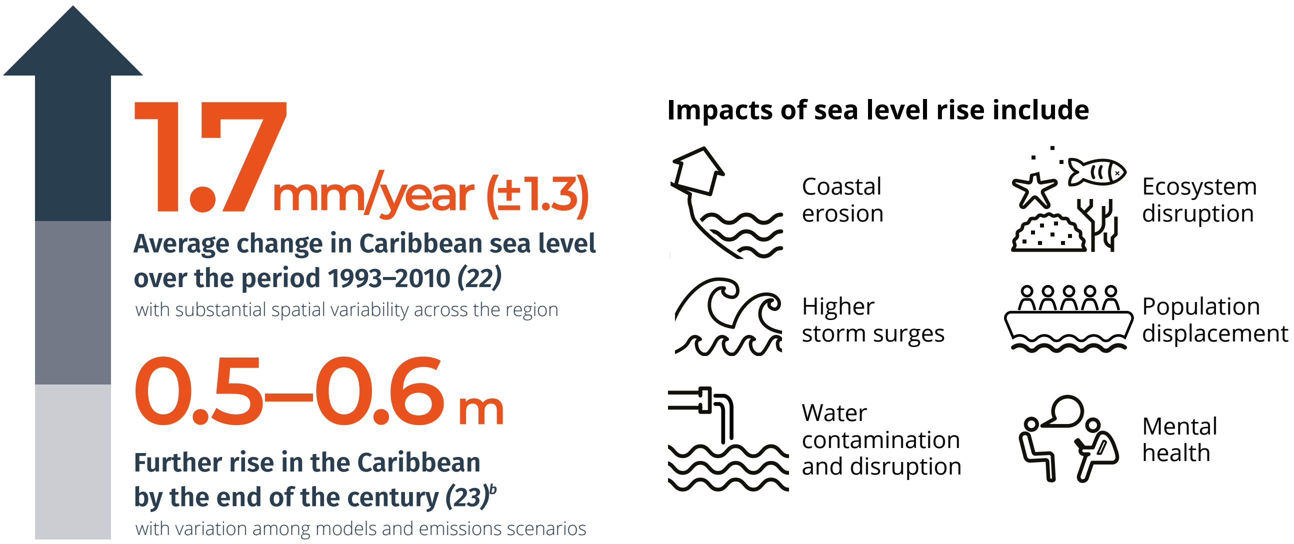
It is anticipated that the total number of tropical cyclones may decrease towards the end of the century. However, it is likely that human-induced warming will make cyclones more intense (an increase in wind speed of 2–11% for a mid-range scenario (i.e. RCP4.5, or about 5% for 2˚C global warming). There are better than even odds that the most intense events (i.e. 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.

A synthesis of expected changes at the global scale is presented below.

POTENTIAL FUTURE CHANGES IN TROPICAL CYCLONES: A GLOBAL PERSPECTIVE *(14–21)*[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.



[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.

[b] Estimates of mean net regional sea level change were evaluated from 21 CMIP5 models and include regional non-scenario components (adapted from WGI AR5 Figures 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:

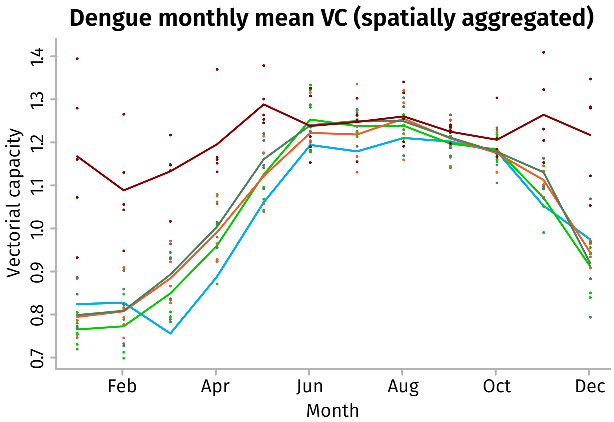
- the elderly
- children
- individuals with pre-existing conditions (e.g. diabetes)
- the socially isolated.

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 *(24,25)*.

