



Australian
National
University

Consultancy to prepare a National Climate Change and Health Policy (NCCHP) and Revised Action Plan for the Republic of Marshall Islands

D2. Desktop Review, Outline of New NCCHP Policy, Contents of New Action Plan

April 2020

Authors: Sotiris Vardoulakis, Amelia Joshy, Lachlan McIver

National Centre for Epidemiology and Population Health

Research School of Population Health

College of Health and Medicine

+61 2 6125 0657

sotiris.vardoulakis@anu.edu.au

The Australian National University

Canberra ACT 2601 Australia

www.anu.edu.au

CRICOS Provider No. 00120C

Table of Contents

Summary	4
1. Review of Climate Change and Health Research, Policies and Plans	5
1.1. Introduction	5
1.2. Methods	5
1.3. Results / findings	6
1.3.1. Key Climate Change Policies, Reports and Initiatives in RMI	6
1.3.2. Key Climate Health Initiatives from other Pacific Island Countries	14
1.3.3. Climate-Related Health Impacts Relevant to RMI and Pacific Island Countries 15	
1.4. Discussion	21
1.5. Key climate-sensitive health risks and adaptation priorities	22
2. Outline of new National Climate Change and Health Policy	26
3. Contents of new National Climate Change and Health Action Plan	31
4. Documents Reviewed	33
Annex 1: Examples of climate-informed health interventions (WHO, 2015).....	40

Summary

Given the vulnerability of Republic of Marshall Island (RMI) to the impacts of climate change, the Government of RMI is aiming to develop a concise and comprehensive National Climate Change Health Policy (NCCHP) and a 5-year Action Plan to support the effective delivery of the NCCHP. The goal of the NCCHP and revised action plan is to improve the coordination and effectiveness of the RMI Environmental Health Unit and lead the country into a climate resilient future.

Specifically, this report includes: (i) a summary of the key findings from the desktop review of relevant policy documents, plans and scientific articles; (ii) a short outline of the new National Climate Change and Health Policy; (iii) a Table of Contents for the new Action Plan; and (iv) a list of key references.

This literature review has discussed relevant policies, plans and initiatives from RMI and the Pacific region, and identified the key priority areas for the RMI National Climate Change and Health Policy and 5-year Action Plan.

To achieve measurable outcomes in the next five years, the new RMI National Climate Change and Health Policy will need:

- To build on existing RMI policies and frameworks
- Extensive internal (MOHHS) and external consultation and communication.
- Strong leadership, a committed local “champion” (from the MOHHS), endorsement by government, and ownership by local communities.
- A realistic implementation plan and a mechanism for attracting and absorbing funds from donors.

In the development of the National Climate Change and Health Policy and 5-year Action Plan for RMI, we propose to follow four strategic lines of action:

- Empowerment: Supporting health leadership to engage locally, nationally and internationally.
- Evidence: Identify priorities and gaps, and build the business case for investment.
- Implementation: Preparedness for climate risks, and health-promoting mitigation policies.
- Resources: Facilitating access to climate and health finance.

1. Review of Climate Change and Health Research, Policies and Plans

1.1. Introduction

This desktop review aims to identify the key climate related health risks and vulnerabilities, and related policies and activities in the Republic of Marshall Islands (RMI) and the Pacific region more broadly, to inform the development of a revised National Climate Change Health Policy and a 5-year Action Plan for RMI.

To achieve this, we have carried out a rapid review of climate change and health research, initiatives, policies and plans relevant to the RMI that have been published in the scientific literature or are publicly available through government and international organisation websites.

On the basis of this review, and after consultation with key stakeholders at the RMI Ministry of Health and Human Services (MOHHS) and the Pacific Community (SPC), we have developed an outline and table of contents for the new National Climate Change Health Policy and a 5-year Action Plan for RMI.

1.2. Methods

A comprehensive search was performed in the following databases: Web of Science and Google Scholar. Various combinations and variation of the keywords 'climate change AND health AND Marshall Islands OR RMI', 'climate change AND health AND pacific island', 'climate change policies AND Marshall Islands OR RMI', 'climate change health policies AND Marshall Islands OR RMI' and 'climate change health policies AND pacific island' were utilised to conduct the searches. The limits for the database search included English language papers with no date of publication limitations. Titles and abstracts were screened to identify the relevance of the journal articles. Additional papers were identified via hand searches of reference lists.

An extensive search of the grey literature was conducted using Google, World Health Organization archives, Pacific regional bodies and other non-government relevant organisations such as the Pacific Community (SPC). Papers were only included if they related to the impacts of climate change on human health in the Marshall Islands or the Pacific Island Regions. Papers which examined the health impacts of climate change on animals/sea life were excluded.

1.3. Results / findings

1.3.1. Key Climate Change Policies, Reports and Initiatives in RMI

The overarching climate change policies which have either guided or complemented the previous RMI National Climate Change Health Action Plan (NCCHAP) 2012 have been listed below. The policies listed below largely pertain to RMI's climate change response on a more general level. Due to the focus on climate change related health priorities, the NCCHAP does not reflect all aspects of the following plans/policies. However, the following documents have direct and indirect implications for RMI's climate change and health response. Thus, these documents shaped the development of the previous NCCHAP (2012) to varying degrees. In many respects, the following policies and plans laid a substantial foundation on which the previous NCCHAP (2012) was developed and will be relevant to the development of the revised policy and 5-year action plan.

RMI's Strategic Development Plan Framework "Vision 2018"

Vision 2018 was created as one of the first segments of RMI's Strategic Developmental Framework 2003-2018. Vision 2018 sets out RMI's long term strategic developmental priorities/interest. Of the 10 goals outlined in this plan, a national response to climate change was linked to 2 of them. Climate change is explicitly acknowledged to affect the country's future development. Vision 2018 called for the development of 'Master Plans' (outlining sector specific policies) and strategic 'Action Plans'. These policies and plans would support the goals of Vision 2018. They were envisioned to provide a comprehensive pathway through which different sectors could contribute towards the implementation of Vision 2018. Vision 2018 is a guide that inspired further policies and actions which respond to climate change.

Links to NCCHAP: The principles of sustainable development outlined in Vision 2018 inspired and guided much of the following efforts to reduce the risk of climate change including RMI's National Climate Change Policy Framework and RMI's Joint National Action Plan. These documents were highly influential in the development of the previous NCCHAP (2012). The NCCHAP (2012) aligns with and builds upon the goals outlined in Vision 2018.

Public Health, Safety and Welfare Act 2004

The 'Public Health, Safety and Welfare Act' aims to improve and maintain health and sanitation conditions in RMI. This Act sets the standards for waste disposal, food hygiene and the inspection of service establishments. With respect to the health impacts of climate change, this legislation plays an important role in reducing the transmission of

communicable diseases and provides standards of practice for public and private service establishments.

RMI Climate Change Roadmap (CCR, 2010)

This document outlines immediate priorities that RMI must take to respond to climate change. The Roadmap was highly influential in establishing an institutional and strategic implementation framework for a co-ordinated multi-sectoral climate change response. It was suggested that a National Climate Change Policy Framework (NCCPF) should be developed and that a National Committee on Climate Change should be established to oversee future efforts relating to climate change.

Links to NCCHAP: The Roadmap cemented the urgent need for further work on RMI's response to climate change. The previous NCCHAP (2012) was largely informed by the NCCPF which was an output of the CCR. Thus, the CCR had an indirect contribution towards the development of NCCHAP 2012.

RMI National Climate Change Policy Framework (NCCPF, 2011)

The NCCPF outlines 5 goals aimed at reducing projected climate-related risk. These goals primarily focus on the development of climate change adaptation, energy security measures, and increasing RMI's preparedness towards climate variability. The NCCPF was largely informed by Vision 2018, RMI's CCR and other sector-specific plans/policies. The National Climate Change Council developed the NCCPF to build upon existing policies and intersectoral frameworks to ensure an integrated, efficient response. The strategic goals and associated outcomes established in the NCCPF are aligned with the sustainable development goals outlined in Vision 2018.

Links to NCCHAP: The NCCPF informed and guided the Joint National Action Plan and subsequently the NCCHAP (2012). Although the scope and focus of these action plans differ, both were created to ensure that the goals and outcomes outlined in the NCCPF are achieved.

First Pacific Regional Climate Change and Health Symposium, Fiji, 2012.

To further inform and discuss national and regional climate change and health initiatives, the first Pacific Regional Climate Change and Health Symposium was held from 13 to 15 September 2012. The symposium was hosted by the University of Fiji and supported by the Secretariat of the Pacific Community, the World Health Organization and the Fiji Ministry of Health. The event brought together over 130 key stakeholders from a number of Pacific Island countries and territories, as well as Australia, New Zealand, Japan and Korea. They included researchers, academics, policy-makers, representatives from

government and non-government sectors, and students. The purposes of the event were to discuss the unique health vulnerabilities of Pacific communities in the context of climate change, present the latest research findings, and plan strategies to manage these risks. The theme was “Improving health through adaptation – strengthening health systems to protect Pacific Island communities from the health impacts of climate change”. The symposium was divided into presentations, breakout sessions, roundtable discussions and panel discussions. McIver et al. (2013) presented the abstracts of the oral and poster presentations, and the outcome statement from the symposium. The statement included the following priorities for health adaptation and mitigation:

- Move beyond a disaster framework to consider climate variability.
- Replicate research and good practices.
- Map risks, threats, and health outcomes of climate change.
- Integrated, multi-disciplinary methodologies.
- Consider impacts of increased air temperature.
- Progress towards a ‘One Health’ approach, combining human, animal and environmental health perspectives.
- Incentives for community participation.
- Improve community-based surveillance.
- Utilise information and communication technologies (where appropriate), such as mobile phones for information, early warnings.
- Include remote/rural areas/outer islands.
- Explore traditional medicines/techniques (e.g. for treatment of ciguatera fish poisoning).
- Improve local and regional climate change and health governance.
- Improve monitoring and evaluation methods.
- New and additional funding for climate change and health research and adaptation.
- Adopt a more proactive, preventative approach (e.g. early warning systems; risk reduction).

