

Climate Adaptation Strategy for Health



Finalised and contextualised by the Ministry of Health for the Health Sector

In collaboration with the Public Health Sector, WHO and MNRE as part of the Project “Integrating Climate Change Risks into Agriculture and Health Sectors in Samoa”

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Contents

Acronyms	3
Executive summary.....	4
Acknowledgement	5
Results and Evidence	6-7
Introduction.....	8
Scope of the assessment and adaptation strategy	8
Operational Framework for Climate Resilient Health Sector Response	9
Overview of the key strategic areas for the operational framework in Samoa.....	9
Key strategic area 1: Health Governance, Policy and Management	9
Key strategic area 2: Cross-sectoral collaboration and partnership.....	9
Key strategic area 3: Capacity Development	9
Key strategic area 4: Vulnerability and adaptation assessment.....	10
Key strategic area 5: Cross sectoral prevention and risk management	11
Future impacts on health	12
Current policies and programmes that address climate sensitive health risks and projected health risks.....	12
Health sector activities	13
Activities in other sectors.....	14
Adaptation needs: additional public health and health-care policies and programmes to prevent likely future health burdens	16
Priority setting for public health policies and programmes.....	20
Resources required for programme implementation and potential barriers	21
Proposed Climate Change and health adaptation plan.....	21
Annexes.....	23-39
References.....	40

ACRONYMS

CASH – Climate Adaptation Strategy for Health

CLEWS- Climate Early Warning Systems

GEF- Global Environment Facility

GIS - Geographical Information System

HCW - Health care Waste

HIS – Health Information System

HRH – Human Resources for Health

ICCRAHS –Integrating Climate Change Risk in the Agriculture and Health Sectors in Samoa

MAF – Ministry of Agriculture and Fisheries

MOH – Ministry of Health

MNRE – Ministry of Natural Resources and Environment

MWCSD – Ministry of Women Community Social Development

NCDs – Non Communicable Diseases

NGOs – Non Governmental Organizations

NHS – National Health Services

PATIS – Patient Information System

PDNA –Post Disaster Needs Assessment

PICs- Pacific Island Countries

SRC – Samoa Red Cross

UNDP-United Nations Development Programme

WASH – Water and Sanitation Hygiene

WHO – World Health Organization

Executive summary

Climate change threatens the social, cultural and ecological underpinnings of health and wellbeing. Major health risks related to climate change include loss of life and injury from extreme climate events, communicable and vector borne diseases and malnutrition but also non communicable diseases. Some of these risks can be managed within the health sector, but most require intersectoral collaboration for effective prevention. Broad objectives for climate-health adaptation include the following:

- strengthen the capacity of health sector to improve risk management and response to disasters, emergencies and climate change.
- ensure that health concerns are addressed in decisions in other sectors to reduce risks from climate change, and
- increase public awareness of the health consequences of climate change.

We summarize activities that are currently in place in Samoa within and outside the health sector that aim to address present-day climate sensitive health risks. These activities do not, in general, consider the potential for climate change to alter or intensify these risks.

Deciding on priorities for adaptation to climate change is difficult, due to incomplete information on existing health risks as well as the effectiveness, feasibility, cost and equity implications of potential actions. Samoa is vulnerable to climate change, especially as it relates to flooding and other extreme events, but also to longer term changes to climate averages. Samoa is already subject to a number of climate-sensitive health problems that are not well addressed, and Samoa's vulnerability to these may be increased with climate change. There was broad agreement on the important climate sensitive health risks that should be considered in climate change adaptation planning.

Acknowledgement

The Climate Adaptation Strategy for Health (CASH) was initially compiled by Simon Hales (University of Otago, New Zealand) and Hilary Bambrick (University of Western Sydney, Australia), engaged as consultants by the Government of Samoa. The CASH forms part of the broader Global Environment Facility (GEF) funded project, Integrating Climate Change Risks in the Agriculture and Health Sectors in Sāmoa (ICCRAHSS). The NHS was initially tasked to coordinate the Health Component of the ICCRAHSS project. The two reports used as the basis of this Climate Adaptation Strategy for Health and Action Plan are the Health Risk Analysis (Hales, January 2013) and the Assessment Report on Climate Change Risks to Health at District Hospitals (Bambrick, May 2013), in addition to WHO Technical Reports, Health Sector Plan and MOH strategic directions.

