

# Climate Change and Health in Small Island Developing States

A WHO Special Initiative in collaboration with UNFCCC and the Fijian Presidency of the COP-23

*SIDS in the Caribbean Region*



Pan American  
Health  
Organization



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REGIONAL OFFICE FOR THE  
Americas



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### *SIDS in the Caribbean Region*

The Small Island Developing States (SIDS) Initiative on Climate Change and Health was launched by WHO at the 23rd Conference of the Parties (COP-23) of the UNFCCC in Bonn, Germany, in December 2017, in collaboration with UNFCCC and the Fijian Presidency of the COP-23. This report is a background document for the Meeting to Develop the Caribbean Region Action Plan, for the WHO Special Initiative on Climate Change in SIDS, in Grenada, 16-17 October 2018. The meeting was organized as part of the WHO Geographically Dispersed 3rd Global Conference on Climate Change and Health.

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# 1 Introduction

Humanity entered a new millennium with unprecedented challenges on a planetary scale. Carbon dioxide emissions, loss of biodiversity, loss of forests, water use, ocean acidification, have all been rapidly increasing for the past 100 to 200 years. At the same time, we never had so many options to steer the planet on a sustainable path of development and eliminating poverty everywhere. The future will assess us, not just on what we did, but also on what we failed to do. One area where we must be judged by what we did well is in the protection, in particular health protection of people in Small Island Developing States (SIDS). Small islands are fragile ecosystems populated by resilient people who have been able to cope with environmental threats over centuries, and some over millennia. But the challenges that climate change brings today are unprecedented, and small islands are the places where the physical and social impacts of climate change are becoming most evident.

The Earth Summit in Rio de Janeiro in 1992 was the birthplace of the United Nations Framework Convention on Climate Change (UNFCCC). Since then, several global conferences and meetings have followed, with limited but steady progress towards addressing our planetary challenges. The Rio+20 conference in 2012 renewed national commitments and accelerated actions towards sustainable development. Importantly, the conference's outcome document recognized that *health is a precondition for and an outcome and indicator of all three dimensions of sustainable development*, that is the social, environmental and economic dimensions (UN, 2012). We must, therefore, think of health as being at the centre of sustainable development in SIDS.

More recently, 2015 saw major national commitments to transition to more climate-resilient and sustainable societies, by preparing for the challenges and opportunities of additional climate change. These include the Paris Agreement under the UNFCCC; the 2030 Agenda for Sustainable Development; and the Sendai Framework for Disaster Risk Reduction 2015-2030 (Box 1).

## 1.1 Over 20 years of international health action

The World Health Organization (WHO) has played a key role for over 20 years on raising awareness of and implementing actions to manage the health risks of climate change within member states. SIDS were among the first countries to become concerned about the health impacts of climate change. The first SIDS workshop on climate change and health in the Pacific was held by WHO in Apia, Samoa, in partnership with UN Environment and the World Meteorological Organization (WHO, 2000). This was followed by similar workshops for the Caribbean in Barbados in 2002 (WHO, 2002), and in the Maldives in 2003 (WHO, 2003). Since then, evidence has continued to increase regarding the impacts of unhealthy environments, including climate change, on health.



Ministers of Health and high-level representatives at the UNFCCC Conference of the Parties (COP) in November 2016 acknowledged that almost one-quarter of the global burden of disease and approximately 12.6 million deaths annually are attributable to modifiable environmental factors, and that global, environmental, and social changes, including climate change, are driving many of these health impacts (WHO, 2016).

Box 1. 2015, the year of three crucial global agendas

**The Paris Agreement** acknowledged that “*climate change is a common concern of humankind*” that parties to the Convention should address, considering “*their respective obligations on human rights, the right to health ...*” (UNFCCC, 2015). Further, the countries agreed to strengthen efforts to address climate change by “*holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C about pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change*”. The Agreement also commits signatories to “*increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development ...*” and to strengthen their ability to prepare for, cope with, respond to and recover from climate-related risks, even as they built less carbon-intensive, resilient futures. SIDS have played a leading role in advocating for strong climate action. The Paris agreement, which entered into force on 4 November 2016, prioritizes climate actions in SIDS as vulnerable countries.

**The 2030 Agenda for Sustainable Development** renews efforts to achieve sustainable development calling on countries to begin efforts to achieve 17 Sustainable Development Goals (SDGs) and 169 targets over the next 15 years. The SDGs address the social, economic, and environmental dimensions of sustainable development, as well as promoting peace, justice, and effective institutions. Goal 3 (good health and well-being) aims to improve population health, with health embedded in multiple other goals, including no poverty, zero hunger, clean water and sanitation, gender equality, reduced inequalities, sustainable cities. Goal 13 calls for urgent action not only to combat climate change and its associated risks, but also to build resilience in preparing for and responding to climate-related hazards

**The Sendai Framework for Disaster Risk Reduction 2015-2030** outlines seven targets and four priorities for action to achieve substantial reductions in disaster risk and losses in lives, livelihoods and health, and in the economic, physical, social, cultural, and environmental assets of persons, communities, and countries. Health is a key element of the Framework.

## 1.2 A special initiative for climate change and health in SIDS

SIDS leaders provided strong arguments to Dr. Tedros Ghebreyesus regarding their special needs on climate change and health, prior to and after his election in 2017. These consultations led to the initial concepts behind the SIDS Initiative. Later in 2017, at the 23rd Conference of the Parties (COP) of the UNFCCC in Bonn, WHO, launched the *Special Initiative on Climate Change and Health in Small Island Developing States*, in collaboration with UNFCCC and the Fijian Presidency of the COP-23. The Initiative responds to SIDS requests and recognizes that SIDS are in the front-line facing a range of acute and long-term risks, including extreme floods, storms, drought and sea level rise; and increased risks of water-, vector- and food-borne diseases.

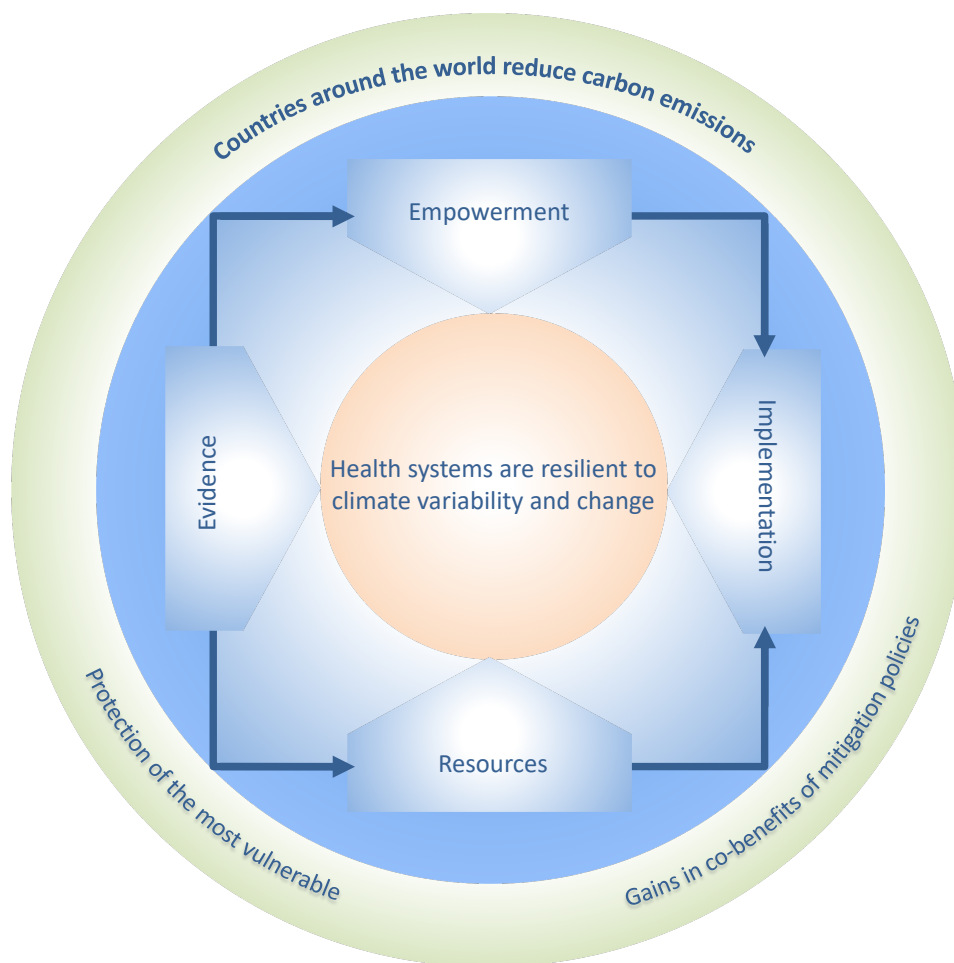
The SIDS Initiative has a vision that by 2030 all health systems in SIDS will be resilient to climate variability and change. This must happen in parallel while countries around the world are reducing carbon emissions both to protect the most vulnerable from climate risks, and to gain the health co-benefits of mitigation policies.

The SIDS initiative has four component elements, as follows:

- *Empowerment*: Supporting health leadership in SIDS to engage nationally and internationally
- *Evidence*: Building the business case for investment
- *Implementation*: preparedness for climate risks, and health promoting mitigation policies
- *Resources*: Facilitating Access to Climate and Health Finance

These four components are inter-linked as shown in figure 1 (WHO, 2017). Evidence leads both to Empowerment, and access to Resources. Both Empowerment and access to Resources lead to successful Implementation of actions. The four components aim at making health systems in SIDS resilient to climate variability and change.

Figure 1. Interlinkages among the four components of the SIDS initiative.



### 1.3 Relevance to SIDS in the Caribbean Region

In 2002, the Pan American Health Organization convened the “Climate Variability and Change and their Health Effects in the Caribbean” conference. This was the first international climate change and health conference in SIDS, counting with representatives from the health, climate, and environment sectors in the Caribbean, and country representatives from other regions. The workshop generated several recommendations, including strategies for 1) awareness raising of climate change and health, 2) the use of climate data by public health programs, and 3) institutional and organization arrangements (such as promoting synergies among existing regional and national institutional mechanisms for climate change



adaptation) (WHO-PAHO, 2003). These recommendations paved the way for PAHO's regional initiatives focused on climate change and health in SIDS.