RMI National Study on Family Health and Safety (2014)

This study was an initiative of the Ministry of Internal Affairs and managed by Women United Together Marshall Islands. The study aimed to collect information about (i) The nature (prevalence, frequency and types) of violence against women, (ii) The extent to which violence against women is associated with a range of health and other outcomes, (iii) Protective and risk factors for violence against women by a partner, and (iv) Coping strategies and services used by women facing domestic violence and perceptions about domestic violence against women.

Links to NCCHAP: The study did not make explicit reference to climate change and related impacts. However, climate change is recognized as a serious aggravator of gender-based violence. In other parts of the world, climate change-induced crises have been shown to worsen domestic violence, whether in relation to sexual and reproductive health or discrimination against indigenous communities (UNFCCC, 2019).

RMI Joint National Action Plan (JNAP, 2014) for Climate Change Adaptation and Disaster Risk Management

The main aim of the JNAP was to improve the resilience of Marshallese people to the negative effects of climate change. The JNAP was developed as the primary mechanism through which the NCCPF would be implemented. This document built upon the NCCPF and the Disaster Risk Management National Action Plan (DRM NAP). The JNAP superseded the DRM NAP once it was finalised. A review of the DRM NAP highlighted a need for a comprehensive plan which addressed both disaster risk management and climate change adaptation. The links between climate change disaster risk management and climate change adaptation suggested that an integrated action plan would be more efficient. Furthermore, the NCCPF did not establish clear strategies or actions. The JNAP aimed to fill these gaps allowing the implementation of the goals established in the NCCPF and Vision 2018. The JNAP's strategic goals are as follows:

- 1. Establish and support an enabling environment for improved coordination of disaster risk management /climate change adaptation in the Marshall Islands**
- 2. Public education and awareness of effective CCA and DRM from local to national level**
- 3. Enhanced emergency preparedness and response at all levels within the Marshall Islands**
- 4. Improved energy security, working towards a low carbon future for the Marshall Islands**
- 5. Enhanced local livelihoods and community resilience for all Marshall Islands people**
- 6. Integrated approach to development planning including consideration of climate change and disaster risks**

JNAP includes a Results Matrix (Annex 2) in which objectives, actions, results (outcomes/outputs), lead agency, supporting agencies, indicators, and indicative costs are specified for each goal.

Links to NCCHAP: The previous NCCHAP (2012) was intended to be the key instrument through which the Ministry of Health and Human Services (MOHHS) contributes to the JNAP. Under JNAP Goal 5: Enhanced local livelihoods and community resilience, the following health objective (5.3) is listed: Address the issue of climate-related health impacts, including socioeconomic impacts; with the following actions: 5.3.1 Conduct assessment on the potential impact of climate change on health, including vector borne

diseases such as dengue fever; 5.3.2 Provide institutional strengthening of the health sector on the issue of climate change and other risks relating to health. Results: Greater understanding of links between climate change and health; and reduced number of vector borne disease cases. Lead agency: MOHHS. Supporting agencies: Environmental Protection Agency (EPA), Weather Service Office (WSO), Local Government, and the Company Security Office (CSO). Indicator: Number of cases of vector borne disease. Cost: \$289,443

RMI 3-Year Rolling Strategic Plan 2017-2019

This plan was developed after conducting reviews of previous plans and aimed to address unaccomplished activities and gaps identified in them. This revolving 3-year plan outlines specific objectives and required actions in 6 outcome areas. These areas include (i) Bureau of Primary Health Care Services, (ii) Majuro Hospital Services, (iii) Kwajalein Health Care Services, (iv) Bureau of Administration, (v) Office of Health Planning, Policy & Statistics and (vi) 177 Health Care Program. The objectives were derived from recurring, specific themes identified from the review. The desired outcomes were developed to be measurable results of the successful implementation of actions. The actions were strategies for addressing objectives and actualising the stated outcomes.

Links to NCCHAP: This document does not specifically refer to climate change. The leadership and structure of the MOHHS has changed since the publication of this Plan.

Climate Change and Health in Small Island Developing States: WHO Special Initiative in collaboration with UNFCCC Secretariat and Fijian Presidency of COP-23

This initiative, launched in 2017, aims to provide national health authorities in Small Island Developing States (SIDS) with the political, technical and financial support, and the evidence, to better understand and address the effects of climate change on health including those mediated via climate change impacts on the main determinants of health (e.g. food, air, water and sanitation, vectors); improve the climate-resilience and environmental sustainability of health services; and to promote the implementation of climate change mitigation actions by the most polluting sectors (e.g. transport, energy, food and agriculture) that maximize health co-benefits, both within and outside SIDS (WHO, 2018a).

The initiative also aimed to lead the way in transforming health services in SIDS away from the current model of curative services with escalating costs, and towards disease prevention, climate resilience, and sustainability. It also aimed to implement approaches for WHO to work in a more integrated way both across its own programmes (e.g., environmental health, worker's health, health systems strengthening, emergency preparedness and response, food security and nutrition), and with other partners.

The initiative has four components, as follows (WHO, 2018a):

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

Pacific Islands Action Plan on Climate Change and Health (WHO, 2018b)

This Action Plan is a product of the Meeting to Develop the Pacific Action Plan for the WHO Initiative on Climate Change and Health in Small Island Developing States (SIDS), organized as part of the Third Global Conference on Climate Change and Health, held in Nadi, Fiji, 15-16 March 2018. This action plan uses the four components outlined above (empowerment, evidence, implementation, resources).

The Republic of the Marshall Islands Nationally Determined Contribution (NDC)

This document outlines RMI's timeline for phasing out greenhouse gas consumption and moving towards 100% renewable energy. The NDC also committed RMI to establishing necessary frameworks such as a National Adaptation Plan (NAP) by the end of 2019 at the latest that specified short, medium and long-term milestones to adapt to the impacts of climate change and transition to climate resilience. The plan would need to suggest implementation measures and include a plan to generate the necessary funding. The NDC committed to submitting an Adaptation Communication to the UNFCCC by 2020.

Furthermore, a commitment was made to utilising a gender-responsive and human rights-based approach in all NDC-related planning, programming and implementation and to use the latest Intergovernmental Panel on Climate Change (IPCC) guidelines in the future.

Links to NCCHAP: The NDC mainly covers the sectors of energy and waste, and notes that emissions from other sectors are negligible. RMI's Tile Til Eo 2050 Climate Strategy is annexed to the NDC document for information purposes (it does not form part of the NDC).

Tile Til Eo 2050 Climate Strategy "Lighting the way" (2018)

This development strategy outlines recommendations and actions which would provide a long-term pathway to ensure that the target of net zero emissions by 2050 is met. This goal is aligned with fulfilling RMI's NDC and the Paris Agreement. The recommendations and actions specified aim to ensure a smooth transition to 100% renewable energy and strengthen RMI's resilience to climate change. The key objective outlined in this document is to facilitate adaptation and climate resilience in a way that ensures the future protection

and prosperity of the country and its women, men and youth. The 2050 Strategy highlights a need for further studies and pilot projects, which focus on the actions with the highest potential to transform RMI's energy usage and accelerate the shift away from emissions-intensive practices.

Links to NCCHAP: A key recommendation of the Tile Til Eo 2050 Climate Strategy is to include health considerations as part of RMI's National Adaptation Plan. As a starting point, studies should be undertaken to develop a better understanding of climate-related health impacts in RMI, including on vulnerable groups.

5th Meeting on Climate Change and Health. Asia-Pacific Parliamentarian Forum on Global Health. Nadi, Fiji, 20-22 August 2019.

The meeting aimed to enhance the role of parliamentarians in addressing the health impacts of climate change. Participants from 20 countries highlighted the role that parliamentarians can play in achieving health in the Sustainable Development (SDGs) through their power to enact legislation, pass budgets, mobilize resources, and ensure government accountability and transparency. Parliamentarians were presented with information highlighting the breadth of the health impacts of climate change in Asia and the Pacific and the immediacy of the threat that climate change poses to human health. Parliamentarians adopted the Nadi Communique, declaring climate change to be a crisis that presents one of the most critical threats to health in all countries in Asia and the Pacific.

Links to NCCHAP: The forum noted that the very existence of some nations is at risk and recognized that a failure to act on the climate crisis will result in preventable injuries, illnesses, and deaths. Parliamentarians urged their fellow parliamentarians to strengthen legal frameworks, advocate for the inclusion of health in all relevant portfolios, and engage in international partnerships, platforms and coalitions to address the climate crisis and the health impacts it creates.

Addressing Climate Vulnerability in the Water Sector (ACWA) in the Marshall Islands, funded by the Green Climate Fund¹ (2019-2026).

This project aims to support the Government of RMI in adapting to increasing climate risks, particularly more frequent and extreme droughts, which impact the country's drinking water supply.

The population and infrastructure of RMI are concentrated in small, low-lying islands and atolls, which are highly susceptible to sea level rise, changes in weather patterns, and extreme weather events.

This project will increase the resilience of water resources for drinking and hygiene in the Marshall Islands. Planned interventions include improving household and community rainwater harvesting and storage structures, and securing groundwater resources from seawater intrusion. The project will also strengthen the technical capacities of national and subnational institutions and key stakeholders to integrate climate change risks into water governance processes. This project has an estimated lifespan of 7 years. Total project value USD 24.7 million.