The work of the TAs were distributed to the Health Sector staff since June 2013, and the MOH had processed a series of consultations to contextualise the document and reaffirmed context and direction for Sector consultation.

A roundtable discussion between MOH, MNRE and WHO was organized in February 2014, leading to a consultation process with all the Health Sector Partners involved and that resulted in the Climate Change Adaption Strategy for Health in Samoa, February 2014.

Results and Evidence

Continuous monitoring of climate-related health risks and vulnerabilities along with health service capacity are essential to track trends. The Ministry of Health, within its role of a monitoring body, has been collecting data for the Samoan context on the trends in health outcomes and health service needs. This will allow the Health sector to anticipate on outbreaks and emergencies related to climatic conditions.

- The STEPS Survey conducted in 2013 provides an overview of the latest data on non communicable diseases, mental health and its risk factors.
- The Synthesis Report on the evaluation and analysis on the linkages between the seasonal climate variability/change and climate-health diseases from the period of 2008 – 2010 in Samoa.
- Project on Impact of Climate Change on Health in Samoa, HMDP 2013.
- The Midterm Review of HSP 2008-2018, conducted in 2013.
- Mass Drug Administration 2013.
- Strengthening Climate Services in Samoa, 2012.
- NIWA MNRE Sector Engagement Workshop, 2012.
- Health GIS Report, 2012.

Many of the needs identified for adaptation planning relate to data and information. Access to data and information together with weaknesses in a shared surveillance system across health sector partners is noted as a significant limitation. Data is required to establish baseline relationships between, for example, climate variables and health outcomes, in order to estimate future risks, plan appropriate adaptation activities and evaluate the impacts of such activities. Improved laboratory testing and surveillance is a high priority, as are research projects to establish baselines and trends in climate sensitive health risks. A process for sharing information across sectors would improve understanding of responsibilities and relationships between sectors and add value to research. Increasing capacity – technical expertise, for example in research and monitoring – as well as in community resilience was also identified as an important need.

In order to bring all this information together and to create an evidence based framework on climate change for Samoa, the World Health Organization (WHO) advises Member States upon an Operational Framework for building Resilient Health Systems, which means a health system that is able to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stress, so as to bring sustained improvement in population health, despite an unstable climate. The framework addresses concerns on how the health sector and its operational basis, health systems, can effectively address the challenges increasingly presented by climate change. The objective is to guide health systems to become better prepared and capable to protect health in an unstable changing climate.

As a result of the evidence and policies in the context of Samoa and taking into account evidence from World Health Organization on the impact of Climate Change and Health Risks the following recommendations in terms of priorities are made for the context of Samoa:

1. Mainstream climate change considerations into all Health Sector activities.
2. Strengthen community health education and health promotion programmes on food and water safety, hygiene, sanitation, healthcare and hazardous waste management, vector control, breastfeeding and nutrition and psychosocial support.
3. Strengthen communicable disease surveillance and control, especially as this relates to climate sensitive diseases.
4. Strengthen non communicable diseases surveillance including mental health and injuries in order to pre determine a proactive response in times of disaster.
5. Conduct further research linking health and climate information, (including CLEWS, EWARS, GIS and HIS, climate risk maps).
6. Consider the effect of climate change on future health risks, especially HIA and risks related to water and food supplies, sanitation and vector control, NCDs including nutrition, psychosocial and mental health.
7. Consider the review of Outcome 7 indicators: Risk Management and Response to Disasters, Emergencies & Climate Change to ensure that it is aligned with revised HSP 2008 – 2018 outcome indicators.
8. Note that the Ministry of Health is the lead agency for the Health Sector and is the National focal point for monitoring the Climate Adaptation Strategy for Health.