Given the susceptibility of the Caribbean region to a wide variety of natural hazards such as hurricanes and flooding, PAHO/WHO launched the SMART Hospital Initiative, to ensure that hospitals continue operations during disasters. The initiative focuses on improving hospitals resilience, strengthening structural and operational aspects, and providing green technologies, therefore reducing their environmental footprint. Furthermore, it builds on the Guidelines for the Evaluation of Small and Medium-sized Health Facilities, the Caribbean version of the Hospital Safety Index, the centerpiece of PAHO/WHO's disaster risk reduction programme, which is now a global tool (PAHO, 2017). The first phase of the initiative was carried out from 2012 to 2014 in hospitals in Georgetown, Saint Vincent and the Grenadines, and St. Kitts and Nevis, and has since been scaled up to several other countries in the Caribbean and in other regions.

In 2011, Member States from the Pan American Health Organization Region adopted the 2012-2017 PAHO Strategy and Plan of Action on Climate Change. The Strategy and Plan of Action was relevant for SIDS, as it was designed to prepare and strengthen national and local health systems to protect human health from risks related to climate change (PAHO, 2011).

In 2014, the PAHO Strategic Plan 2014-2019 was published. The strategic plan recognizes that action is needed on climate change, such as support to capacity building and strengthening technical cooperation, and specific programs that address current and emerging environmental threats with local health impacts - including climate change, loss of biodiversity, ecosystem depletion, water scarcity, and desertification (PAHO, 2014).

In 2015, Caribbean countries and territories met for the Caribbean Environmental Health Conference, organized by PAHO and the Caribbean Community (CARICOM). The conference provided an opportunity and platform to review the impact of the Caribbean Cooperation in Health Initiative, phase III (CCH III), and planning and priority setting for the development and implementation of the CCH phase IV (CCH IV). Climate change was identified as one of the top environmental health programmatic priority areas for CCH IV, including water and pollution as cross-cutting issues; taking into consideration the Sustainable Development Goals and the Samoa Pathway as a framework (PAHO, 2015).

In 2016, PAHO, in collaboration with the Caribbean Community Secretariat, the Caribbean Public Health Agency, and the University of West Indies (Cave Hill Campus), commissioned an evaluation of the Caribbean Cooperation in Health Phase III. During consultations, safe, resilient, healthy environments to mitigate climate change was recommended as a priority, including adaptation of the health sector to climate change as a strategic approach. The PAHO Smart Hospitals

Initiative was identified as one of the main advancements in regional cooperation, regarding environmental health (PAHO, 2016a).

In 2016, the PAHO Sub Regional Cooperation Strategy for the Caribbean 2016-2019 was published. The strategy sets out the issues, strategic priorities and outcomes that PAHO's technical cooperation in the Caribbean will address. The strategic priorities and focus areas of the Strategy are aligned with the CCH IV Strategic Priorities, including safe, resilient and healthy environments to adapt to climate change and mitigate disasters (PAHO, 2016b).

In 2017, a joint effort between PAHO, CARPHA and the Caribbean Institute for Meteorology and Hydrology produced the first issue of the Caribbean Health Climatic Bulletin. This initiative aims to guide health professionals that manage health systems, to identify and prepare health interventions for upcoming favorable or inclement climate conditions in the Caribbean. The Caribbean Health-Climatic Bulletin is published quarterly and provides 3-month climate projections. This information is intended to be used in tandem with weather forecasts (1-7 days) (PAHO, CARPHA, and CIMH; 2017).

In 2017, PAHO conducted a Country Survey on Health and Climate Change to understand needs and challenges in the region of the Americas in order to plan appropriate actions. The findings are described in Box 2.

In 2018, high level officials from Antigua and Barbuda, Barbados, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia and St. Vincent and the Grenadines signed the 2018-2024 PAHO/WHO Multi-Country Cooperation Strategy for Barbados and Eastern Caribbean Countries. The Strategy is a medium-term strategic vision that will guide PAHO and WHO's work with countries taking into consideration their health priorities, institutional resources and objectives. Capacity strengthening to address climate change and health impacts is one of the Cooperation Strategy priorities and focus areas (PAHO, 2018).

At the global level, the General Assembly adopted in 2014 the SIDS Accelerated Modalities of Action (SAMOA) Pathway (UN, 2014). Countries expressed concerns that the impacts of climate change compound existing challenges, placing additional burdens on their national budgets and in their efforts to achieve sustainable development goals. Countries reaffirmed their commitment to support the efforts of SIDS, citing specifically *“to develop and implement comprehensive, whole government, multisectorial policies and strategies for the prevention and management of diseases, including through the strengthening of health systems, the promotion of effective universal health coverage implementation, the distribution of medical and drug supplies, education and public awareness and incentivizing people to lead healthier lives through healthy diet, good nutrition, sports and education”*. The SAMOA Pathway drives the actions of SIDS toward sustainable development.

## Box 2. PAHO Country Survey on Health and Climate Change

In 2017, PAHO conducted a Country Survey on Health and Climate Change to understand needs and challenges in the region of the Americas,. Responses from the Caribbean included 15 Member States and three Territories (hereinafter referred as “countries”). The current situation and challenges identified are:

### *Higher level of participation of the health sector in national climate change planning is necessary to reflect the situation and challenges of the sector*

Ministries of health continue to increase their participation in national climate change issues. Fourteen countries have established interministerial committees on Climate Change, and twelve countries included the Ministry of Health (MoH) as a member. Ten countries have National Strategies and Plans on Climate Change, however, only three included health indicators to evaluate the success of its implementation. Although direct and indirect health-related issues appear in all latest National Communications and other official climate change documents (e.g. National Adaptation Plans – NAP; Nationally Appropriate Mitigation Actions – NAMA), MoH was involved in the preparation of less than half of them.

### *Having dedicated and trained personnel would increase actions and resource mobilization for the health sector*

Higher participation of the health sector in national climate actions could be achieved by increasing the number of dedicated personnel in MoH, the budget for actions, and the numbers of trained persons. Eleven countries had a division or department responsible for health and climate change, often addressing other environmental health issues. Although two countries had a budget for the topic, they identified that it was not enough to conduct all actions and programs. Seven received specific training, five of which from PAHO (as of May 2017).

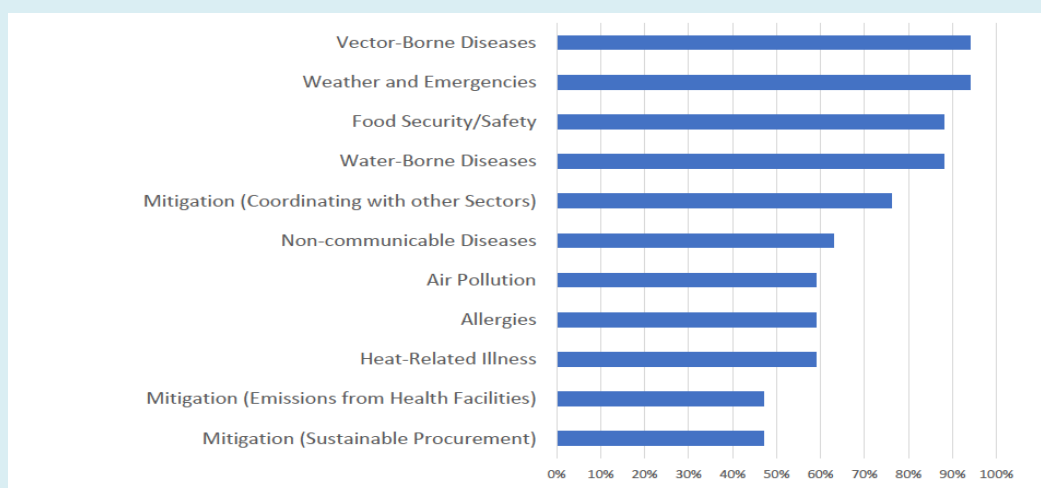
As a response to this scenario, PAHO provided training for health representatives of the Caribbean on the preparation of health chapters in National Adaptation Plans to Climate Change, in St Lucia, in October 2017. Also, PAHO has been providing technical support for the writing of national documents, and has been working with CARICOM and countries to prepare and submit projects for donors.



## Box 2. PAHO Country Survey on Health and Climate Change – cont.

*There are clear priority topics for action identified by Ministries of Health of the Caribbean*

As a guidance for the next steps, Caribbean countries rated the following topics as “*Extremely Important*” or “*Important*” to be addressed in a climate change and health agenda (percentages based on 18 respondents):