Pacific Resilience Project Phase II for RMI, funded by the Green Climate Fund (2019-2024).

This project aims to enhance the resilience of people in RMI to long-term climate change through coastal protection to protect lives and property from inundation.

The islands of RMI - one of the world's smallest, most isolated, and low-lying nations - are highly vulnerable to climate change. RMI is threatened by sea level rise, changes in wave and storm patterns, and coastal inundation. The average annual loss to the nation related to typhoons and tsunamis is estimated to be about 1.7 percent of its GDP, equivalent to USD 3 million. This figure is expected to be much higher during the next 50 years.

The project will focus on enhancing the resilience of coastal infrastructure in the densely populated areas of the capital Majuro and the island of Ebeye. It will include strengthening institutions and improving access to early warning and disaster preparedness. The proposed coastal infrastructure intervention has been shown to be the only feasible option to protect people and assets against sea level rise and storms. The project has an estimated lifespan of 5 years. Total project value USD 44.1 million.

¹ The Green Climate Fund (GCF) is the world's largest dedicated fund helping developing countries reduce their greenhouse gas emissions and enhance their ability to respond to climate change. It was set up by the United Nations Framework Convention on Climate Change (UNFCCC) in 2010. GCF has a crucial role in serving the Paris Agreement, supporting the goal of keeping average global temperature rise well below 2 degrees C. It does this by channelling climate finance to developing countries, which have joined other nations in committing to climate action.

1.3.2. Key Climate Health Initiatives from other Pacific Island Countries

Palau National Environmental Health Action Plan (NEHAP, 2004)

The Palau NEHAP was developed to address the national health impacts of environmental hazards including climate change. This initiative aimed to direct the provisions of national environmental health services across 2004-2007. The action plan outlined strategic approaches to improve environmental health in 8 key areas and partnerships within the community who can facilitate the implementation of the strategies. The key areas of focus include (i) Environmental Health Administration, (ii) Community Environmental Health Development, (iii) Consumer Safety, (iv) Vector Control & Health Quarantine, (v) Emerging Issues, (vi) Health Education & Promotion, (vii) Environmental Health Information System, Epidemiology, (viii) Human Resource Development.

Links to NCCHAP: This Plan, which encompasses climate change, may not be currently in force.

Palau Climate Change Policy for Climate and Disaster Resilient Low Emissions Development (2015)

This policy was developed through a 2-year participatory sector-based consultation process. Ten sectors that were identified to be being impacted by climate change were involved in the process. The policy recommended objectives and priorities which aimed to (i) enhance adaptation and resilience to climate change, (ii) manage disasters and minimise disaster risk and (iii) mitigate climate change by transitioning into a low emission future. The policy included a 5-year costed action plan. Each action outlined in the plan was assigned to lead and supporting agencies who would be responsible for the implementation of the specific action. The items on the action plan described the actions necessary to achieve the objective and priorities outlined in this policy. The action plan was designed to be evaluated and updated in 5-year increments.

Links to NCCHAP: This ambitious Policy includes a costed Action Plan and identifies three priorities for the health sector mainly related to rising sea levels and extreme weather events: (1) Disruption of food supply/production systems, with increases in poor nutrition and non-communicable diseases (NCDs); (2) Damage or destruction of infrastructure (water, sewage, power, health etc.) and disruption in community health services; (3) Increases in water-borne and vector-borne diseases.

The interventions to address these priorities are: (1) Strengthen the capacity and resilience of existing health infrastructure; (2) Strengthen resilience within vulnerable communities including persons with disabilities; (3) Improve health services communication systems and preventative health services to build resilience to water-borne and vector-borne diseases.

The financial needs for the implementation of this Strategy were costed, with the costs for implementing the health priority interventions (first 5 years) being USD 3,500,000.

Climate Change and Health Strategic Action Plan (CCHSAP) 2016 – 2020: Building Climate Resilient Health Systems in Fiji

This plan was developed by Fiji's Ministry of Health and Medical Services (MOHMS) to identify and address the health risks posed by climate change, to ensure sustainable developments both within and outside the MOHMS.

Links to NCCHAP: Guided by the 10 components outlined in WHO's Operational Framework for building climate resilient health systems, the CCHSAP suggests adaptation measures for health systems to respond to both current and future health risks associated with climate change.

1.3.3. Climate-Related Health Impacts Relevant to RMI and Pacific Island Countries

From the scientific literature review, 45 peer-reviewed journal papers were identified that related to health impacts of climate change in RMI and Pacific Island countries. Only 2 of the 31 papers exclusively studied climate-related health vulnerabilities in RMI. Nineteen papers focused on a broader population base, namely Pacific Island Developing Countries (PIDC) and Small Island Developing Countries (SIDC). RMI falls into both these broader categories, thus these studies are relevant to RMI. The other 9 papers identified examined climate-related health vulnerabilities in surrounding countries with comparable profiles to RMI. The main climate-related health vulnerabilities identified within the searches included: (i) vector borne and zoonotic diseases, (ii) diarrhoeal diseases, (iii) food/nutrition security, non-communicable diseases, obesity, malnutrition and stunting, (iv) mental health issues, (v) respiratory diseases (including tuberculosis and COVID-19), (vi) measles, and (vii) ciguatera. These results align with literature reviews investigating the health impacts of climate change within the Pacific region (McIver et al., 2016).

Vector-Borne and Zoonotic Diseases

(6 papers reviewed)

The main vector borne infectious diseases which pose a considerable risk to PIDC include: zika virus (ZIKV), dengue virus (DENV) and chikungunya (CHIKV) (Canyon et al., 2016; Leal et al., 2019; Descloux et al., 2012). ZIKV, DENV and CHIKV viruses are transmitted by *Aedes* mosquitoes. Most people presenting with one of these viral infections experience relatively mild symptoms and fully recover. However, in rare cases these viruses can

cause hospitalisation or death (Leal et al., 2019). In 2007 the ZIKV emerged in Micronesia and had spread to RMI by 2016. The CHIKV also became endemic in RMI (Canyon et al., 2016). More recently, DENV outbreaks have occurred in RMI. Extreme weather events such as droughts and high temperatures caused by climate change are projected to exacerbate the transmission of vector borne diseases (Ebi et al., 2006).

In addition to vector borne diseases, RMI has been affected by zoonotic diseases. Leptospirosis is the most common zoonotic disease in RMI and more broadly among PIDC (Canyon et al., 2016). Leptospirosis is a bacterial infection that humans contract through direct exposure to an infected animal or indirectly, e.g. through exposure to water or soil contaminated by urine of an infected animal. Factors such as flooding, high rainfall and other natural disasters have been strongly associated with leptospirosis outbreaks. Climate variability is predicted to increase the severity of these factors (Lau et al., 2016).

Primarily, preventative strategies for vector borne and zoonotic diseases rely on personal protective behaviours. Increasing personal protective behaviours requires behavioural modification and increased awareness (Canyon et al., 2016). Reviews suggest that additional funding for educational programs are required to improve personal protective behaviours (Ebi et al., 2006). A more recent approach to controlling vector borne diseases involves curtailing the transmission of disease by blocking the replication of the virus (Leal et al., 2019). It is also important to improve disease surveillance to ensure outbreaks are detected early and contained (McIver et al. 2014).

Diarrhoeal Diseases

(3 papers reviewed)

Studies and reviews which have looked at the impact of climate change suggest that diarrhoeal diseases are linked to extreme weather events (Ebi et al., 2006; McIver et al., 2017; Singh et al., 2001). Specifically, decreased water availability and extremely high rainfall are positively associated with diarrhoeal disease (Singh et al., 2001). Flaws in key infrastructure compromise waste sanitation and drinking water supply in many PIDC including RMI. The confluence of these factors exacerbates the risk of diarrhoeal diseases (Ebi et al., 2006).

Food Security, Non-communicable Diseases, Obesity Malnutrition and Stunting

(15 papers reviewed)

Climate change is predicted to have a significant impact on food security in many PIDC (Savage et al., 2020). Food insecurity in PIDC is related to lack of access to nutritional food sources rather than general food availability (McCubbin et al., 2017). Access to fish will likely decrease due to the adverse impacts of climate change on coastal fisheries and

coastal aquaculture (Cvitanovic et al., 2016). This is a concern for many PIDC where fish consumption accounts for up to 90 percent of dietary protein (Jenkins et al., 2018). Dietary trends in PIDC have also shifted away from traditional foods towards imported, processed foods (Connell, 2015). Other impacts of climate change such as droughts and further intrusion of saltwater adversely impact agriculture and increase dependence on imported foods (Ahlgren et al., 2014).

The reviewed evidence suggests that food insecurity is indirectly linked to a higher prevalence of non-communicable diseases (NCDs) and malnutrition (Barnett, 2011). There is increasing availability of processed food, which has a high caloric, sugar and trans-fat content. Poor nutritional choices have also been linked to an increase in malnutrition among children (Ahlgren et al., 2014; Jung et al., 2018). These types of foods are causal factors of obesity (Sarfati et al., 2019). Obesity is an important risk factor of many NCD's including cardiovascular disease, cancer and diabetes (Smith, 2019). The prevalence of obesity and NCD's among PIDC populations far exceeds global standards. If the percentage of people affected by NCDs remains the same, health inequality between PIDC and the rest of the world is projected to grow (Matheson et al. 2017).

In RMI, dependency on Western foods and a loss of traditional food practices has encouraged the consumption of high fat foods. Gittelsohn et al. (2003) reported that nearly three quarters of women in RMI are overweight or obese. Obesity in women was associated with greater age, higher education and more imported food consumption. The same study also reported that over a third of children in RMI (ages 1-5 years) were stunted, with stunting associated with worse economic status, less active feeding, increased consumption of imported foods and urban residence (Gittelsohn et al., 2003).