Substantial resources are required to implement the proposed climate adaptation for health actions. It is recommended that applications for further external funding are developed, in consultation with international donors.

Introduction

Climate change has a significant impact on health because it affects the essential requirements for health – that is clean air, safe drinking water, sufficient food and secure shelter. Furthermore, it has a worsening effect on many existing health problems such as insecure drinking water, poor sanitation, and insecure food. It increases the risk of illness and death from diseases which are already of much concern, such as dengue, diarrhoea, malnutrition, cardiovascular and respiratory conditions as well as mental disorders. (Samoa Annual Health Sector Forum, 2011).

Scope of the assessment and adaptation strategy

Samoa's climate variability and exposure to extreme weather events, its topography and location of heavily populated areas, its dependence on agriculture and fisheries for food and economic livelihoods, and its developing infrastructure means that it is already vulnerable to a number of climate-sensitive health risks. These are expected to worsen under climate change. Climate change threatens the social, cultural and ecological underpinnings of health and wellbeing. Broad objectives for climate-health adaptation include the following:

- strengthen the capacity of health sector to improve risk management and response to disasters, emergencies and climate change.
- ensure that health concerns are addressed in decisions in other sectors to reduce risks from climate change, and
- increase public awareness of the health risks of climate change.

In order to develop an adaptation strategy, it is helpful to consider which health risks fit the following criteria:

- already an important public health issue in Samoa
- health risks sensitive to climate variability,
- potentially made worse by global climate change, and
- able to be managed effectively by actions carried out within the health sector, (or in policy development between the health sector and other relevant sectors).

It is important to note that the scope of climate change related research is growing; therefore this Strategy may need updating and revising where necessary as new information and understanding about climate change and health issues emerge.

Operational Framework for Climate Resilient Health Sector Response

The operational framework will allow the country to monitor and communicate but also to prepare for changing climate health risks. The framework operates from different key strategic areas which are crucial to emphasize that continues investment in primary health care and essential public health services is vital, which helps to reduce population and health system vulnerability to climate change. It is paramount and defined as a priority within the Samoa Health Sector Plan to continue to improve environmental and social determinants of health and strengthen core public health function and health care delivery systems.

Overview of the Key Strategic Areas for the Operational Framework in Samoa

Key strategic area 1: Health Governance, Policy and Management

As resilience building requires an enabling environment to take action and effectively manage change, the Samoa Health Sector Plan identifies Climate Change as one of the seven key outcomes to measure progress. Although the Mid Term Review of the Health Sector Plan conducted in 2013 indicated that the current indicators on monitoring climate change do not relate to community preparedness or resilience to climate change, the health sector response to the two national disasters that have hit Samoa in the life of the Health Sector Plan have reportedly been excellent.

Key strategic area 2: Cross-sectoral collaboration and partnership

As effective cross-sectoral collaboration and governance forms the basis of health actors becoming capable to understand, prevent and manage climate risks to health, the Samoan government has prioritized this form of engagement by taking on the sector approach. The Health Sector Plan for Samoa is a key example of how partnership helped the health sector partners to generate a more complete understanding of health risks influenced by climate change. Samoa organized a round table discussion and an official consultation process with the health sector partners to establish this Climate Adaption Strategy for Health. During the implementation of the Strategy, the health sector partners will continue to meet and exchange information on progress or challenges faced toward health risk on climate change.

Key strategic area 3: Capacity Development

Through the Climate Change Adaptation Strategy for Health, Samoa engages in cross-sectoral monitoring to effectively manage changing risks to health and health system performance.

Key strategic area 4: Vulnerability and adaptation assessment

Major health risks related to climate change include loss of life and injury from extreme climate events, communicable and vector borne diseases and malnutrition. Some of these risks can be managed within the health sector, but most require intersectoral collaboration for effective prevention. Table 1 on “Vulnerability and Adaptation assessment” attached for the detailed roles and activities in health sector.