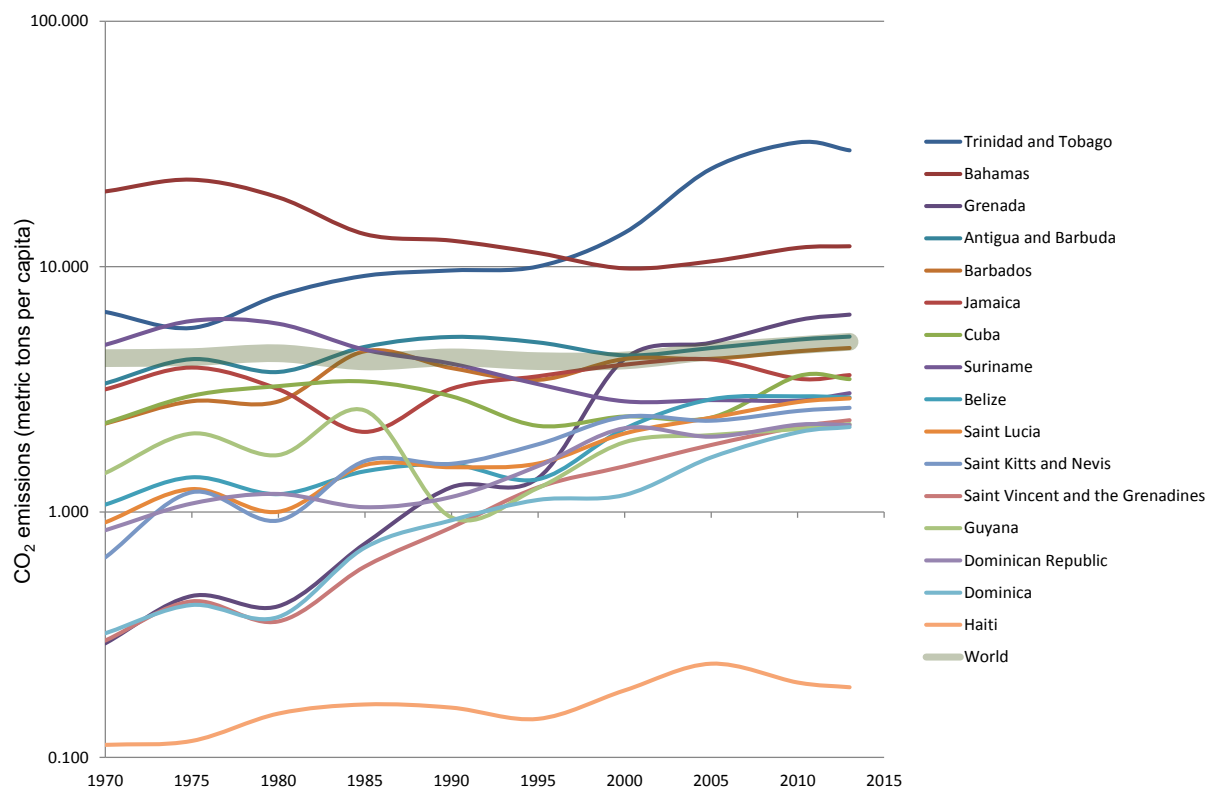


## 2 Health risks of climate change in SIDS

### 2.1 A small contribution to the problem, a major impact on health

Most SIDS have made a very small contribution to the overall global emissions that cause climate change and yet they are amongst the most affected countries. Figure 2 shows CO<sub>2</sub> emissions per capita comparing the global average with SIDS in the Caribbean region, noting that although there are increases in per capita emissions over time, for many countries these are below the world average.

Figure 2. CO<sub>2</sub> emissions (metric tons per capita), in the Caribbean Region, 1970 to 2013 (Source: EDGAR, 2018)



## 2.2 Small Island Developing States are uniquely vulnerable to climate change

Their geography, frequent exposure to extreme weather and climate events and sea level rise, and often small numbers of people and limited resources make SIDS uniquely vulnerable to climate change. Many SIDS have weak health systems and constrained financial and human resources, limiting options for transitioning to climate-resilient and sustainable health systems. Climate change is affecting not only the health and well-being of their citizens, but also their livelihoods and culture. Populations often depend on marine related resources (fisheries, wildlife tourism) that are being affected by ocean acidification and coral bleaching, which also may compromise lifestyles.

Similarly, extreme weather and climate events can affect health, livelihoods, and development. Because many islands depend on services linked with tourism, even if an extreme weather event does not cause extensive damage, it can affect the public's perception of risk, reducing tourism. Higher ocean temperatures can initiate coral bleaching events, affecting tourism and reef survival.

Globally, there were 737 climate related disasters (storms, floods and droughts) in all SIDS in the 50 years between 1966 and 2015. These resulted in over 15 thousand deaths, over 41 million affected persons (many of them more than once), and around USD 41 billion in damages. Table 1 shows the breakdown by type of event (EM-DAT, 2018).

Table 1. Climate related disasters in SIDS between 1966 and 2015

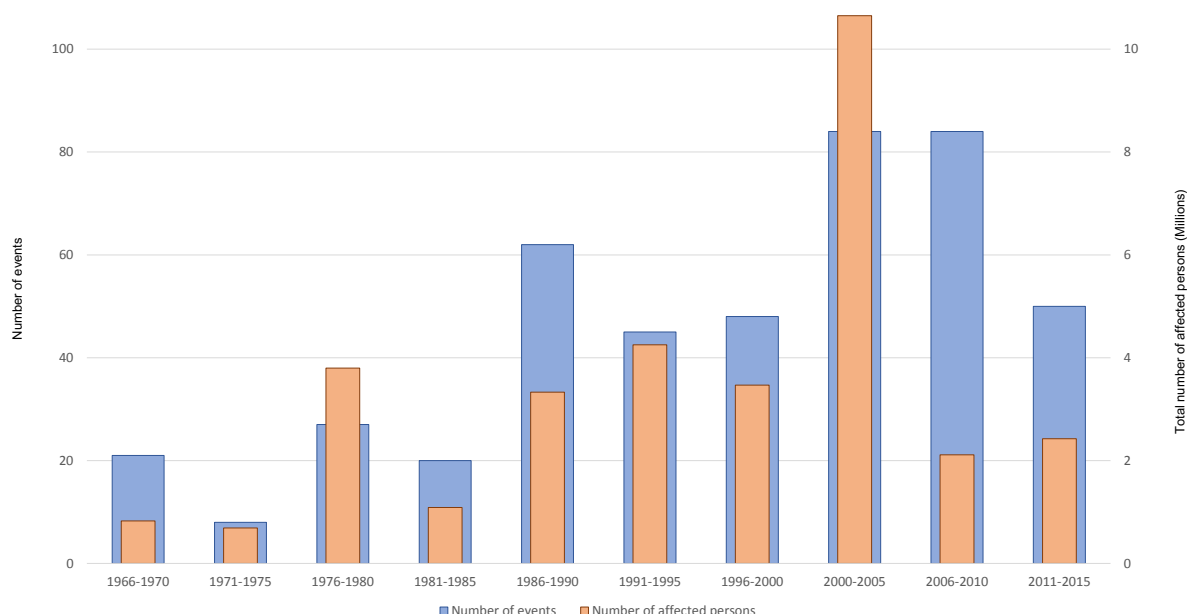
Type of event	Number of events	Deaths	Total affected	Damage (USD)
Storm	474	10,017	25,914,810	38,712,161,000
Flood	204	5,390	6,220,341	1,989,206,000
Drought	59	84	9,165,981	513,239,000
All	737	15,491	41,301,132	41,214,606,000

Source: EM-DAT, 2018

In SIDS of the Caribbean Region, during the same period there were 449 occurrences of storms, floods and drought, which resulted in nearly 14 thousand deaths, over 32 million affected persons, and over to USD 36.5 billion in damages (EM-DAT, 2018). Although around 60% of all climate related disasters in SIDS occurred in the Caribbean, the region had around 90% of all deaths, 79% of all affected persons and almost 90% of all damage costs. Figure 3 shows the number of climate related events and total affected persons between 1966 and 2015.



Figure 3 Total number of storms, floods and drought and total affected persons in SIDS in the Caribbean Region between 1966 and 2015 (Source: EM-DAT, 2018).



### 2.3 SIDS face unequal health impacts

Climate change is affecting, and will continue to harm human health. WHO has estimated that between 2030 and 2050, around 250 thousand extra deaths will occur as a result of climate change impacts on nutrition, malaria, diarrhoeal diseases and heat stress (WHO, 2014). Some health burdens have already changed due, at least in part, to changing weather patterns associated with climate change (Ebi et al, 2017). Risks can arise from direct exposures, indirect exposures and via economic and social disruption (Box 3; Smith et al, 2014). Climate change will likely benefit some health outcomes in some locations in the short term. However, the overall balance will be detrimental, particularly in SIDS that experience higher burdens of climate-sensitive health outcomes.

### Box 3. Sources of climate change risks

*Direct exposures:* Climate change-related alterations in the frequency, intensity, and duration of extreme weather events (e.g. heatwaves, floods, droughts, and windstorms). Each year, these events affect millions of people, damage critical public health infrastructure, and cause economic losses costing billions of dollars. The frequency and intensity of some types of extreme weather events are expected to continue to increase over coming decades as a consequence of climate change (IPCC, 2012), suggesting that the associated health impacts could increase without additional interventions, including impacts on mental wellness.

*Indirect exposures:* The effects of climate change on natural and physical systems that, in turn, alter the number of people at risk of undernutrition, the geographic range and incidence of vector-borne, zoonotic, and food- and waterborne diseases, and the prevalence of diseases associated with air pollutants and aeroallergens. Additional climate change is projected to significantly increase the number of people at risk of these major causes of ill health. Further, sea level rise associated with climate change can result in, for example, larger and more destructive storm surges, and food and water security associated with saltwater intrusion into freshwater drinking sources.

*Via economic and social disruption:* Climate change can affect population health through climate-induced economic dislocation and environmental decline, as well as through development setbacks incurred by damage to critical public health infrastructure and livelihoods by extreme events.

Climate change acts as a health risk multiplier by affecting the social and environmental determinants of health, including safe drinking water, clean air, sufficient food, and safe shelter. Health risks of climate change will not occur individually. Many communities will experience multiple adverse consequences simultaneously or closely spaced in time. For example, common challenges across SIDS include the impacts of extreme weather and climate events (including floods, droughts, and storms) and of sea level rise on individuals, communities, and health infrastructure; changes in the transmission of vector-borne and other infectious diseases; and impacts of climate change on marine ecosystems, affecting tourism and marine production. Combined with high vulnerability, these challenges affect the ability of health systems to promote and protect population health.

As the climate continues to change, risks will continue to emerge, such as increases in the number of cases of ciguatera fish poisoning and psychosocial stress. Surveillance and monitoring programs will need to be extra vigilant to identify when diseases emerge or re-emerge, particularly as travel, tourism, and trade provide opportunities for vectors and pathogens to quickly move from one country to another.