High child undernutrition, maternal overweight and obesity, and micronutrient deficiencies also exists in Kiribati, with children under 5 years disproportionately affected (Kodish et al., 2019). Approximately 80% of Kiribati women are overweight and 50% are obese. A study from Vanuatu indicated higher adult obesity prevalence in urban areas, but also highlighted an emerging obesity risk among girls from a rural island where the tourism industry increased rapidly after malaria eradication (Dancause et al., 2012). Multiple factors might contribute to high obesity risk, including stunting, biological responses after malaria control, sleeping patterns, diet and physical activity levels.

The absence of traditional food sources affects lifestyle choices more broadly. The traditional farming and fishing practices are slowly eroded as traditional food sources diminish. This change in lifestyle ultimately shifts towards a more sedentary way of life. Physical inactivity is also linked with NCDs (Smith, 2019). Initiatives which aim to change food or lifestyle choices should ideally be owned and driven by local communities, to ensure that changes are sustainable (Hoy et al., 2014). Policies in this area should adopt a multidisciplinary approach that takes into account both environmental and public health priorities (Kingsley et al., 2015).

Mental Health Issues

(6 papers reviewed)

Research into climate change-related mental health in RMI and surrounding PIDC has mainly focused on distress experienced while preparing for a disaster, during an ongoing disaster situation, and/or post-disaster (Asugeni et al., 2015; Dawes et al., 2019; Zahlawi et al., 2019). A study conducted in the Solomon Islands examined participants' thinking and behaviour relating to sea level rise. Participants expressed worry and reported that their worry affected individual and community behaviour (Asugeni et al., 2015). This is consistent with other studies conducted in SIDC which reported a strongly negative correlation between drought and life satisfaction. A weak negative correlation between floods and life satisfaction was also observed (Lohmann et al., 2019). A study based in Tuvalu found that distress was linked to both ongoing and predicted climate change impacts (Gibson et al., 2019).

This area requires more research as there are few empirical papers on the mental health and psychosocial impacts of climate change in RMI and PIDC (Asugeni et al., 2015). Health system facilities and resources should also be reviewed in relation to mental health. Often PIDC's have struggled with fragmented health care systems and lack of trained health professionals. The capacity of health systems to cope with disaster situations and adapt to the impacts of climate change has been consistently identified as a barrier to well-being in PIDC (Ibell et al., 2015).

Respiratory Diseases

(6 papers reviewed)

Increased risk of a wide range of respiratory diseases including asthma, tuberculosis and pneumonia has been associated with climate variability (McIver et al., 2016; McIver et al., 2014).

Tuberculosis in particular, has a high prevalence in RMI, affecting approximately 1 in 200 people (McIver et al., 2015; Yamada et al., 2016). Overcrowding, NCDs, food/water insecurity, and poor sanitation have been identified as indirect risk factors for tuberculosis. Climate variability has a negative impact on these factors. Extreme weather events can be followed by the need to provide accommodation in crowded conditions or displacement, which increase the risk of the rapid spread of a range of infectious respiratory diseases. The convergence of these factors due to the fragile environment considerably increases the risk of tuberculosis in Pacific atoll countries (McIver et al., 2015). Tuberculosis screening and elimination programmes were conducted in RMI (Majuro and Ebeye) in 2017-2018 (Louie, 2018, Brostrom et al., 2018).

The coronavirus disease 2019 (COVID-19) that first emerged in Wuhan has quickly spread to many countries in the Western Pacific Region. Pacific Island countries or territories have reported imported and locally transmitted COVID-19 cases, including in Fiji, Papua New Guinea, Guam, French Polynesia, and New Caledonia. Given the limited resources for emergency preparedness and disease control in PIDC, it would cause a serious crisis if COVID-19 broke out in Pacific islands (Mei and Hu, 2020). Compared with other countries in the Western Pacific Region, there is a significant lag in the onset time of initial infected cases in these islands, which may reflect their remoteness. Graig et al., (2020) have assessed the COVID-19 importation risk into the Pacific Islands.

Although published literature on COVID-19 in the Pacific is currently very limited as it is a recent outbreak, we can link COVID-19 to reduced opportunities to conduct disease surveillance in RMI due to ongoing travel restrictions. Travel restrictions may hinder the progress of initiatives to combat climate change, but on the other hand they reduce carbon emissions from air travel. The COVID-19 pandemic may also affect perceptions of food security, food safety, hygiene issues (such as handwashing, water quality, air quality) and place additional pressure on the health infrastructure of RMI.

Measles

(7 papers reviewed)

Measles is one of the world's most contagious diseases, with unvaccinated young children being at highest risk of measles and its complications. Measles can make children more vulnerable to malnutrition and to other infectious diseases that accompany extreme weather events. Large outbreaks of measles affected several Pacific Island countries in late 2019 to January 2020; as an example, Samoa reported over 5,700 cases and 83 deaths predominantly among children (Craig et al., 2020). No cases were reported from RMI (the last measles case was reported in RMI in 2001). However, in anticipation of the possible spread of the epidemic to RMI, an extensive catch-up vaccination program against measles was conducted in October 2019.

Measles is still common in many developing countries, particularly in parts of Africa and Asia (WHO, 2020). We found 7 published studies that have discussed measles in the context of climate change (but not specifically for RMI or the Pacific). The overwhelming majority of measles deaths occur in low-income countries with weak health infrastructures. Measles outbreaks can be particularly deadly in countries experiencing or recovering from a natural disaster or conflict. Damage to health infrastructure and health services interrupts routine immunization, and overcrowding in residential camps greatly increases the risk of infection (WHO, 2020). Measles has been associated with poverty, food insecurity, poor sanitation and illiteracy in a number of studies (Khalil et al., 2017; de Waal & Vogel, 2016; Chen & Kates, 1994). A study from Nigeria showed that cases of measles increased with

increases in temperature, with the disease being more prevalent during the dry season. This study suggested that incorporating indigenous knowledge into climate change policies could increase participation and effectiveness of adaptation strategies (Oloukoi and Jaggernath, 2014).

Climate change could make populations within the Pacific region increasingly mobile in terms of the movement of people within islands and across borders, which may increase the risk of measles outbreaks. However, high levels of vaccination rates (covering over 95% of children) provides excellent protection against measles outbreaks.

Ciguatera

(2 papers reviewed)

Ciguatera poisoning has been identified as a public health issue among PIDC (McIver et al., 2016; Rongo & van Woesik, 2013). Ciguatera poisoning has been associated with reef disturbances. Reef disturbances provide space for microalgae which are the preferred vectors of ciguatoxins. These toxins are then consumed by herbivorous fish. Whether reef disturbances lead to ciguatera poisoning depends on the presence and density of vectors which carry the ciguatoxins (Rongo & van Woesik, 2013). The research suggests that there is an increase in the density of herbivorous fish after major cyclones pass. Thus, cyclones increase the chances of ciguatoxins being transferred (Rongo & van Woesik, 2013).

1.4. Discussion

The Pacific Island states face many complex challenges in relation to climate change, development, and health.

The RMI is extremely vulnerable in the context of climate change in general and its impacts on health specifically. The major climate change phenomena anticipated in the period to 2100 are as follows:

- El Niño and La Niña events will continue to occur in the future (very high confidence), but there is little consensus on whether these events will change in intensity or frequency;
- Annual mean temperatures and extremely high daily temperatures will continue to rise (very high confidence);
- Average annual rainfall is projected to increase (high confidence), with more extreme rain events (high confidence);
- Drought frequency is projected to decrease (medium confidence);
- Ocean acidification is expected to continue (very high confidence);
- The risk of coral bleaching will increase in the future (very high confidence); and
- Sea level will continue to rise (very high confidence).

RMI's Joint National Action Plan for Climate Change Adaptation and Disaster Risk Reduction (JNAP, 2014-2018) outlined several features that explain the heightened vulnerability of the country and its people to the effects of climate change, including:

- Rapid population growth and over-population in urban centres;
- Low elevation and small atoll islands;
- Unsustainable development;
- Localized pollution (including contamination of water supply), poor management of waste and sanitation, and environmental degradation;
- Limited resources (particularly food, water and fuel);
- Limited economic potential due to small size and remoteness;
- High exposure to external market shocks; and
- Sparse and scattered nature of islands and atolls, making communication and transportation to outer islands more difficult, with infrequent and at times unreliable transport links.

Improved community and stakeholder engagement is needed. This may involve incentives for community participation and community-based surveillance.

1.5. Key climate-sensitive health risks and adaptation priorities

Specific to health, it should be noted that the predominant burden of ill health in RMI is due to NCDs, with the country consistently ranking among the highest in the world in terms of NCD-related morbidity and mortality. However, given the links between NCDs and climate change are only now becoming clearer, it is not surprising that the JNAP and RMI's Second National Communication to the UNFCCC (2015) focus on the risks posed by vector- and water-borne diseases, with no mention of NCDs. Of note, at the time RMI's NCCHAP began to be developed, in early 2011, the stakeholder consultations identified a widespread (but clearly mistaken) belief that Marshallese were immune to arboviral diseases. However, by the time the draft NCCHAP was finalised at the end of that year, that illusion had been shattered, with a large epidemic of dengue fever – the first documented in RMI – affecting over 1600 people, or 3% of the total population, with most cases occurring in densely populated communities on the capital atoll of Majuro.