Health impacts of extreme climate events

Climate events such as cyclones and floods cause acute deaths and injuries, and can trigger a range of communicable disease outbreaks, for example, via disruption of water supplies and NCDs including nutrition. In the longer term, health impacts result from the effects of extreme events on food security, infrastructure, livelihoods and social development.

Water and food borne communicable diseases

Enteric diseases are an important category of climate sensitive health impact. There is preliminary evidence of associations between communicable disease notifications and monthly climate in Sāmoa.

Vector borne diseases

Vector borne diseases are also an important category of climate-sensitive disease in Sāmoa. Reported mosquito borne diseases include dengue and filariasis. Other arboviral diseases such as chikungunya and Ross River virus are potential threats, while leptospirosis (caused by bacteria and spread by rodents) is probably already present though not routinely detected.

Malnutrition

Just under 5% of children were malnourished in 1999. Risk factors for protein-energy malnutrition in children include low birth weight, enteric and respiratory infections, lack of breastfeeding, short interval between successive births, adoption, overcrowding, and rural residence. According to FAO, dietary energy supply is increasing, but in 2008, about 5% of the population were estimated to live in food poverty. The Demographic Health Survey findings show that only 51% of infants are exclusively breastfed for 6 months and 40% of 6-23 month old children fed in accordance with infant and young child feeding recommendations. There has been growing evidence in the number of mothers who tend to discontinue with breastfeeding once they start working. Over nutrition is serious and increasing public health problem and climate variability to a certain extent could be a contributing factor of non-communicable diseases in Samoa.

Non Communicable Diseases, and Mental Health

The global burden and threat of NCDs (heart disease, stroke, cancer, type 2 diabetes, and respiratory diseases) constitutes a major public health challenge that undermines social and economic development throughout the world, and inter alia has the effect of increasing inequalities between countries and within populations, according to the World Health Organization. Climate change may increase the risk of cardiovascular disease (CVD) through three main exposure pathways: directly via air pollution and extreme temperatures and indirectly via changes to dietary options. Increasing frequency and intensity of extreme temperatures and weather events, and increased competition for scarce natural resources, on top of existing social inequities, are likely to affect interpersonal and intergroup behaviour and may result in increased stress and anxiety. Even in the absence of direct impacts, the perception and fear of climate change may threaten mental health.

There has been growing evidence on the link of climate change and mental health, and given their particular vulnerability to climate change. Mental health consequences of climate change in general is poorly researched and under resourced. Impacts of climate change on mental health are mediated directly through injury and secondly less directly through environmental and social impacts for example loss of jobs and livelihoods, shortage of the basic essential for life, increase in food prices and conflicts from displacement. All these would exacerbate mental health problems in those with pre-existing disease no doubt but would also cause or trigger new mental health problems the so called; post traumatic stress disorders (PTSD), in people without pre existing mental health problems and particularly the most vulnerable groups in the communities, children and the elderly. This has been reported through observation by Health Sector Partners during Post Disasters in Samoa.

Maternal and Child Health

The WHO refers to maternal health as the health of women during pregnancy, childbirth, and the postpartum period.

Climate change is considered one of the biggest threats to achieving the MDG for maternal health, clearly emphasizing the need for better and geographically more specific knowledge of climate change and maternal health.

The Lancet Commission have identified a number of ways in which climate change can influence human health: Pregnant women, the developing foetus, and young children are considered the most vulnerable members of our society and therefore, they may have increased sensitivity to the effects of climate change.

Evidence indicates that climate change will increase the risk of infant and maternal mortality, birth complications, and poorer reproductive health, especially in tropical, developing countries such as Samoa.

Thus, climate change will have a substantial impact on the health and survival of the next generation among already challenged populations. The effects of malnutrition, infectious diseases, environmental problems, and direct heat exposure on maternal health outcomes will lead to severe health risks for mothers and children. Increased focus on antenatal care is recommended to prevent worsening maternal health and perinatal mortality and morbidity. Interventions to reduce the negative health impacts caused by climate change are also crucial. Every effort should be made to develop and maintain good antenatal care during extreme life conditions as a result of climate change.