Health service delivery, particularly access to healthcare, will be increasingly affected by storms, floods, and sea-level rise. The majority of populations and health care facilities (hospitals and community health centers) in SIDS are located in close proximity to low-lying coastal areas, with high vulnerability to cyclones, floods, storm surges, sea level rise, and disturbances in water supply caused by

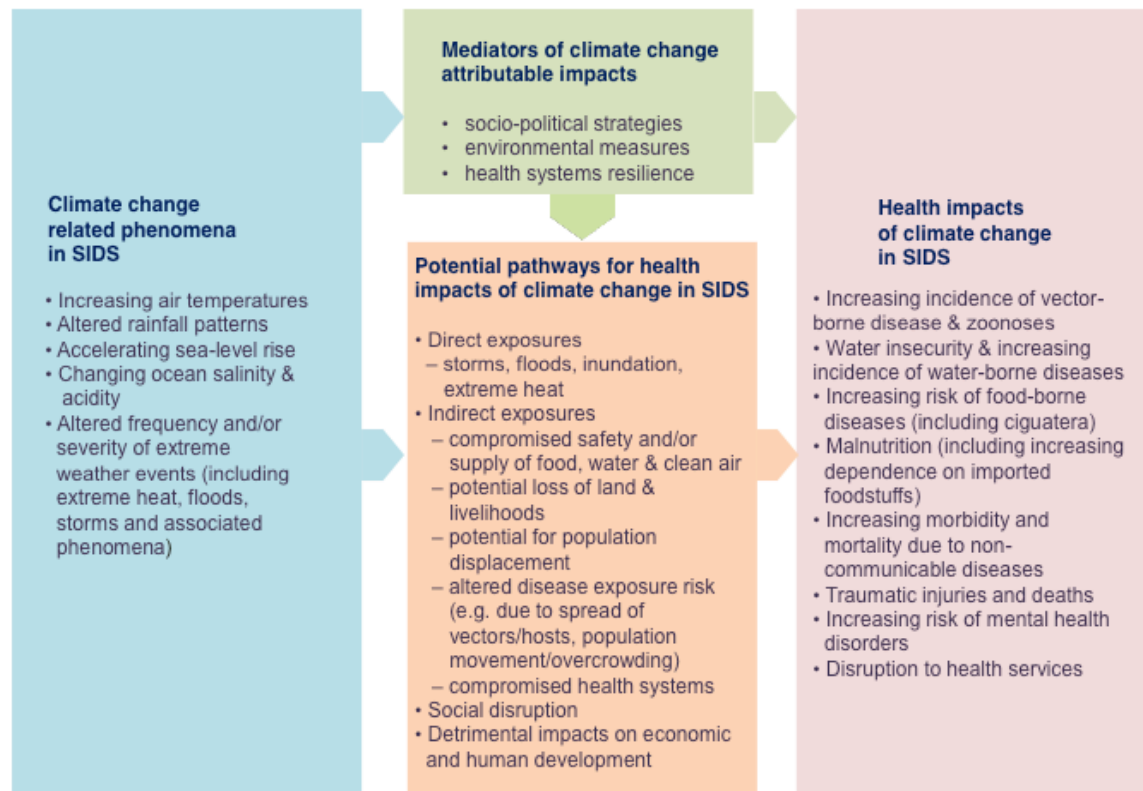
drought or salinization of aquifers. Due to the lack of capacity and resources in health systems, the majority of facilities are not resilient to climate-induced pressures with respect to structural, non-structural, and functional safety. Damage to buildings and essential supplies/amenities affects their capacity to provide health services when they are most needed in emergency situations. These problems will increase with additional climate change.

## 2.4 Current and projected health risks of climate variability and change in SIDS

Although additional data are needed to provide robust estimates, it is clear that SIDS are already experiencing high burdens of many climate-sensitive health outcomes, with burdens expected to increase unless additional adaptation programs are implemented.

Figure 4 shows the range of pathways by which climate change could threaten health in SIDS.

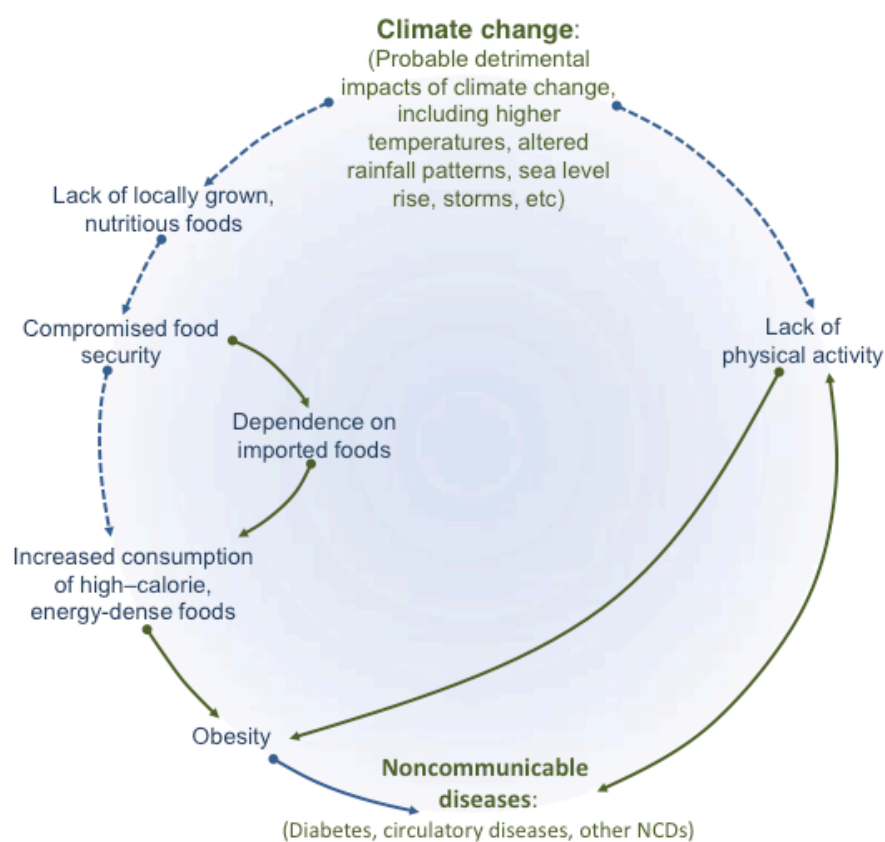
Figure 4: Climate change and health impact pathways relevant SIDS (Adapted from McIver et al, 2016)





In addition to high burdens of infectious diseases, SIDS experience some of the highest worldwide rates of obesity, diabetes, hypertension, and related non-communicable diseases (NCDs). With climate change likely to increase the burden on NCDs in SIDS, as shown in Figure 5, the impacts of this double-burden of disease will only grow unless additional interventions are designed and implemented.

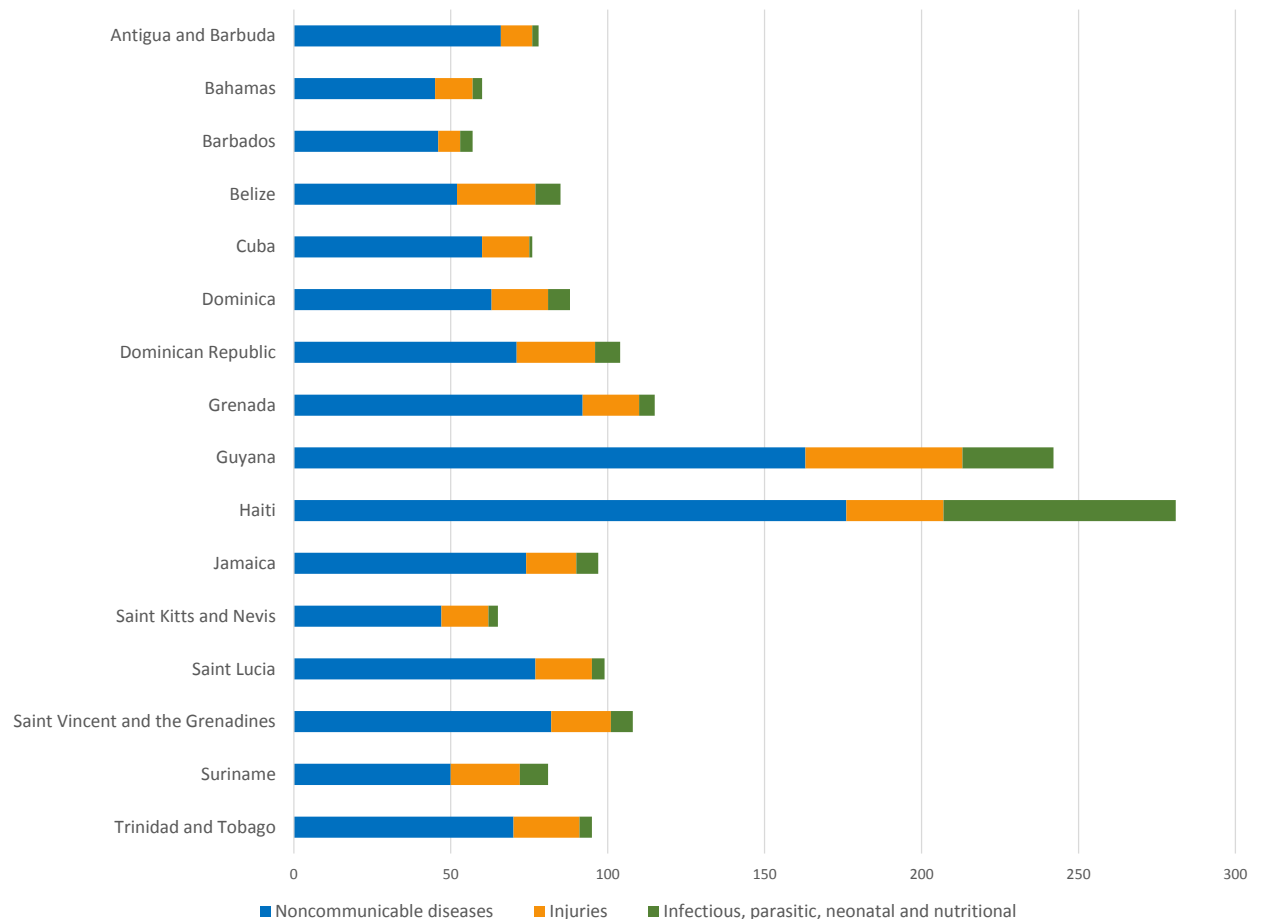
Figure 5: Conceptual model summarizing the pathways between climate change and noncommunicable diseases (dotted arrows are hypothetical links) (WHO, 2015)



This is also observed with the burden of disease from modifiable environmental risk factors (WHO, 2016), which indicates that for age-standardized rates per 100,000, a large fraction of the disease burden are NCDs (Fig 6). In absolute numbers the category Noncommunicable accounts for 62.6% of deaths; the category Infectious, parasitic, neonatal and nutritional 18.9%; and with Injuries responsible for 18.5% of deaths. While globally around 23% of all deaths can be

attributed to environmental factors, SIDS in the Caribbean Region have fractions ranging from 8 to 23%.