The process of developing RMI's NCCHAP involved the abovementioned consultations, along with an epidemiological analysis of the available data on weather variables and climate-sensitive diseases, with a focus on diarrhoeal diseases, respiratory infections and diabetes-related presentations. It should be pointed out that it was in RMI, as well as Kiribati and Tuvalu, that a potential link between climate change, diabetes and tuberculosis (TB) was first identified (McIver et al., 2015). These atoll countries not only have among the highest rates of diabetes and TB in the world – with the former a well-known risk factor for the latter – but, combined with their high fertility rates and population densities, there is a plausible causal pathway whereby climate change, in particular via sea level rise, could thus further exacerbate household overcrowding and increase TB transmission risk, particularly in combination with its parallel impacts on food security, nutrition and NCDs.

It appears that the only scientific investigation of climate change-related health threats in RMI, in addition to those presented in section 1.3.3, that has been conducted since the publication of WHO's regional report in 2015 and the corresponding journal paper (McIver et al., 2016) is a qualitative study of the links between climate change, migration and health in the context of RMI and its free association with the United States, presented at a conference (Morgan et al., 2018).

RMI currently has neither a National Adaptation Plan for the Health Sector nor a WHO Climate and Health Country Profile, but it has selected health as its focus for the Global Climate Change Alliance Plus: Scaling Up Pacific Adaptation (GCCA+ SUPA) project, to be co-implemented by the Secretariat of the Pacific Community (SPC), South Pacific Regional Environment Programme (SPREP) and the University of the South Pacific (USP).

Our findings are summarised in Table 1, along with some of the key needs and opportunities relevant to adaptation and the building of a climate resilient health system in RMI.

Table 1. Climate change and health priorities for RMI

Health Issue	Risk (ie. likelihood x impact) posed by climate-sensitive disease in RMI	Needs / Gaps	Adaptation Strategies / Priorities
Vector-borne diseases (VBDs)	High	Longstanding misconceptions and lack of preparedness regarding threats posed by VBDs.	Significant strengthening required in this area given impact of 2011-2012 outbreak. Mosquito surveillance and control as well as community education and environmental health training will all be part of these essential processes.
Diarrhoeal diseases (including water- and food-borne illnesses)	High	<p>Inadequate hospital preparedness for responding to an outbreak of water-borne illnesses.</p> <p>Lack of public understanding/awareness re: risks of water borne disease transmission.</p> <p>Lack of strong coordination/communication between MOHHS and EPA.</p> <p>Lack of access to clean drinking water and/or water catchments.</p> <p>Inadequate sewage treatment facilities (worse in Ebeye).</p> <p>Lack of high-quality food-handling standards/regulations.</p> <p>Lack of understanding on part of public regarding safe food preparation and handling.</p>	<p>Rotavirus vaccination to infants.</p> <p>Health promotion and community education regarding clean drinking water, sanitation and hygiene.</p> <p>Train and improve the skills of health assistants in the treatment of patients with water-borne diseases.</p> <p>Improve water quality testing, food safety inspections and sewage treatment practices.</p>
NCDs, obesity, malnutrition and Stunting	High	<p>Lack of adequate consumption of healthy, nutritious, local foods.</p> <p>Lack of food choices (due to imported foods, processed foods and cost considerations).</p> <p>Low levels of physical activity.</p>	<p>Strengthen weight loss control and physical activity programmes, including community-based healthy lifestyle and physical activities.</p> <p>Build partnerships with the other public, private and nongovernmental organizations.</p> <p>Provide educational materials and information on local foods that are healthy and nutritious.</p> <p>Improve control of tobacco, alcohol and betel nut.</p> <p>Promote better nutrition, including subsidising sales of healthy foodstuffs.</p>

Mental ill-health	High	<p>MOHHS not sufficiently resourced to deal adequately or appropriately with patients with mental health issues.</p> <p>Lack of trained counsellors and other mental health professionals.</p> <p>Lack of community awareness regarding manifestations, prevention and management of mental health problems.</p> <p>Anxiety is an overlooked factor. It came up in the initial survey and discussions in RMI in January 2020.</p>	<p>Hire mental health professional staff.</p> <p>Create mental health policies and treatment guidelines.</p> <p>Conduct crisis assessment and treatment.</p> <p>Provide outpatient consultations and counseling.</p> <p>Conduct outreach visits in Majuro and outer atolls to schools and various communities.</p> <p>Develop Information, Education and Communication (IEC) materials on the services available.</p> <p>Coordinate with other medical departments and/or countries to strengthen psychiatric evaluation and treatment services.</p>
Respiratory diseases (TB and COVID-19)	High/Medium	<p>Lack of sufficient funds/resources for adequate management of TB in the community.</p> <p>Lack of public understanding re: symptoms/signs of TB and risks of transmission, with associated stigma.</p> <p>Lack of strong, well-coordinated primary health program for TB.</p> <p>High rates of household over-crowding and poor ventilation.</p> <p>Respiratory disease is related to health infrastructure and malnutrition. It is also linked to diabetes.</p> <p>One of top 10 diagnosis in RMI. Immunization levels still low.</p> <p>COVID-19 may affect perceptions of food security, food safety, hygiene issues.</p> <p>Maybe less relevant to climate change, but complementary to other plans and health priorities.</p>	<p>Strengthen vaccination programmes (i.e. for TB, influenza and pneumonia).</p> <p>Strengthen health promotion, prevention and early detection and adequate management of TB.</p> <p>Reduce outdoor and indoor air pollutants (including cigarette smoke).</p> <p>Improve environmental, occupational and personal hygiene (handwashing, surface disinfection, water quality).</p>
Measles	High/Medium	<p>Measles outbreaks can be deadly in countries experiencing or recovering from a natural disaster.</p> <p>Damage to health infrastructure and health services interrupts routine immunization.</p> <p>Overcrowding greatly increases the risk of infection.</p>	<p>Routine measles vaccination for children, combined with mass immunization campaigns in countries with low routine coverage, are key public health strategies to prevent measles outbreaks.</p> <p>Maintain high vaccination coverage rates of the complete range of childhood vaccinations offered routinely in the RMI.</p>

		<p>One of top 10 diagnosis in RMI. Immunization levels still low.</p> <p>Maybe less relevant to climate change, but complementary to other plans and health priorities.</p>	
Traumatic injuries and deaths from extreme weather events	High/Medium	<p>This is potentially a high impact risk. MOHHS has limited capacity in terms of necessary medical supplies, pharmaceuticals, procedures, human and financial resources to react to injuries or deaths caused by an extreme weather event (including stockpiled supplies, et.).</p> <p>MOHHS has a Disaster Plan, but not enough of the key people are aware of this plan (e.g. medical/nursing staff).</p>	<p>MOHHS to review and update plans regarding safe storage of medical supplies, equipment etc (i.e. surge capacity planning).</p> <p>Disaster training for health and other staff.</p>
Ciguatera	Medium	<p>Lack of public understanding re: risks of transmissions, recognition of symptoms, etc.</p> <p>Anecdotal reports suggest that most cases of ciguatera are reported from Ailinglapiap, Jaluit.</p> <p>It could be become more of a problem in the future.</p>	Health promotion and community education.
Other effects including, temperature related effects and sun exposure	Medium/Low	<p>Lack of estimates of heat related mortality and morbidity.</p> <p>Lack of evidence of productivity loss due to extreme heat.</p> <p>Lack of public understanding of risks of excessive sun exposure.</p>	<p>Health promotion and community education.</p> <p>Adaptation in the built environment to avoid overheating through shading and other passive cooling methods.</p>

2. Outline of new National Climate Change and Health Policy

This literature review has discussed relevant policies, plans and initiatives from RMI and the Pacific region, and identified the key priority areas for the RMI National Climate Change and Health Policy and 5-year Action Plan.

Focusing on overarching issues and in line with the WHO objectives, the aim of the revised National Climate Change and Health Policy and 5-year Action Plan for RMI should be to:

1. Increase awareness of the direct and indirect health consequences of climate change across the RMI population, including policy-makers, the private sector, youth and the elderly, and those living in outer atolls;
2. Strengthen the capacity of health systems to provide protection from climate-related risks, including extreme weather events, sea level rise, and vector-, water-, and food-borne diseases;
3. Reduce the greenhouse gas emissions of the RMI health sector;
4. Ensure that health concerns are addressed in decisions to reduce risks from climate change in other sectors;
5. Mobilize communities to better adapt to the health consequences of climate change, as well as other impacts, applying the healthy settings approach embedded in Healthy Islands;
6. Strengthen national capacity to develop and implement effective interventions to minimize climate-related health risks and enhance community resilience for adaptation, with special regard for the most vulnerable populations;
7. Reinforce existing programs and build up the capacity of health and other related sectors in terms of infrastructure, human resources and financial resources;
8. Assess the health implications (including co-benefits and potential trade-offs) of decisions made on climate change by other key sectors, such as energy, agriculture, fisheries, industry, water supply and sanitation, transport, urban and rural planning, and advocate for decisions that would improve health.

To achieve measurable outcomes in the next five years, the new RMI National Climate Change and Health Policy will need:

- To build on existing RMI policies and frameworks
- Extensive internal (MOHHS) and external consultation and communication.

- Strong leadership, a committed local “champion” (from the MOHHS), endorsement by government, and ownership by local communities.
- A realistic implementation plan and a mechanism for attracting and absorbing funds from donors.

At the COP23 of the UNFCCC in Bonn in 2017, WHO launched a Special Initiative on Climate Change and Health in Small Island Developing States in collaboration with UNFCCC and the Fijian Presidency of the COP23. The Initiative recognizes that Small Island Developing States (SIDS) are on 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 (WHO, 2018a).

In the development of the National Climate Change and Health Policy and 5-year Action Plan for RMI, we propose to follow the four strategic lines of action of the SIDS Initiative:

- Empowerment: Supporting health leadership to engage locally, nationally and internationally.
- Evidence: Identify priorities and gaps, and build 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 interlinked as shown in Fig. 1. 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 (WHO, 2018a).