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 Dominica 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 Dominica is consistently highly suitable for dengue transmission under all scenarios and thus vulnerable to outbreaks *(26–29)*.[b,c]

FIGURE 7: Monthly mean vectorial capacity (VC) in Dominica for dengue fever. Modelled estimates for 2015 (baseline) are presented together with 2035 and 2085 estimates under low emissions (RCP2.6) and high emissions (RCP8.5) scenarios



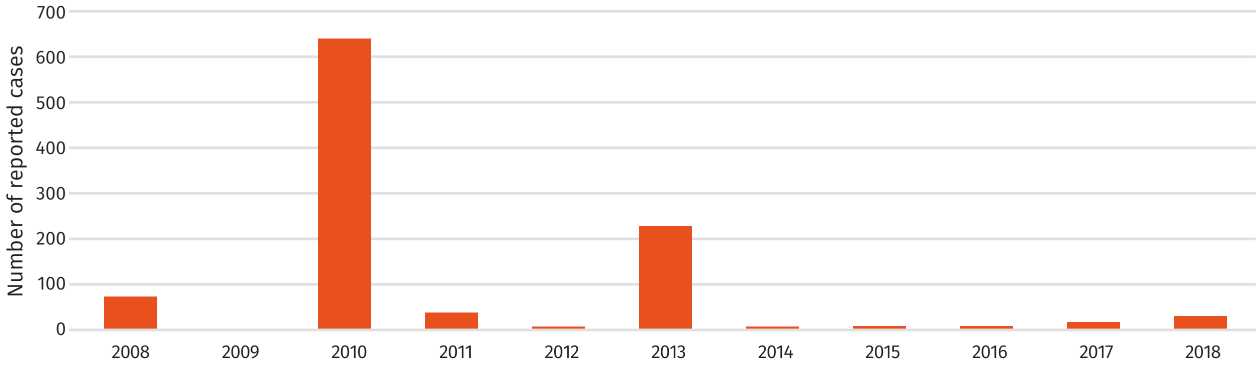
[a] A suite of mathematical models was systematically developed, then applied and interpreted by a team of researchers at Umeå University (Sweden) to assess the potential for mosquito-borne disease outbreaks (e.g. dengue, chikungunya, Zika and malaria) in terms of climate-dependent VC. The baseline year 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.

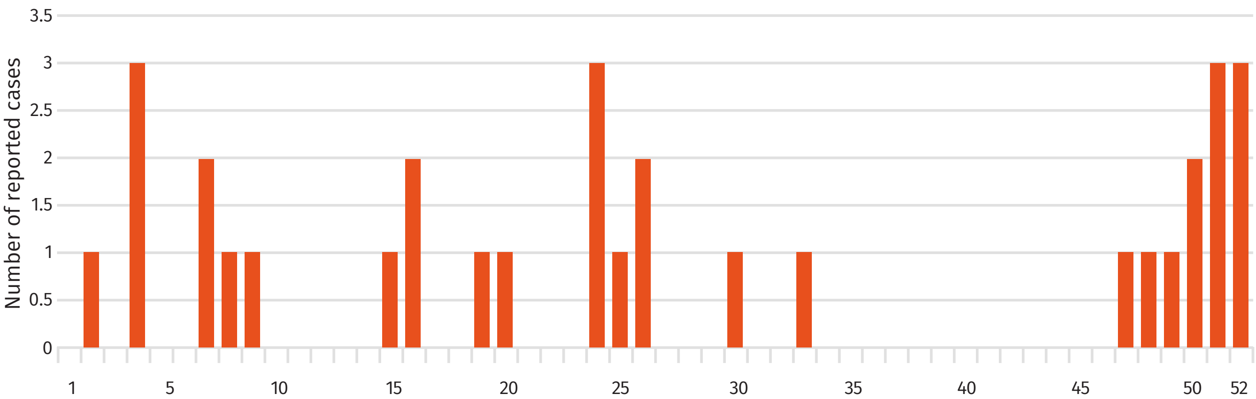
The following figures (Figures 8 and 9) present numbers of reported dengue cases for 2008 to 2018. The 10-year figures show outbreaks in 2010 and 2013, but no overall trend. Weekly reported dengue figures for 2018 show a cluster of cases in December.