FIG 6 Age-standardized deaths from modifiable environmental risks per 100000, 2012 (WHO, 2016)



Considerable progress was made in recent decades to reduce the burden of major climate-sensitive health outcomes, at least partly through efforts to achieve the Millennium Development Goals, Sustainable Development Goals, and other goals. These trends are expected to continue depending on the development pathways followed (Ebi, 2014).

The balance of increased health risks associated with a changing climate and decreased health risks from socioeconomic development will vary from location to location, depending on the local context. Climate change may not be the most important driver of climate-sensitive health risks over the next few decades, but is expected to be significant past mid-century.

Current estimates of global coverage of access to safe drinking water and improved sanitation do not take climate resilience into account. The world is off-track to meet water supply and sanitation targets when climate change is taken into consideration. A global assessment concluded that by 2020, climate change has the potential to undermine investments to improve access to safe drinking water and sanitation (WHO, 2010). A reduction in coverage can be expected unless actions are taken to increase the resilience of water and sanitation services to climate change over the short- and medium-term. This is particularly problematic in SIDS with challenges for providing water and sanitation services.

### 3 Taking action

#### 3.1 The SIDS initiative is aligned to the Operational Framework for Climate Resilient Health Systems

To support the delivery of Universal Health Care, WHO has identified six common “building blocks”: 1) Leadership and governance; 2) Health workforce; 3) Health information systems; 4) Essential medical products and technologies; 6) Service delivery; and 6) Financing (WHO, 2015b). For an entire health system to be resilient to climate change, each of the six common building blocks also should be climate resilient. The WHO Operational Framework for Climate Resilient Health Systems builds on this approach by focusing on 10 components necessary for health systems to prepare for, cope with, respond to, and recover from climate-related risks of current climate variability and change. These, in turn, will orient actions that contribute to the four components of the SIDS initiative, as explained in Figure 7.

Figure 7: SIDS initiative components within the framework of the WHO operational framework for building climate resilient health systems (WHO, 2015b)





In addition to these six building blocks and ten components of climate resilient health systems, consideration must be given to six key health systems performance dimensions: equity, quality, responsiveness, efficiency and resilience (WHO & WB, 2017). A climate-resilient health system as one that is capable to anticipate, respond to, cope with, recover from, and adapt to climate-related shocks and stress, to bring sustained improvements in population health, despite an unstable climate (WHO, 2015b). Climate resilience reduces vulnerability, builds capacity to manage health risks of climate change, considers shorter to longer term perspectives, implements adaptive management approaches, enables community-based partnerships and participation, and promotes collaboration across sectors (Bowen & Ebi, 2014). Key factors for supporting multi-sectoral collaboration and partnerships are systems-based approaches that explicitly acknowledge the intersections across health and other sectors. These approaches will be more effective when they incorporate partnership with all relevant sectors, and structural supports, including leadership, sufficient resources, and responsive governments. Another critical factor for building longer-term climate resilience is reducing greenhouse gas emissions within public health and healthcare infrastructure.

SIDS differ significantly among each other on their diversity of specific climate-related exposures, vulnerabilities, and capacities. However, many SIDS share common needs to implement the operational framework for climate-resilient health systems and achieve their SDG targets and goals. Although the particular needs of a country depend on its context, underlying needs to manage the health risks of a changing climate align with the basic building blocks of health systems.

SIDS can broadly be categorized into those countries:

- With the capacities to undertake building climate-resilient health systems with a minimal level of external financial and technical support within the next decade;
- Who could undertake building climate-resilient health systems with a moderate level of external financial and technical support within the next decade; and
- Requiring high level of external capacity supplementation for an indefinite period.

Given the risk multiplier characteristic of climate change, there are a range of interventions in different areas which would address the additional risk contribution of climate change (Table 2).

**Table 2: Examples of climate-informed health interventions**

Climate-related health risks and mechanisms	Examples of interventions
Extreme heat and thermal stress	<ul style="list-style-type: none"> <li>○ Establish occupational health exposure standards</li> <li>○ Improve health facility design, energy efficient cooling and heating systems</li> <li>○ Ensure public education to promote behavior change (e.g. in relation to clothing, ventilation, etc.)</li> <li>○ Develop heat-health action plans, including early warning, public communication, and responses, such as cooling centers for high-risk populations</li> </ul>
Waterborne and foodborne diseases	<ul style="list-style-type: none"> <li>○ Enhance disease surveillance systems during high-risk seasons/periods</li> <li>○ Strengthen food and water quality control</li> </ul>
Zoonotic and vectorborne diseases	<ul style="list-style-type: none"> <li>○ Expand the scope of diseases monitored, and monitor at the margins of current geographic distributions</li> <li>○ Establish early warning systems when there are sufficient data and a robust enough association between environmental variables and health outcomes</li> <li>○ Establish vector / pest control programs</li> <li>○ Enhance diagnostic and treatment options in high-risk regions / periods</li> <li>○ Ensure adequate animal and human vaccination coverage</li> </ul>
Allergic diseases and cardiopulmonary health	<ul style="list-style-type: none"> <li>○ Develop exposure forecasts for air quality, allergens, dust</li> <li>○ Enforce stricter air quality standards for pollution</li> <li>○ Establish allergen management</li> <li>○ Plans for increased demand for treatment during high-risk seasons or weather conditions</li> </ul>
Nutrition	<ul style="list-style-type: none"> <li>○ Perform seasonal nutritional screening in high-risk communities</li> <li>○ Scale up integrated food security, nutrition, and health programming in fragile zones</li> <li>○ Promote public education and food hygiene</li> </ul>
Storms and floods	<ul style="list-style-type: none"> <li>○ Include climate risks in siting, designing, or retrofitting health infrastructure</li> <li>○ Establish early warning and early action systems, including education and community mobilization</li> <li>○ Assess and retrofit or construct public health infrastructure (e.g. health facilities in flood-prone areas) to be resilient to increased extreme weather conditions, warmer temperatures, environmental changes</li> </ul>
Mental health and disability	<ul style="list-style-type: none"> <li>○ Address special needs of mental health patients (as well as other disabilities) by developing emergency preparedness plans</li> <li>○ Address mental health needs of disaster- and trauma-exposed populations</li> <li>○ Establish community watch for people with mental illness during extreme weather conditions</li> </ul>

Source: WHO, 2015

### 3.2 Status of the building blocks of climate resilient health systems in SIDS

SIDS Initiative components in relation to the building blocks of climate resilient health systems are described in tables 3 to 6.

Table 3. Climate resilient health systems in SIDS: Empowerment

Empowerment: <b>Supporting health leadership in SIDS to engage nationally and internationally</b>	
<b>Building block</b>	<b>Status in SIDS</b>
Leadership and governance	There is high political awareness within the SIDS national governments of the risks that climate change presents today and in the future, with awareness of the health risks in many countries within Ministries of Health. The national coordination and collaboration across ministries that is critical for managing the upstream drivers of the health risks of climate change is recognized in many SIDS, with memorandums of understanding and other mechanisms under development. Close collaboration is needed between ministries of health and environment, to ensure access and utilization of the latest understanding of environmental factors that can influence the burden of climate sensitive health outcomes. There are multiple international organizations that can provide technical and/or financial support for political engagement, technical programs, raising awareness, and mobilization of financial resources.
Health workforce	Limited efforts are underway for training and capacity building of health workforces in SIDS, to make sure public health and healthcare professionals have the knowledge and tools necessary to build climate-resilient health systems. Overall, health workforces need further understanding of the risks that climate change presents to individuals, communities, and healthcare facilities; of approaches to protect and promote health in the face of uncertainty about the magnitude and pattern of future climate change; of the methods and tools that can be used to reduce current and projected impacts; and of best practices and lessons learned from efforts undertaken elsewhere. Training and awareness raising are needed in Ministries of Health and educational institutions at all levels, and in community groups and the media.

Table 4. Climate resilient health systems in SIDS: Evidence

Evidence: <b>Building the business case for investment</b>	
<b>Building block</b>	<b>Status in SIDS</b>
Vulnerability, capacity, and adaptation (V&A) assessment	<p>V&amp;A assessments are an important component of developing Health National Adaptation Plans (HNAPs). Such assessments are underway or were conducted in many SIDS.</p> <p>Once initial V&amp;A assessments are undertaken, iterative processes need to be established to ensure appropriate policies and programs to manage risks as they change with climate and with development choices; more efforts are required in many Ministries of Health.</p> <p>HNAPs provide the overall strategic direction for strengthening health systems to protect health from climate change. They identify and address medium- and long-term adaptation needs, including upstream drivers of health risks, taking into consideration the physical, social, and biological determinants of health. The latter is particularly important in SIDS, where many countries are experiencing high burdens of non-communicable diseases and poverty, with many populations living in low-lying areas susceptible to sea level rise.</p>
Integrated risk monitoring and early warning	<p>Integrated risk monitoring brings together, at a minimum, health and environmental information to provide real-time perspectives of health risks. When there are sufficient data and strong enough associations, this information can be used to develop early warning and response systems that can provide timely warnings to save lives from heat-related illnesses and deaths; extreme events such as floods, droughts, and floods; and vector-borne diseases. Increased skill in forecasting El Nino events can inform health system preparedness and surveillance.</p>
Health and climate research	<p>Significant efforts are needed in SIDS to build the integrated surveillance and monitoring systems that are a foundation for understanding the associations between weather patterns and climate-sensitive health outcomes, projecting how risks could change with additional climate change, and developing early warning and response systems where possible. In situations where there are limited data, exposure-response</p>

relationships may need to be estimated based on analyses conducted in other regions.

National and regional research is needed to increase understanding of the health risks of climate variability and change at local to national scales; to identify additional adaptation policies and programs to prepare for and manage changing risk profiles; and to evaluate the effectiveness of implemented interventions. The precise research needs will vary across countries, and could be coordinated across countries to maximum results to ensure they are useful in multiple contexts, such as furthering understanding of outbreaks of vector-borne diseases across a region.