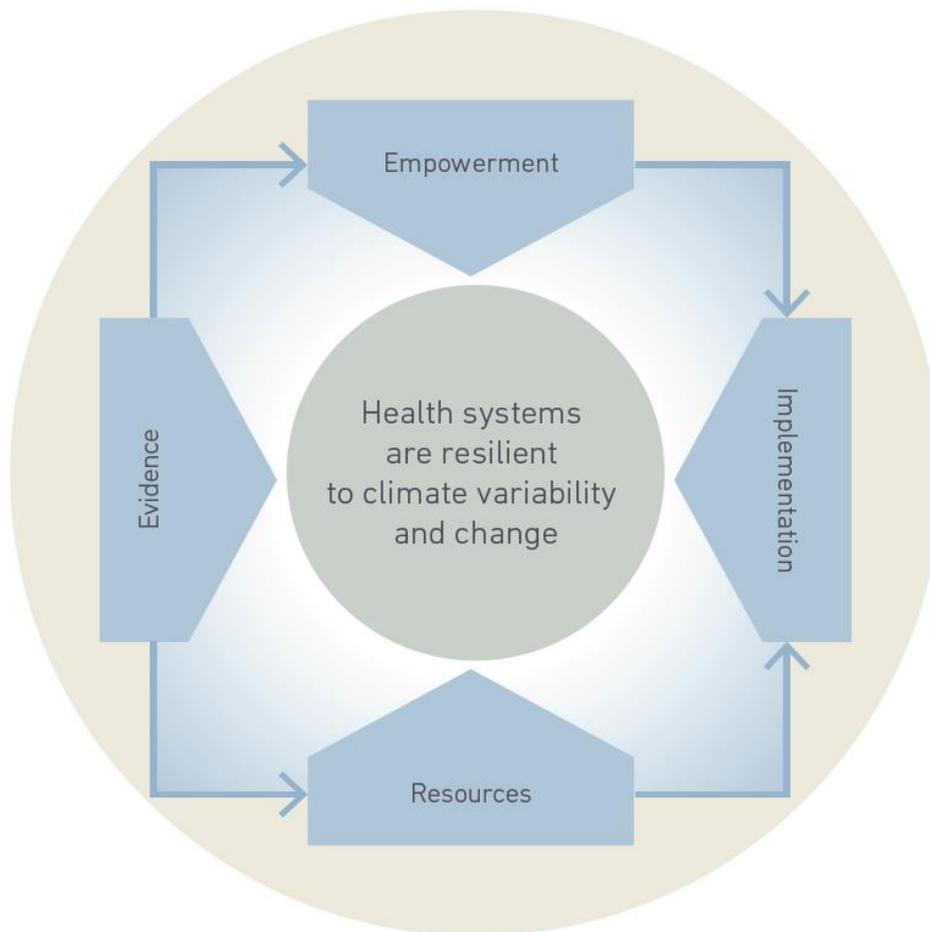


Fig. 1: Interlinkages among the four components of the SIDS Initiative (WHO, 2018a).

The SIDS Initiative is aligned to WHO’s Operational Framework for Climate Resilient Health Systems. To support the delivery of universal health coverage (UHC), WHO has identified six common “building blocks”: 1) Leadership and governance; 2) Health workforce; 3) Health information systems; 4) Essential medical products and technologies; 5) Service delivery; and 6) Financing (WHO, 2015).

For an entire health system to be resilient to climate change, each of the six common building blocks should also 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 illustrated in Fig. 2 (WHO, 2018b). The climate change and health impact pathways relevant to SIDS are shown in Fig. 3 (WHO, 2018a).

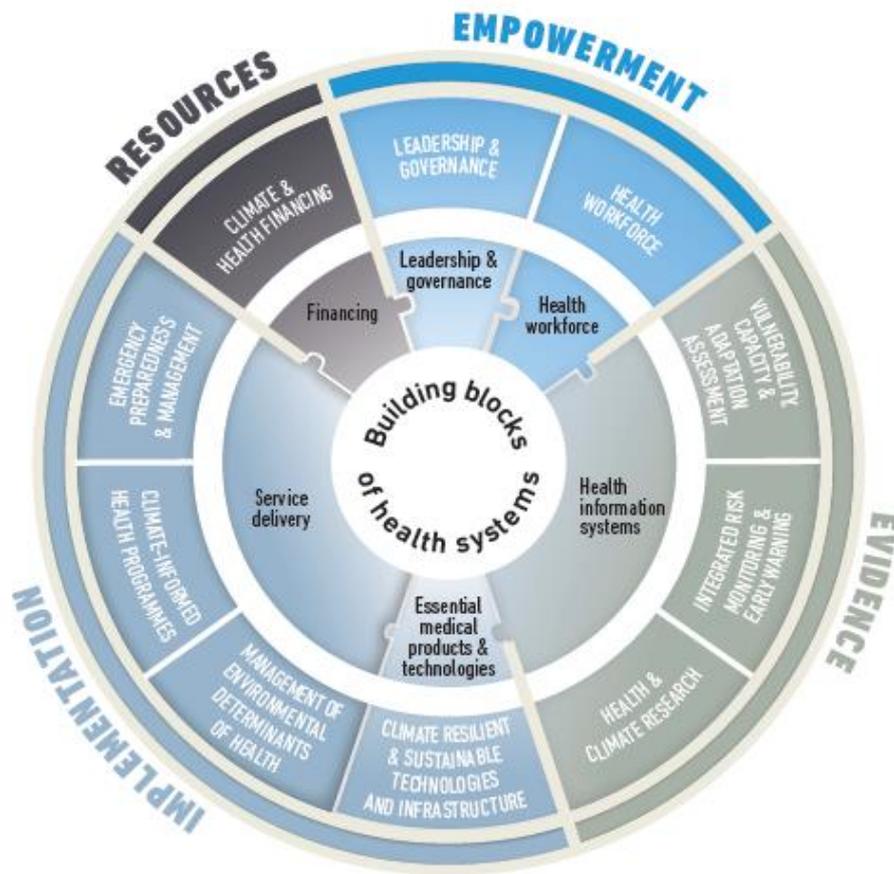
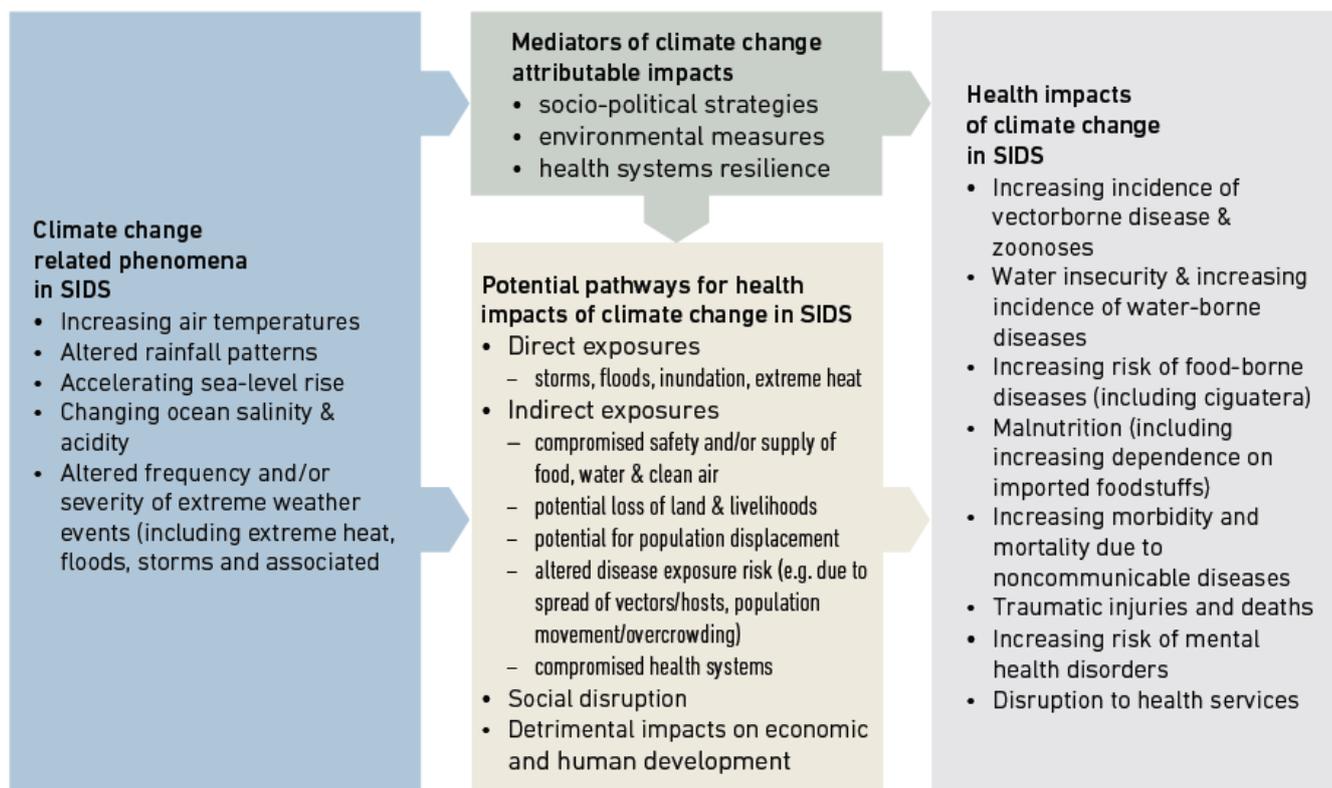


Fig. 2: SIDS Initiative components within the framework of the WHO Operational Framework for Building Climate Resilient Health Systems (WHO, 2015).