Key strategic area 5: Cross sectoral prevention and risk management

Climate Change and Health has cross cutting issues with other Sectors, and therefore cross-sectoral prevention and climate risk management is a critical part of health prevention since many climate-related health risks are determined by conditions in other sectors.

While disaster risk management and response in Samoa are well developed, there is considerable need to better understand how climate variability and change affects health outcomes, including outside the context of 'extreme events' usually considered in disaster plans. Capacity to respond through public awareness, to familiar events

such as flooding, droughts, can be limited by availability of adequate human resource (HRH) and by the nature of the disaster itself (e.g. disease outbreak (dengue, typhoid). Current capacity to continuously monitor, prevent and respond to communicable and non communicable diseases need to be strengthened.

Future impacts on health

Though any individual extreme event cannot be attributed solely to climate change, there is compelling evidence that climate change is already affecting the frequency and/or severity of climate extremes. In the future, heat waves, flooding from sea level rise, heavy rainfall events and severe cyclones are projected to increase. Increasing sea surface temperatures and acidification of sea water will have additional impacts. The health impacts of these trends are potentially severe, but even the direct impacts (injuries, mortality) are difficult to quantify. In the long term, indirect effects of extreme events, including loss of livelihoods and migration, are likely to be very important.

The potential future effect of climate change on vector borne diseases can be quantified, in the future. Dengue fever, in particular, is rapidly re-emerging worldwide, while climate based empirical models suggest a probable worsening of this trend. Such models do not project a spread of malaria to Samoa within the 21st century.

Future nutritional health status will depend on a wide range of social, demographic and economic trends as well as climate factors, but increases in extreme climate events are projected to have adverse impacts on food prices and food security globally. Extreme events will also affect local and national availability of fresh produce, potentially increasing reliance on less healthy processed foods. Disruption of coral reef ecosystems through increased sea surface temperatures and acidification of sea water may impair the availability of reef fish.

Current policies and programmes that address climate sensitive health risks and projected health risks

Some activities are currently in place in Samoa within the health and other sectors that aim to address present-day climate sensitive health risks. These do not, in general, consider the potential for climate change to alter or intensify these risks, but are focused on the currently recognized risks. For a descriptive list of the current policies, refer to the Annex: table 3: Comparison of national, Health Sector Plan and NHS Plan, Table 4: Relevant policies in the Health Sector Plan and Table 5: Strategies and action in the Water and Sanitation Sector Plan.

Health sector activities

During the consultation process, initiated by the Ministry of Health Samoa, February 2014, the Health Sector Partners conducted the vulnerability and adaptation assessment, refer to annex, table 1.

Within the assessment, the Health Sector Partners aligned their activities within the CASH to support future response for CASH.

Plans are in place for responding to extreme events such as cyclones. These are reviewed following an event in order to find ways to refine or improve the plans in response to any observed shortcomings.

The primary health risks following an extreme climate event are thought to be those related to impacts on crops and fisheries, rather than outbreak of infectious disease, but this may largely be due to the coordinated preventive health response following an event which may include media campaigns on water boiling, delivery of clean water, and medical outreach.

National Food and Nutrition policies and programmes are in place to address malnutrition, through breastfeeding education and counseling and promotion of local foods. Food safety continues to be monitored at all food premises.

As mentioned above, maternal and child health is one of the key health risks identified through the vulnerability and adaptation assessment whereby the CASH will focus on strengthened efforts to monitor maternal and child health outcomes. Supporting antenatal care for pregnant women but also ongoing immunisation against typhoid is being proposed for high risk population. It is a key activity underway in Samoa aimed at reducing the current burden of communicable disease. Mass drug administration has been undertaken periodically to reduce filariasis transmission (completed 9 rounds since 2011, and post MDA prevalence survey 2013). These activities are organized by the Health Sector Communicable Disease Control Committee.