Table 5. Climate resilient health systems in SIDS: Implementation

Implementation: <b>Preparedness for climate risks, and health promoting mitigation policies</b>	
<i>Building block</i>	<i>Status in SIDS</i>
Climate resilient and sustainable technologies and infrastructure	<p>Critical components of climate resilient healthcare facilities include:</p> <ul style="list-style-type: none"> <li>• Structural safety in the face of increases in the frequency and intensity of extreme weather and climate events (e.g. building codes). For many SIDS, healthcare facilities are often located in low-lying areas subject to flooding and storm surges. Further climate change will decrease access to some facilities when floods and storm surges limit access, and will decrease their ability to offer services.</li> <li>• Non-structural safety issues such as ensuring access to safe water and improved sanitation, and providing energy access for all. Extreme weather and climate events, including floods and droughts, can compromise water availability and safety. Energy access is an important component of maintaining and improving population health.</li> <li>• Decreasing the carbon footprint of healthcare. Healthcare facilities are often a significant proportion of a country's greenhouse gas emissions, so reducing these emissions will both show the leadership of health systems and will reduce the magnitude and pattern of</li> </ul>

	health risks that will need to be addressed later this century.
Management of environmental determinants of health	Weather and climate are not the only drivers of climate-sensitive health outcomes. Travel and tourism can facilitate the introduction of vectors and pathogens. Increasing temperatures and health precipitation events can compound the health burdens associated with limited access to safe water and improved sanitation. Other environmental determinants of health where joint action is needed with other ministries and departments is air quality, water quantity and quality, food and nutrition security, and housing. Few SIDS have institutionalized the coordinated management needed to ensure health in all policies.
Climate-informed health programs	With climate change increasing the geographic range, seasonality, and incidence of climate-sensitive vector-, food- and water-borne diseases in some SIDS, health programs need to be modified to explicitly consider what, if any, adjustments are needed to manage the potential impacts of a changing climate. Similarly, adjustments may be needed to programs concerned with maternal and child health, WASH, nutrition, occupational health, emergency management, and mental health. The health risks of climate variability and change can affect nearly all programs within a ministry of health, requiring consideration of policies, regulations, standard operating procedures, and contingency plans. While progress in increasing climate resilience is underway in some SIDS, these efforts urgently need to be improved and expanded as risks increase. Further, many SIDS would benefit from closer integration of policies and programs to address adaptation, disaster risk management, and WASH, to increase resilience to a range of climate-related stresses.
Emergency preparedness and management	SIDS frequently experience extreme weather and climate events that can result in disasters because of high underlying geographic and socioeconomic vulnerabilities. Disaster risk management is a priority for most SIDS, although the extent to which health systems are integrated into national committees under the Sendai Framework and related activities varies. Further efforts are required to integrate climate change adaptation and disaster risk management programs; doing so can help protect communities in high risk regions.



Table 6. Climate resilient health systems in SIDS: Resources

Resources: <b>Facilitating Access to Climate and Health Finance</b>	
<i><b>Building block</b></i>	<i>Status in SIDS</i>
Climate and health financing	<p>Achieving a climate-resilient health system requires additional financing. Health systems do not have the resources to make all the adjustments necessary to increase resilience to a changing climate, such as building integrated surveillance systems that include health and weather data to identify where and when infectious disease outbreaks could occur. While much can be accomplished by mainstreaming climate change into policies and programs, the extent of changes required goes beyond the capacity of health systems in SIDS. Additional investment is needed to have the human and financial resources needed to ensure that all the building blocks of health systems are climate resilient.</p> <p>A proposal to the Least Developed Country Fund would provide additional funding for selected SIDS to develop comprehensive health national adaptation plans.</p>

## 4 Measuring success

Success will be measured with regards to the attainment of the goals designed for each of the four components of the initiative included above, namely:

1. **Empowerment:** The voice of health leaders, on behalf of the most vulnerable populations, becomes a driving force for adaptation in SIDS, and for mitigation by countries around the world.
2. **Evidence:** Health Ministries of SIDS have the necessary health, environment and economic evidence to support scaled up investment in climate change and health, identify priority investments, and monitor their success.
3. **Implementation:** Transformational change in health systems, through promoting a culture of disease prevention, building the climate resilience of health systems and maximizing the health co-benefits of climate change mitigation policies
4. **Resources:** Triple the current level of investment of climate finance for health in SIDS.

Success will also be measured by the contribution the SIDS initiative can provide to relevant SDG Goals, Targets and Indicators. Specifically, contributions to achieving SDG targets 13.1 (strengthening resilience and adaptive capacity to climate change), and 13.A (climate financing), and 13B (planning and management, including in SIDS); and where appropriate indicator 3.9.2 (mortality from unsafe WASH), 6.1.1 (safe drinking water), 6.2.1 (sanitation), and 7.1.2 (clean household energy). There are several other relevant goals, targets and indicators to which the initiative may directly or indirectly contribute. These are listed in Table 7.

Table 7. SDGs Goals, Targets and Indicators Relevant to the SIDS initiative

SDG1	End poverty in all its forms everywhere. The SIDS initiative contributes to <i>Target 1.5</i> , by 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters. Proposed indicators are <i>1.5.1</i> Number of deaths, missing persons and persons affected by disaster per 100,000 people; <i>1.5.2</i> Direct disaster economic loss in relation to global gross domestic product (GDP); and <i>1.5.3</i> Number of countries with national and local disaster risk reduction strategies.
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SDG2	<p>End hunger, achieve food security and improved nutrition and promote sustainable agriculture. Climate change in SIDS could impact on food production, leading to nutritional problems particularly in children. Indirectly the SIDS initiative contributes to <a href="#">Target 2.4</a>, by 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality. More specifically, the SIDS initiative will support the health sector regarding <a href="#">Target 2.2</a>, by 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons. WHO programs monitor the prevalence of stunting, wasting and overweight.</p>
SDG3	<p>Ensure healthy lives and promote well-being for all at all ages. The SIDS initiative directly contributes to this Goal, in particular to <a href="#">Target 3.9</a>, by 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. WHO monitors indicators, and produces data in support to indicators <a href="#">3.9.1</a> (Mortality rate attributed to household and ambient air pollution), and <a href="#">3.9.2</a> (Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)). There is a key resources related <a href="#">Target 3.C</a>, which proposes to substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and SIDS. One proposed indicator is <a href="#">3.C.1</a> (Health worker density and distribution).</p>
SDG4	<p>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Education is an important element of resilience, and a well-educated and informed society can make better choices regarding improving adaptation and resilience to climate change. Although indirectly, the Initiative supports <a href="#">Target 4.C</a>, by 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and SIDS.</p>
SDG5	<p>Achieve gender equality and empower all women and girls. Women have a key role in building adaptation and resilience. Empowering women, and women leaders, at every level, is essential to the success of the SIDS initiative. Therefore the Initiative supports <a href="#">Target 5.5</a>, ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.</p>
SDG6	<p>Ensure availability and sustainable management of water and sanitation for all. Safe drinking water and adequate sanitation are current problems in many SIDS which climate change will worsen without urgent action. The Initiative therefore supports <a href="#">Target 6.1</a>, by 2030, achieve universal and equitable access to safe and affordable drinking water for all, and its indicator <a href="#">6.1.1</a> Proportion of population using safely managed drinking water services. The Initiative also supports <a href="#">Target 6.2</a>, by 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention</p>

	to the needs of women and girls and those in vulnerable situations, to be measures by indicator <a href="#">6.2.1</a> Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water. A separate although related issue for many SIDS is water scarcity. Relevant to the Initiative are <a href="#">Target 6.4</a> , by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity. Similarly, <a href="#">Target 6.4.2</a> , level of water stress: freshwater withdrawal as a proportion of available freshwater resources. Community participation is indispensable for implementation, therefore relevant is also <a href="#">Target 6.B</a> , support and strengthen the participation of local communities in improving water and sanitation management.
SDG7	<a href="#">Ensure access to affordable, reliable, sustainable and modern energy for all</a> . Renewable energy, including for health care facilities is supported by the initiative, therefore highly relevant is <a href="#">Target 7.1</a> , by 2030, ensure universal access to affordable, reliable and modern energy services; and indicator <a href="#">7.1.2</a> Proportion of population with primary reliance on clean fuels and technology.
SDG8	<a href="#">Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</a> . Safe and secure working environments, including health care work, are also threatened by climate change. Thus, relevant to the Initiative is <a href="#">Target 8.8</a> , protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.
SDG9	<a href="#">Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</a> . Resilient health infrastructure is urgently required in many SIDS. The SIDS initiative contributes to <a href="#">Target 9.A</a> , facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and SIDS.
SDG10	<a href="#">Reduce inequalities within and among countries</a> . There are two targets relevant to the Initiative. The first addresses poverty, a key vulnerability in front of climate change. <a href="#">Target 10.1</a> proposes by 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average. The second focuses on economic and financial institutions. <a href="#">Target 10.6</a> states ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions.
SDG11	<a href="#">Make cities and human settlements inclusive, safe, resilient and sustainable</a> . Climate related disasters severely affect SIDS, and climate change threatens to make the problem worse. The SIDS initiative supports <a href="#">Target 11.5</a> by 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations. Indicators to measure this target are <a href="#">11.5.1</a> Number of deaths, missing persons and persons