Fig. 3: Climate change and health impact pathways relevant to SIDS (WHO, 2018a; adapted from McIver et al. 2016).



The National Climate Change and Health Policy for RMI should have a realistic and specific action plan. This will be fully integrated in the JNAP, which currently includes two health related actions (5.3.1 Conduct assessment on the potential impact of climate change on health, including vector borne diseases such as dengue fever. 5.3.2 Provide institutional strengthening of the health sector on the issue of climate change and other risks relating to health) owned by the MOHHS.

Similar to the structure of JNAP, the revised NCCHAP should include clear goals, actions, results (outputs/outcomes), responsible agencies, indicative costs, implementation strategy (including time frames), communication strategy, and monitoring and evaluation, and it should be reviewed annually.

3. Contents of new National Climate Change and Health Action Plan

Proposed NCCHAP contents list:

Foreword (high level endorsement by Minister of Health)

List of abbreviations

Executive Summary

- 1. Introduction*
- 2. Evidence*
 - a. Climate-sensitive health risks and priorities*
 - b. Vulnerable populations*
 - c. Health systems and infrastructure*
 - d. Evidence gaps*
- 1. Empowerment*
 - a. Key stakeholder engagement*
 - b. Community engagement*
 - c. Communication*
- 2. Implementation*
 - a. MOHHS leadership role*
 - b. Actions / Responsible Agencies / Milestones*
 - c. Monitoring and evaluation*
- 3. Resources*
 - a. Personnel needs*
 - b. Indicative costs*
 - c. Funding mechanism*
- 4. Conclusions and recommendations*

References

Appendix 1. List of contributors

Appendix 2. Data analysis methods and results

Appendix 3. Actions matrix

Appendix 4. Risk register

Proposed NCCHAP actions matrix:

Objective 1: E.g. Address vector-borne diseases

Health Issue	Activities	Leader / Responsible Agency	Supporting Agencies	Resources required	Timeline	Cost	RMI Government contribution	Donor contribution	Indicator
Dengue outbreaks	Mosquito surveillance and control programme	Manager XX, Ministry of Health, RMI	Ministry of XX, EPA. etc.	XX nurses; XX coordinators from the RMI Ministry of Health	Jul 2021-June 2024 (36 months)	\$100,000	Costed activities that can be done by RMI. E.g. Small manageable activities considering capacity and available funds	Costed activities that will require donor funding. Especially big projects that require a lot of funds.	Number of dengue cases

4. Documents Reviewed

Ahlgren, I., Yamada, S., & Wong, A. (2014). Rising Oceans, Climate Change, Food Aid, and Human Rights in the Marshall Islands. *Health and Human Rights*, 16(1), 69-80.

Asugeni, J., MacLaren, D., Massey, P. D., & Speare, R. (2015). Mental health issues from rising sea level in a remote coastal region of the Solomon Islands: current and future. *Australasian Psychiatry*, 23(6), 22-25. doi:10.1177/1039856215609767

Barnett, J. (2011). Dangerous climate change in the Pacific Islands: food production and food security. *Regional Environmental Change*, 11(1), 229-237. doi:10.1007/s10113-010-0160-2

Brostrom, R., Dugan, G., Hill, J., et al. (2018). TB & leprosy free Majuro: early findings of a mass TB and leprosy screening and treatment program in the Marshall Islands. 49th World Conference on Lung Health, The Hague, The Netherlands.

Canyon, D. V., Speare, R., & Burkle, F. M. (2016). Forecasted Impact of Climate Change on Infectious Disease and Health Security in Hawaii by 2050. *Disaster Medicine and Public Health Preparedness*, 10(6), 797-804. doi:10.1017/dmp.2016.73

Chen, R. S., & Kates, R. W. (1994). World food security - prospects and trends. *Food Policy*, 19(2), 192-208. doi:10.1016/0306-9192(94)90069-8

Connell, J. (2015). Food security in the island Pacific: Is Micronesia as far away as ever? *Regional Environmental Change*, 15(7), 1299-1311. doi:10.1007/s10113-014-0696-7

Craig, A. T., Heywood, A. E., & Worth, H. (2020). Measles epidemic in Samoa and other Pacific islands. *The Lancet Infectious Diseases*, 20(3), 273-275. doi: 10.1016/S1473-3099(20)30053-0

Cvitanovic, C., Crimp, S., Fleming, A., et al. (2016). Linking adaptation science to action to build food secure Pacific Island communities. *Climate Risk Management*, 11, 53-62. doi:10.1016/j.crm.2016.01.003

Dancause, K. N., Vilar, M., Chan, C., et al. (2012). Patterns of childhood and adolescent overweight and obesity during health transition in Vanuatu. *Public Health Nutrition*, 15(1), 158-166. doi:10.1017/s1368980011001662

Dawes, N., Franklin, R., McIver, L., & Obed, J. (2019). Post-disaster mental health servicing in Pacific Island communities: An integrative review. *International Journal of Disaster Risk Reduction*, 38, 9. doi:10.1016/j.ijdr.2019.101225

de Waal, J., Vogel, C. (2016). Disaster risk profiling in southern Africa: inventories, impacts and implications. *Natural Hazards*, 84(3), 1921-1942. doi:10.1007/s11069-016-2527-2

- Descloux E, Mangeas M, Menkes CE, Lengaigne M, Leroy A, Tehei T, et al. (2012) Climate-Based Models for Understanding and Forecasting Dengue Epidemics. *PLoS Negl Trop Dis* 6(2): e1470. <https://doi.org/10.1371/journal.pntd.0001470>
- Ebi, K. L., Lewis, N. D., & Corvalan, C. (2006). Climate Variability and Change and Their Potential Health Effects in Small Island States: Information for Adaptation Planning in the Health Sector. *Environmental Health Perspectives*, 114(12), 1957-1963. doi:doi:10.1289/ehp.8429
- Fiji Climate Change and Health Strategic Action Plan 2016-2020 (2016) <https://www.health.gov.fj/wp-content/uploads/2018/03/Climate-Change-and-Health-Strategic-Action-Plan-2016-2020.pdf>
- Gibson, K., Haslam, N., & Kaplan, I. (2019). Distressing encounters in the context of climate change: Idioms of distress, determinants, and responses to distress in Tuvalu. *Transcultural Psychiatry*, 56(4), 667-696. doi:10.1177/1363461519847057
- Gittelsohn, J., Haberle, H., Vastine, A. E., Dyckman, W., & Palafox, N. A. (2003). Macro- and microlevel processes affect food choice and nutritional status in the Republic of the Marshall Islands. *Journal of Nutrition*, 133(1), 310S-313S. DOI: 10.1093/jn/133.1.310S
- Hoy, D., Roth, A., Lepers, C., et al. (2014). Adapting to the health impacts of climate change in a sustainable manner. *Globalization and Health*, 10, 5. doi:10.1186/s12992-014-0082-8
- Ibell, C., Sheridan, S. A., Hill, P. S., et al. (2015). The individual, the government and the global community: sharing responsibility for health post-2015 in Vanuatu, a small island developing state. *International Journal for Equity in Health*, 14, 13. doi:10.1186/s12939-015-0244-1
- Jansen, H.A.F.M & Abraham, B.T. (2014). Republic of the Marshall Islands National Study on Family Health and Safety. Majuro, Republic of the Marshall Islands. [https://asiapacific.unfpa.org/sites/default/files/pub-pdf/Marshall Islands national family health safety survey report 2014.pdf](https://asiapacific.unfpa.org/sites/default/files/pub-pdf/Marshall%20Islands%20national%20family%20health%20safety%20survey%20report%202014.pdf)
- Jenkins, A., Horwitz, P., & Arabena, K. (2018). My island home: place-based integration of conservation and public health in Oceania. *Environmental Conservation*, 45(2), 125-136. doi:10.1017/s0376892918000061
- Jung, E. M., Jagals, P., Brereton, C., et al. (2018). Children's Environmental Health Indicators in Context of the Sustainable Development Goals for Small Island Developing States. *International journal of environmental research and public health*, 15(7), 12. doi:10.3390/ijerph15071404
- Kessaram T et al. (2015). Non-communicable diseases and risk factors in adult populations of several Pacific Islands: results from the WHO STEPwise approach to surveillance. *Australian and New Zealand Journal of Public Health*; 39(4): 336-343. doi.org/10.1111/1753-6405.12398