FIGURE 8: Reported dengue cases, 2008–2018



Source: Data supplied by the Health Information Unit, Ministry of Health and Social Services, Dominica *(30)*

FIGURE 9: Number of dengue cases by Epi week, 2018



Source: Data supplied by the Health Information Unit, Ministry of Health and Social Services, Dominica *(30)*

The Environmental Health Department has developed a way to cover water storage drums to prevent mosquito breeding. In partnership with Dominica Red Cross, they created a leaflet showing instructions on how to make such a drum to protect communities from mosquito-borne diseases. A further important initiative was the collaboration with an international research consortium to develop early warning systems for vector-borne disease using geographic information systems *(31)*.

Photo credit: Environmental Health Department and Dominica Red Cross, Instruction leaflet to make a mosquito-proof water storage drum *(32)*

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.

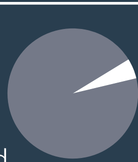
Climate change is likely to exacerbate the triple-burden of malnutrition and the metabolic and lifestyle risk factors for diet-related NCDs. It is expected to reduce short- and long-term food and nutrition security both directly, through its effects on agriculture and fisheries, and indirectly, by contributing 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 DOMINICA

N/A

Healthy life expectancy (2016) *(35)*

5.2%

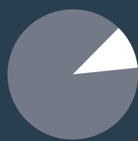


Adult population considered **undernourished** (2015–17 3 year average) *(36)*

28.2%

Adult population considered **obese** (2016) *(37)*

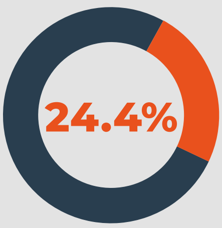
11.4%



Prevalence of **diabetes** in the adult population (2014) *(38)*

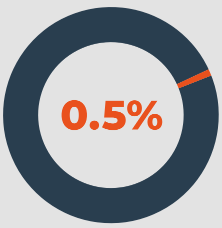
In Dominica, temperature rise and changes in weather patterns have impacted the viability of key sectors: agriculture, fisheries and tourism (among others). The drought in 2010 caused massive losses in the agriculture sector. Changing temperatures are altering marine ecology and the viability of fish species. In 2005, a mass coral bleaching event destroyed 75% of the coral colonies in Dominica *(8,33)*. In 2017, Hurricane Maria destroyed most of the foliage, leaving a brown and barren-looking landscape; most agricultural crops were destroyed and reliance on processed food imports grew, increasing susceptibility to noncommunicable diseases as well as generally affecting nutritional quality *(34)*.

MOTHER AND CHILD HEALTH



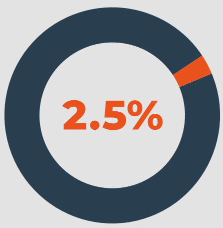
24.4%

Iron deficiency anaemia in women of reproductive age (2016) *(39)*



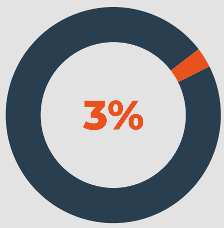
0.5%

Wasting in children under five years of age (2018) *(40)*



2.5%

Stunting in children under five years of age (2018) *(40)*



3%

Overweight in children under five years of age (2018) *(40)*

HEALTH VULNERABILITY AND ADAPTIVE CAPACITY

SDG indicators related to health and climate change

Many of the public health gains 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) *(41)*

N/A

3. GOOD HEALTH AND WELL-BEING

5.3%

Current health expenditure as percentage of gross domestic product (GDP)[b] (2016) *(43)*

N/A

Universal Health Coverage Service Coverage Index (N/A)[a] *(42)*

34

Under-five mortality rate (per 1000 live births) (2017) *(44)*

6. CLEAN WATER AND SANITATION

Proportion of total population using **at least basic drinking-water services** (N/A)[b] *(45)*

N/A

Proportion of total population using **at least basic sanitation services** (N/A)[b] *(45)*

N/A

13. CLIMATE ACTION

Total number of weather-related disasters recorded between 2000 and 2018[c] *(46)*

4

Highest total number of persons affected by a single weather-related disaster between 2000 and 2018[c] *(46)*

Entire population of approximately

71 393[d]

[a] There is no data available for this index. 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.