	<p>affected by disaster per 100,000 people, and <a href="#">11.5.2</a> Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services. Importantly, the Initiative also supports <a href="#">Target 11.B</a>, by 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.</p>
SDG12	<p><a href="#">Ensure sustainable consumption and production patterns</a>. Environmentally sound technologies, including in the health sector, are an important contribution to mitigation. Relevant to the Initiative is <a href="#">Target 12.A</a>, support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production. A second concern are health-harming financial incentives such as fossil fuel subsidies, and which remove funding for other needed initiatives such as Universal Health Coverage. The Initiative supports <a href="#">Target 12.C</a>, rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities.</p>
SDG13	<p><a href="#">Take urgent action to combat climate change and its impacts</a>. The SIDS initiative supports <a href="#">Target 13.1</a>, strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries, to be measures as <a href="#">13.1.1</a> Number of countries with national and local disaster risk reduction strategies; and <a href="#">13.1.2</a> Number of deaths, missing persons and persons affected by disaster per 100,000 people. Highly relevant to the Initiative is <a href="#">Target 13.2</a>, integrate climate change measures into national policies, strategies and planning; <a href="#">Target 13.3</a>, improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning; <a href="#">Target 13.A</a>, on implementing financial commitments; and <a href="#">Target 13.B</a>, promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and SIDS, including focusing on women, youth and local and marginalized communities.</p>
SDG14	<p><a href="#">Conserve and sustainable use the oceans, seas and marine resources for sustainable development</a>. Relevant to the Initiative is <a href="#">Target 14.7</a>, by 2030, increase the economic benefits to SIDS and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.</p>
SDG15	<p><a href="#">Protect, restore and promote sustainable use of terrestrial ecosystems, sustainable manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</a>. Many SIDS are periodically affected by drought, floods and suffer from land degradation. Relevant to the Initiative is <a href="#">Target 15.3</a>, by 2030, combat desertification, restore degraded land and soil,</p>

	including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.
SDG16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels. Relevant to the Initiative are <i>Target 16.6</i> , develop effective, accountable and transparent institutions at all levels; <i>Target 16.7</i> , ensure responsive, inclusive, participatory and representative decision-making at all levels. The voice of SIDS in influencing global actions are important to the Initiative, therefore highly relevant is <i>Target 16.8</i> , broaden and strengthen the participation of developing countries in the institutions of global governance.
SDG17	Strengthen the means of implementation and revitalize the global partnership for sustainable development. Partnerships are a fundamental element of the SIDS initiative. Particularly relevant to the initiative is <i>Target 17.18</i> , by 2020, enhance capacity-building support to developing countries, including for least developed countries and SIDS, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts.



## 5 Progressing the SIDS initiative

During 2018, Regional action plans to implement the SIDS initiative will be developed in consultation with countries and in regional workshops as part of the overall Plan of Action to be submitted to the World Health Assembly in 2019. Although there is increasing level of awareness, and evidence of health impacts, there are important limitations in SIDS to carry out actions for resilience and adaptation to health and of the health sector.

### 5.1 Progressing on Empowerment

There are champions in SIDS, but many more are needed among health system leaders of the risks of climate change, to promote priority investments and interventions within and outside the health sector. Dr. Tedros Ghebreyesus identified climate change as one of WHO's priorities. Climate and other environmental changes will affect the other priorities by altering food- and water- security and safety, air quality, water and sanitation systems, and livelihoods. As a stress multiplier, climate change will increasingly lead to health emergencies; affect the health of women, children, and adolescents; and affect access to and the effectiveness of universal healthcare. WHO is committed to playing a key role in advancing adaptation and mitigation strategies for climate and other environmental changes, working in close partnership with other UN agencies and stakeholders. Similar champions are needed at national and subnational scales.

### 5.2 Progressing on Evidence

Health systems need to build consensus around indicators to track, evidence to assemble, and partnerships to enact the transformative changes needed. Metrics are essential, to clarify the scope of the problems and to monitor progress. WHO is monitoring the health impacts of climate change and progress in building climate resilient health systems mainly through the WHO-UNFCCC Climate and Health Country Profile project. The project aims to raise awareness of the health impacts of climate change, support evidence-based decision making to strengthen the climate resilience of health systems, and promote actions that improve health while reducing carbon emissions. The profiles provide country-specific estimates of current and future climate hazards and the expected burden of climate change on human health; identify opportunities for health co-benefits from climate mitigation actions; and track current policy responses at national level.

National progress on climate action in the health sector is tracked through a biennial WHO climate and health country survey completed by ministries of health, in collaboration with other relevant ministries. Findings from the survey are reflected in the country profiles with indicators in the following key areas: leadership and governance, national vulnerability and adaptation assessments, emergency preparedness, disease surveillance, adaptation and resilience measures, climate and health finance and mitigation action in the health sector.

In 2018, the WHO-UNFCCC climate and health country profiles will be developed for all SIDS through direct consultation with government/health authority focal points. Collection of data, for the SIDS country profiles will in part be generated through the WHO climate and health country survey (2017/2018) currently being conducted. WHO global monitoring efforts aim to be aligned with other global monitoring frameworks including the SDGs, the Sendai Framework for Disaster Risk Reduction, and the Lancet 2030 Countdown on Climate and Health.

### 5.3 Progressing on Implementation

The science is continuously progressing therefore information and awareness raising of the risks of a changing climate within and outside health systems is always required. When there is insufficient awareness choices may be taken that are unlikely to be robust to climate variability and change, increasing the vulnerability of population health.

Additional support is required for mainstreaming climate variability and change into policies and plans to manage the burdens of climate-sensitive health outcomes. Specific needs vary by country, with common challenges across the SIDS related to WASH, extreme weather and climate events, undernutrition, and emerging and re-emerging infectious diseases. Periodic reviews of best practices and lessons learned on health adaptation would be valuable to inform scaling up of adaptation efforts.

Health co-benefits of mitigation policies and technologies represent selected near term, positive consequences of climate policies that can offset mitigation costs in the short term before the beneficial impacts of those policies on the magnitude of climate change are evident. Low-carbon development is an approach for designing, building, operating, and investing in health systems and facilities that generate minimal amounts of greenhouse gases (WB, 2017). This approach aligns health development and delivery with global and national goals for reducing greenhouse gas emissions, to reduce the magnitude and pattern of health risks that health systems will need to manage later in the century. Low-carbon development saves money by reducing energy and resource costs. And it can improve the quality of care by increasing the resilience of healthcare facilities to extreme weather and climate events and other disasters. In low-resource, energy-poor settings, powering healthcare with low-carbon solutions can enhance access to care, with particular benefits for the poor and most vulnerable. Co-benefits of low-carbon development include improved health through reductions in environmental pollution and climate change, and more efficient and effective health systems.

### 5.4 Progressing on Resources

Increased investments, capacity building, and training to support the implementation of the initiative on climate change and health in SIDS is required. Compared with other sectors, international investment has been limited in health adaptation

programs and projects under the UNFCCC adaptation funds or through development partners. This means the health risks of climate change are an additional draw on scarce human and financial resources in SIDS that can ill-afford the additional health impacts and costs. With their greater vulnerability to climate change, human and financial resources for health adaptation in many SIDS is urgently needed. Because SIDS contributed very little to the greenhouse gas emissions driving anthropogenic climate change (on average, SIDS emit just 1.5% as much greenhouse gases as do high-income countries), international development funds and development partners have the responsibility under the UNFCCC to support SIDS in their transition to resilient and sustainable societies. Funding opportunities are described in table 8 (WHO, 2015b).

Financing needs to be increased to ensure sufficient human and financial resources to adapt and mitigate to promote climate-resilient health systems. Global, regional, and national guidance is needed for accessing international finance by SIDS for adaptation, including from the Green Climate Fund and the adaptation funds accessed through the Global Environment Facility. The Paris Agreement and supporting decisions include provisions on adaptation finance; these emphasize the Green Climate Fund's role as a key provider of predictable financial resources in the post-2020 framework. Funding is to be balanced between adaptation and mitigation initiatives, acknowledging the importance of sustainable development co-benefits and prioritizing action in LDCs and SIDS.

Table 8. Matrix of current and future funding opportunities for climate change and health

Funder	Description
<b><i>Green Climate Fund (GCF)</i></b>  <a href="http://www.greenclimate.fund/gcf-101/empowering-countries/readiness-support">http://www.greenclimate.fund/gcf-101/empowering-countries/readiness-support</a>	The GCF is the newest of the UNFCCC financial mechanisms, established in 2010. Created to support the efforts of developing countries to respond to the challenge of climate change. GCF helps developing countries limit or reduce their greenhouse gas (GHG) emissions and adapt to climate change, with equal amounts of funding to mitigation and adaptation. LDCs and SIDS are special priorities. GCF investments can be in the form of grants, loans, equity, or guarantees.
<b><i>GEF Special Climate Change Fund (SCCF)</i></b>  <a href="http://www.who.int/globalchange/projects/adaptation/en/">http://www.who.int/globalchange/projects/adaptation/en/</a>	SCCF is a special grants programme established by GEF to provide support for climate change and health adaptation to least developed countries.  Two types of grants are provided: 1. SCCF-A for adaptation 2. SCCF-B for technology transfer

<p><b><i>GEF Least Developed Countries Fund (LDCF)</i></b></p> <p><a href="https://www.thegef.org/project/building-resilience-health-systems-pacific-island-lDCs-climate-change">https://www.thegef.org/project/building-resilience-health-systems-pacific-island-lDCs-climate-change</a></p>	<p>The GEF fund is a grant to support climate and health adaptation in LDCs in support of national adaptation programme of action (NAPA) implementation, if health is identified as a priority, or via other priority sectors.</p>
<p><b><i>GEF Adaptation Fund (AF)</i></b></p> <p><a href="https://www.thegef.org/news/gef-and-adaptation-fund">https://www.thegef.org/news/gef-and-adaptation-fund</a></p>	<p>This GEF fund supports “concrete” projects on climate adaptation.</p> <p>For health, GEF-AF supports climate change monitoring of disease vectors, early warning systems, disaster risk reduction (DRR), and establishing regional centres for response to these events.</p>
<p><b><i>World Bank Pilot Programme for Climate Resilience</i></b></p> <p><a href="https://www.climateinvestmentfunds.org/fund/pilot-program-climate-resilience">https://www.climateinvestmentfunds.org/fund/pilot-program-climate-resilience</a></p>	<p>The World Bank (WB) provides climate change adaptation grants and highly concessional financing for investments (near zero% interest with up to 75% grant component) for mainstreaming climate-resilience development in all sectors.</p>
<p><b><i>EU Global Climate Change Alliance (EU GCCA)</i></b></p> <p><a href="http://www.gcca.eu/regional-programmes/gcca-pacific-small-island-states">http://www.gcca.eu/regional-programmes/gcca-pacific-small-island-states</a></p>	<p>The EU Global Climate Change Alliance provides grants and overseas development assistance, as well as adaptation plan technical assistance in non-LDCs, NAPA implementation in LDCs and adaptation in the water sector.</p> <p>It also provides support on DRR, including climate monitoring and forecasting, and data based preparedness measures.</p>
<p><b><i>World Bank International Development Association (WB IDA)</i></b></p> <p><a href="http://documents.worldbank.org/curated/en/672261468771858006/The-World-Bank-strategy-for-health-nutrition-and-population-in-the-East-Asia-and-Pacific-region">http://documents.worldbank.org/curated/en/672261468771858006/The-World-Bank-strategy-for-health-nutrition-and-population-in-the-East-Asia-and-Pacific-region</a></p>	<p>The WB IDA provides grants, loans and technical assistance for climate change adaptation to reduce poverty, promote growth, reduce inequalities, and improve living conditions.</p> <p>It also supports works on adaptation and mitigation for water and energy.</p>
<p><b><i>Global Facility for Disaster Reduction and Recovery (GFDRR)</i></b></p> <p><a href="https://www.gfdr.org/acp-eu/building-climate-and-disaster-resilience-in-the-pacific-with-risk-data">https://www.gfdr.org/acp-eu/building-climate-and-disaster-resilience-in-the-pacific-with-risk-data</a></p>	<p>The GFDRR provides grants for climate change adaptation, DRR, recovery, risk financing and insurance, and capacity building.</p>