- Khalil, A. T., Ali, M., Tanveer, F., et al. (2017). Emerging viral infections in Pakistan: issues, concerns, and future prospects. *Health Security*, 15(3), 268-281.
doi:10.1089/hs.2016.0072
- Kingsley, J., Patrick, R., Horwitz, P., et al. (2015). Exploring Ecosystems and Health by Shifting to a Regional Focus: Perspectives from the Oceania EcoHealth Chapter. *International journal of environmental research and public health*, 12(10), 12706-12722.
doi:10.3390/ijerph121012706
- Kodish, S. R., Grey, K., Matean, M., et al. (2019). Socio-Ecological Factors That Influence Infant and Young Child Nutrition in Kiribati: A Biocultural Perspective. *Nutrients*, 11(6), 22.
doi:10.3390/nu11061330
- Lau, C. L., Watson, C. H., Lowry, J. H., et al. (2016). Human Leptospirosis Infection in Fiji: An Eco-epidemiological Approach to Identifying Risk Factors and Environmental Drivers for Transmission. *Plos Neglected Tropical Diseases*, 10(1), 25.
doi:10.1371/journal.pntd.0004405
- Leal, W., Scheday, S., Boenecke, J., et al. (2019). Climate Change, Health and Mosquito-Borne Diseases: Trends and Implications to the Pacific Region. *International journal of environmental research and public health*, 16(24), 12. doi:10.3390/ijerph16245114
- Lohmann, P., Ponderfer, A., & Rehdanz, K. (2019). Natural Hazards and Well-Being in a Small-Scale Island Society. *Ecological Economics*, 159, 344-353.
doi:10.1016/j.ecolecon.2018.12.023
- Louie, J. (2018). TB Free Marshall Islands: Ebeye and Majuro, Republic of Marshall Islands, 2017-2018. Heartland National TB Centre. University of Texas.
https://www.heartlandntbc.org/assets/training/archive/mecoanme_20181130_1110.pdf
- RMI (2015). Republic of Marshall Islands Second National Communication to the UNFCCC. <https://www.adaptation-undp.org/projects/marshall-islands-second-national-communication>
- Matheson, D., Park, K., & Soakai, T. S. (2017). Pacific island health inequities forecast to grow unless profound changes are made to health systems in the region. *Australian Health Review*, 41(5), 590-598. doi:10.1071/ah16065
- McCubbin, S. G., Pearce, T., Ford, J. D., & Smit, B. (2017). Social-ecological change and implications for food security in Funafuti, Tuvalu. *Ecology and Society*, 22(1), 13.
doi:10.5751/es-09129-220153
- McIver L et al. (2015). Climate change, overcrowding and non-communicable diseases: the 'triple whammy' of tuberculosis transmission risk in Pacific atoll countries. *Annals of the Australasian College of Tropical Medicine*; 16(3): 57-61.

- Mclver L et al. (2016). Health impacts of climate change in Pacific Island countries: a regional assessment of vulnerabilities and adaptation priorities. *Environmental Health Perspectives*; 124(11):1707–1714; <http://dx.doi.org/10.1289/ehp.1509756>
- Mclver L et al. (2015) Human health and climate change in Pacific Island countries. World Health Organization, Western Pacific Regional Office, Manila, Philippines. https://iris.wpro.who.int/bitstream/handle/10665.1/12399/9789290617303_eng.pdf
- Mclver, L., Bowen, K., Hanna, E., & Iddings, S. (2017). A 'Healthy Islands' framework for climate change in the Pacific. *Health Promotion International*, 32(3), 549-557. doi:10.1093/heapro/dav094
- Mclver, L., Hoy, D., Lepers, C., Naicker, J., Souarès, Y. (2013). The First Pacific Regional Climate Change and Health Symposium. Inform'ACTION Special Issue. Noumea, New Caledonia: Secretariat of the Pacific Community. 35 p.
- Mclver, L., Kim, R., Woodward, A., et al. (2016). Health Impacts of Climate Change in Pacific Island Countries: A Regional Assessment of Vulnerabilities and Adaptation Priorities. *Environmental Health Perspectives*, 124(11), 1707-1714. doi:doi:10.1289/ehp.1509756
- Mclver, L., Viney, K., Harley, D., Hanna, L., & Kienene, T. (2015). Climate Change, Overcrowding and Non-Communicable Diseases: the “Triple Whammy” of Tuberculosis Transmission Risk in Pacific Atoll Countries. *Annals of the ACTM: An International Journal of Tropical and Travel Medicine*, 16, 57-61.
- Mclver, L., Woodward, A., Davies, S., et al. (2014). Assessment of the Health Impacts of Climate Change in Kiribati. *International Journal of Environmental Research and Public Health*, 11(5), 5224-5240. doi:10.3390/ijerph110505224
- Mei, Y., Hu, J. (2020). Preparedness is Essential for Western Pacific Islands during the COVID-19 Pandemic. *Disaster Medicine and Public Health Preparedness*, 1-11. doi:10.1017/dmp.2020.102
- Morgan J et al. (2018). The intersection between climate, health and migration in Hawaii and the Republic of the Marshall Islands. American Geophysical Union, Fall Meeting 2018, abstract #GH13A-01. <https://ui.adsabs.harvard.edu/abs/2018AGUFMGGH13A..01M/abstract>
- Oloukoi, G., Bob, U., & Jaggernath, J. (2014). Perception and trends of associated health risks with seasonal climate variation in Oke-Ogun region, Nigeria. *Health & Place*, 25, 47-55. doi.org/10.1016/j.healthplace.2013.09.009
- Pacific Australia Climate Change Science and Adaptation Planning Program. Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports - Chapter 7: Marshall Islands (2014). <https://www.pacificclimatechangescience.org/wp->

content/uploads/2014/07/PACCSAP_CountryReports2014_Ch7MarshallIs WEB_140710.pdf

Palau National Environmental Health Action Plan (2004)

<https://www.mindbank.info/item/1149>

Palau Climate Change Policy for Climate and Disaster Resilient Low Emissions Development (2015)

https://www.pacificclimatechange.net/sites/default/files/documents/PalauCCPolicy_WebVersion-FinanceCorrections_HighQualityUPDATED%2011182015Compressed.pdf

Republic of Marshall Islands Climate Change Roadmap (2010)

Republic of Marshall Islands (2018). 2050 Climate Strategy.

https://unfccc.int/sites/default/files/resource/180924%20rmi%202050%20climate%20strategy%20final_0.pdf

Republic of the Marshall Islands Joint National Action Plan on Climate Change Adaptation and Disaster Risk Reduction 2014-2018.

<https://pafpnet.spc.int/attachments/article/782/RMI-JNAP-CCA-DRM-2014-18.pdf>

Republic of Marshall Islands (2011). National Climate Change Policy Framework.

https://www.sprep.org/attachments/Climate_Change/RMI_NCCP.pdf

Republic of Marshall Islands (2018). Nationally Determined Contribution.

<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Marshall%20Islands%20Second/20181122%20Marshall%20Islands%20NDC%20to%20UNFCCC%2022%20November%202018%20FINAL.pdf>

Republic of Marshall Islands (2004). Public Health and Safety Act.

http://www.vertic.org/media/National%20Legislation/Marshall_Islands/MH_Public_Health_Safety_Welfare_Act.pdf

Republic of Marshall Islands (2003). Strategic Development Plan Framework 2003-2018.

<http://policy.thinkbluedata.com/sites/default/files/vision%202018.pdf>

Republic of Marshall Islands (2017). 3 Year Rolling Strategic Plan 2017 -

2019. http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/marshall_islands/rmi_moh_3year_rolling_strategic_plan_fy2017-2019.pdf

Republic of Marshall Islands (2018). Tile Til Eo 2050 Climate Strategy “Lighting the way”.

https://unfccc.int/sites/default/files/resource/180924%20rmi%202050%20climate%20strategy%20final_0.pdf

Republic of the Marshall Islands Ministry of Health (2012). National Climate Change and Health Action Plan.

- Rongo, T., & van Woelik, R. (2013). The effects of natural disturbances, reef state, and herbivorous fish densities on ciguatera poisoning in Rarotonga, southern Cook Islands. *Toxicon*, 64, 87-95. doi:10.1016/j.toxicon.2012.12.018
- Sarfati, D., Dyer, R., Sam, F. A. L., et al. (2019). Cancer control in the Pacific: big challenges facing small island states. *Lancet Oncology*, 20(9), E475-E492. doi:10.1016/s1470-2045(19)30400-0
- Savage, A., McIver, L., Schubert, L. (2020). Review: the nexus of climate change, food and nutrition security and diet-related non-communicable diseases in Pacific Island Countries and Territories. *Climate and Development*, 12(2), 120-133. doi:10.1080/17565529.2019.1605284
- Sharp T et al. (2014). Characteristics of a dengue outbreak in a remote Pacific island chain – Republic of the Marshall Islands, 2011-2012. *PLoS One* 2014; 9(9): e108445. doi: 10.1371/journal.pone.0108445
- Singh, R. B. K., Hales, S., de Wet, N., et al. (2001). The influence of climate variation and change on diarrheal disease in the Pacific Islands. *Environmental Health Perspectives*, 109(2), 155-159. doi:10.2307/3434769
- Smith, R. (2019). Options and Choices in Relation to Adopting Healthy Lifestyles in the Pacific Islands Region. *Journal of Developing Societies*, 35(1), 62-82. doi:10.1177/0169796x19826733
- UNFCCC (2019). Climate Change Increases the Risk of Violence Against Women. Article 25 November, 2019. United Nations Framework Convention on Climate Change. <https://unfccc.int/news/climate-change-increases-the-risk-of-violence-against-women>
- WHO (2015). Operational framework for building climate resilient health systems. Geneva: World Health Organization
http://apps.who.int/iris/bitstream/10665/189951/1/9789241565073_eng.pdf
- WHO (2018a). Climate change and health in Small Island Developing States: a WHO special initiative, Pacific island countries and areas. Manila, Philippines. World Health Organization Regional Office for the Western Pacific.
<https://iris.wpro.who.int/handle/10665.1/14273>
- WHO (2018b). Pacific islands action plan on climate change and health. Manila, Philippines. World Health Organization Regional Office for the Western Pacific.
<https://apps.who.int/iris/handle/10665/275484>
- WHO (2020). Health Topics: Measles. World Health Organization.
<https://www.who.int/en/news-room/fact-sheets/detail/measles>
- Yamada, S., Riklon, S., & Maskarinec, G. G. (2016). Ethical Responsibility for the Social Production of Tuberculosis. *Journal of Bioethical Inquiry*, 13(1), 57-64. doi:10.1007/s11673-015-9681-1

Zahlawi, T., Roome, A. B., Chan, C. W., et al. (2019). Psychosocial support during displacement due to a natural disaster: relationships with distress in a lower-middle income country. *International Health*, 11(6), 472-479. doi:10.1093/inthealth/ihy099

Annex 1: Examples of climate-informed health interventions (WHO, 2015)

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