[d] While this is the available recorded total number of persons affected, the entire population of Dominica was affected by Hurricane Maria to some extent.

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)

60%

International Health Regulations (IHR) Monitoring Framework Human Resources Core Capacity *(47)*

Unknown

"Does your human resource capacity as measured through the IHR adequately consider the human resource requirements to respond to climate-related events?" *(48)*

No

"Is there a national curriculum developed to train health personnel on the health impacts of climate change?" *(48)*

HEALTH WORKFORCE (PER 10 000 POPULATION) *(35)*

10.83

Medical doctors (2017) *(49)*

59

Nurses and midwives (2017) *(49)*

3

Environmental and occupational health and hygiene professionals (2011) *(50)*[a]

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.

[a] The data gives a total of 21 Environmental and Occupational Health and Hygiene Professionals. Calculations based on population size (70 739) as reported in the most recent census in 2011.

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 small island developing States, health care facilities are often in low-lying areas, subject to flooding and storm surges, making them particularly vulnerable.

0
Health centres
(total density per 100 000 population) (2013) *(47)*

5.56
Hospitals
(total density per 100 000 population) (2013) *(47)*

49
Assessed SMART health facilities *(51)*[a,c]

7
Designated SMART health facilities *(51)*[b,c]

[a] All 49 health facilities have been assessed by PAHO using SMART criteria.

[b] Under projects developed since Hurricane Maria in 2017, all 7 Type 3 health facilities are being refurbished to SMART standards by PAHO and the World Bank.

[c] 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 *(48)*. Key indicators are aligned with those identified in the Caribbean 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: 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, ✗=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

Stakeholder engagement has been completed for a National Adaptation Plan for Health and the Plan is being developed. The plan builds on considerable experience in Dominica of development of national policies based on environmental considerations. Following the Earth Summit in 1992, a Sustainable Development Council was formed in 1995. The Environmental Coordinating Unit (ECU) was established in 1999 to manage funds to address environmental issues, including funds from the Global Environment Facility, and to coordinate agencies working in this field. The ECU serves as the focal point for the implementation of all Multilateral Environmental Agreements to which Dominica is a signatory. The Government has also established a Disaster Vulnerability Reduction Project and an Office of Disaster Management.

Work on a Health Vulnerability and Adaptation Assessment began in 2015, prior to Tropical Storm Erika, with updated analyses and recommendations following Tropical Storm Erika *(33)*. Further reviews and assessments that included a focus on health were conducted following Tropical Storm Erika (2015) and Hurricane Maria (2017) *(11,52,53)*.

These developments and the evidence from assessments have informed national policy guidelines and documents, including the Low Carbon Climate Resilient Development Strategy 2012–2020 and the National Resilience Development Strategy 2030 *(54,55)*. These documents envisage strong partnerships between sectors to achieve climate resilience through adaptation and mitigation measures. However, the National Resilience Development Strategy does not include a major focus on health.

Intersectoral collaboration to address climate change[a]

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

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

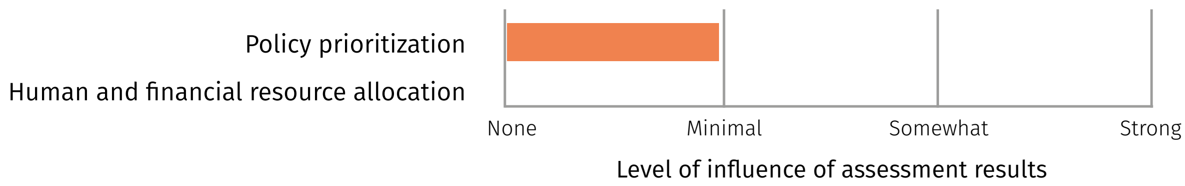
Evidence: Building the investment case

Vulnerability and adaptation assessments for health

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

TITLE: Climate and Health Vulnerability and Adaptation Assessment Dominica

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?



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

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	✗	O	✗
Storms (e.g. hurricanes, monsoons, typhoons)	✓	✓	✓
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)
- [x] Other multilateral donors
- [ ] Bilateral donors
- [ ] Other: ______

* Except for PAHO and World Bank contributions to building SMART Health Care Facilities

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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