Increasing resilience is likely to be achieved through longer-term, multifaceted and collaborative approaches, with supporting activities (and funding) for capacity building, communication, and institutionalized monitoring and evaluation. Adaptation projects would succeed by focusing not just on shorter-term outputs to address climate variability, but also on establishing processes to address longer-term climate change challenges. Opportunities for capacity development can be created, identified, and reinforced.

The need to work across sectors is well understood by all but it remains elusive. Addressing looming health challenge of climate change requires not only understanding health risks, but also working across departments within ministries of health and across ministries, in recognition that many of the drivers of greatest relevance to population health are not under direct health sector control. Ministries of Health in SIDS therefore have the opportunity to shift conceptualizations of problems, partnerships, and practice in strengthening health systems, moving from disease-oriented vertical approaches to system-wide transformation, emphasizing the fundamental role of learning.

## References

- Bowen K & Ebi K. Governing the health risks of climate change: towards multi-sector responses. *Current Opinion in Environmental Sustainability* 2015, 12:80–85
- Ebi KL, Ogden NH, Semenza JC, Woodward A, 2017. Detecting and attributing health burdens to climate change. *Environ Health Perspect*  
<https://doi.org/10.1289/EHP1509>
- Ebi K, Hallegatte S, Kram T, et al., 2014. A new scenario framework for climate change research: background, process, and future directions. *Climatic Change* (2014) 122:363–372 DOI 10.1007/s10584-013-0912-3
- EDGAR, 2018. European Commission Joint Research Centre. Emissions database for global atmospheric research (EDGAR).  
[http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts\\_pc1990-2013&sort=des4](http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts_pc1990-2013&sort=des4)
- IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 pp.
- McIver L, Kim R, Woodward A, Hales S, Spickett J, Katscherian D, Hashizume M, Honda Y, Kim H, Iddings S, Naicker J, Bambrick H, McMichael AJ, Ebi KL. 2016. Health impacts of climate change in Pacific island countries: a regional assessment of vulnerabilities and adaptation priorities. *Environ Health Perspect* 124:1707–1714; <http://dx.doi.org/10.1289/ehp.1509756>
- PAHO, 2011. Strategy and Plan of Action on Climate Change, 2012-2017 [Internet]. 51th Directing Council of PAHO, 63rd Session of the WHO Regional Committee for the Americas; 2011 Sep 26-30; Washington, DC.  
<http://iris.paho.org/xmlui/bitstream/handle/123456789/28467/CD51-6-e.pdf?sequence=1&isAllowed=y> (Resolution CD51.R15)  
<http://iris.paho.org/xmlui/handle/123456789/1717/>
- PAHO, 2014. Strategic Plan of the Pan American Health Organization, 2014-2019. Washington, D.C.: <https://www.paho.org/hq/dmdocuments/2017/paho-strategic-plan-eng-2014-2019.pdf>
- PAHO, 2015 Caribbean Environmental Health Conference. CCH III Review and CCH IV Planning Workshop Report.  
[https://www.paho.org/ocpc/index.php?option=com\\_docman&view=download&alias=77-2015-caribbean-environmental-health-conference-7&category\\_slug=workshops&Itemid=490](https://www.paho.org/ocpc/index.php?option=com_docman&view=download&alias=77-2015-caribbean-environmental-health-conference-7&category_slug=workshops&Itemid=490)
- PAHO, 2016a. Advancing the Caribbean Cooperation in Health: Review of CCH III and Preparation for CCH IV. Caribbean Regional Consultation.



[https://www.paho.org/ocpc/index.php?option=com\\_docman&view=download&alias=157-advancing-the-caribbean-cooperation-in-health-review-of-cch-iii-and-preparation-for-cch-iv&category\\_slug=cch-iii-caribbean-cooperation-in-health&Itemid=490](https://www.paho.org/ocpc/index.php?option=com_docman&view=download&alias=157-advancing-the-caribbean-cooperation-in-health-review-of-cch-iii-and-preparation-for-cch-iv&category_slug=cch-iii-caribbean-cooperation-in-health&Itemid=490)

- PAHO, 2016b. Working for Health in the Caribbean. Subregional Cooperation Strategy, 2016-2019. Washington DC.  
[https://www.paho.org/ocpc/index.php?option=com\\_docman&view=download&alias=79-paho-who-subregional-cooperation-strategy-9&category\\_slug=paho-who-subregional-cooperation-strategy-2016-2019-796&Itemid=490](https://www.paho.org/ocpc/index.php?option=com_docman&view=download&alias=79-paho-who-subregional-cooperation-strategy-9&category_slug=paho-who-subregional-cooperation-strategy-2016-2019-796&Itemid=490)
- PAHO, 2017. Smart Hospitals Toolkit. Washington, D.C.  
[http://iris.paho.org/xmlui/bitstream/handle/123456789/34977/9789275119396\\_eng.pdf?sequence=1&isAllowed=y](http://iris.paho.org/xmlui/bitstream/handle/123456789/34977/9789275119396_eng.pdf?sequence=1&isAllowed=y)
- PAHO, CARPHA, CIMH, 2017. Caribbean Health-Climatic Bulletin. 1 (1); 2017.  
[https://rcc.cimh.edu.bb/files/2017/06/Caribbean-Health-Climatic-Bulletin-May-2017\\_Vol-1\\_Issue-1.pdf](https://rcc.cimh.edu.bb/files/2017/06/Caribbean-Health-Climatic-Bulletin-May-2017_Vol-1_Issue-1.pdf)
- PAHO, 2018. PAHO/WHO Multi-Country Cooperation Strategy for Barbados and Eastern Caribbean Countries, 2018-2024.  
[https://www.paho.org/ecc/index.php?option=com\\_docman&view=download&alias=88-paho-who-multi-country-cooperation-strategy-for-barbados-and-eastern-caribbean-countries&category\\_slug=publications&Itemid=154](https://www.paho.org/ecc/index.php?option=com_docman&view=download&alias=88-paho-who-multi-country-cooperation-strategy-for-barbados-and-eastern-caribbean-countries&category_slug=publications&Itemid=154)
- UN, 2012. The future we want. Outcome document of the United Nations Conference on Sustainable Development Rio de Janeiro, Brazil, 20–22 June 2012.  
<https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf>
- UN, 2014. Resolution adopted by the General Assembly on 14 November 2014. 69/15. SIDS Accelerated Modalities of Action (SAMOA) Pathway. Outcome of the the Third International Conference on Small Island Developing States (SIDS Conference), 1-4 September 2014, Samoa.
- UNFCCC 2015. The Paris Agreement.  
[http://unfccc.int/files/essential\\_background/convention/application/pdf/english\\_paris\\_agreement.pdf](http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf)
- WHO, 2000. Climate Variability and Change and their Health Effects in Pacific Island Countries. Apia, Samoa, 25-28 July 2000.  
[http://apps.who.int/iris/bitstream/10665/66777/1/WHO\\_SDE\\_OEH\\_01.1.pdf](http://apps.who.int/iris/bitstream/10665/66777/1/WHO_SDE_OEH_01.1.pdf)
- WHO-PAHO, 2003. Climate Variability and Change and their Health Effects in the Caribbean: Information for Adaptation Planning in the Health Sector. Conference May 21-22, 2002. Workshop May 23-25, 2002. St. Philip, Barbados.  
[http://www.wmo.int/pages/prog/wcp/wcasp/meetings/documents/climate\\_variability\\_barbados\\_english.pdf](http://www.wmo.int/pages/prog/wcp/wcasp/meetings/documents/climate_variability_barbados_english.pdf)

- WHO, 2003. Synthesis Workshop on Climate Variability, Climate Change and Health in Small-Island States. Bandos Island Resort, Maldives, 1-4 December 2003 Maldives 2003. <http://www.who.int/globalchange/climate/en/oe0402.pdf>
- WHO, 2010. Vision 2030. The resilience of water supply and sanitation in the face of climate change. Technical report (G Howard and J Bartram).
- WHO, 2014. Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. [http://apps.who.int/iris/bitstream/10665/134014/1/9789241507691\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/134014/1/9789241507691_eng.pdf)
- WHO, 2015. Human health and climate change in Pacific Island Countries.
- WHO, 2015b. Operational framework for building climate resilient health systems. [http://apps.who.int/iris/bitstream/10665/189951/1/9789241565073\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/189951/1/9789241565073_eng.pdf)
- WHO, 2016. Preventing disease through healthy environments. A global assessment of the burden of disease from environmental risks. [http://apps.who.int/iris/bitstream/10665/204585/1/9789241565196\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/204585/1/9789241565196_eng.pdf?ua=1)
- WHO, 2017. Climate Change and Health in Small Island Developing States: WHO Special Initiative in collaboration with UNFCCC Secretariat and Fijian Presidency of COP-23. <http://www.who.int/globalchange/mediacentre/news/Global-change-special-Global-Initiative-External.pdf>
- WHO-WB, 2017. Healthy systems for universal health coverage - a joint vision for healthy lives.