A pilot project on rainfall and diarrhoea is underway using monthly rainfall data and community surveys, with data collection by medical students visiting from Fiji. In 2011 there was a survey conducted to determine the burden of typhoid and a follow up survey is planned.

Each district hospital has a disaster management plan but there is no specific adaptation planning in place other than the relocation of one hospital that is in a low-lying area.. Of the four major climate sensitive health risks identified, only extreme climate events were perceived as directly affecting district hospitals.

The Samoa Red Cross is the first line of response in emergencies natural disasters as they provide basic needs in times of disaster to shelters such as basic soap, clothes, sanitation items, assist with evacuation of victims from danger zones such as victims of inland flooding in Apia urban area. They also provide support to vulnerable during and after natural disasters. Maintain the blood bank through awareness of public to donate blood. They conduct first aid training based on internationally accredited

standard as well as providing hardware such as installations of latrines, water tanks, and vegetables seedlings to be planted to vulnerable groups when resources are readily available.

Activities in other Sectors

Non-health sectors in Samoa are undertaking activities that address current climate sensitive health risks.

Promoting food security in Samoa is a priority of the Ministry of Agriculture and Fisheries. Much of the food consumed in Samoa is locally produced and includes taro, coconut and bananas, fish and beef. Some food is imported, including beef, lamb and tinned fish. Research is underway to determine which crops and which varieties of crops can best withstand extreme climate events such as drought. There is also a program run through the Ministry of Women promoting small scale subsistence agriculture.

The Ministry of Women, Community and Social Development is also working with community Women's Committees and Aiga ma NuuManuia Programme to promote community health for example, raising awareness of dengue prevention, organizing household sanitary inspections (campaign to clean up houses and surrounds to eliminate breeding places such as removing coconut shells and other containers, especially during an outbreak). It is seen as impossible to eradicate the dengue vector, but minimizing breeding habitats is an effective way to reduce risk of a dengue outbreak. Other 'clean up' campaigns are the National Clean Campaign, for clearing waterways. Schools are monitored for their water and sanitation facilities quarterly, with a program of upgrading underway. The Ministry's ongoing community work through the Aiga ma Nu'uManuia Programme (MWCSD) plays an important role in raising awareness in hygiene, water safety and food handling to minimize communicable disease transmission.

Climate change is a consideration in all development projects in Samoa, including placement of infrastructure such as electricity supply on higher ground and away from vulnerable coastal areas to minimize risk of damage during flooding as well as risk of coastal contamination from pollution and erosion. Sea walls are being built to protect some low-lying areas from sea-level rise.

While water resources are largely managed independently at village level, the Water Research Division (WRD) of the Ministry of Natural Resources and Environment has a number of programs in place to manage and protect surface and ground water. These include monitoring of bore holes for salinity from sea level rise, watershed management (such as developing strategies for farmers to grow crops further away from waterways to prevent contamination before it gets to treatment, and buying up land around Apia for conservation and rehabilitation to minimize catchment contamination from increasing 'suburbanization'. There is little public support for water conservation and management. Efforts in water management are largely focused on the urban area, especially with regard to flood mitigation. The Ministry

instigates water rationing during the dry season. In the NGO sector, the Red Cross has implemented a program to introduce rainwater harvesting to vulnerable communities. Drilling of supplementary bore holes and monitoring these for salinity is underway to supply additional water during drought. Rainwater harvesting at community level is increasing and encouraged, while upgrading independent water schemes, including training of local plumbers (to ensure the integrity of pipe systems, for example), is a priority. Improving sanitation outside the small areas that are serviced by reticulated water is also a priority, and the need to upgrade pipes to reduce wasted water from leakage is also recognized.

There is some monitoring occurring for recreational water and other open water sources for biological organisms and not just physical parameters. There is a plan to introduce a rating system for rivers based on an Australian system (as an A to D 'report card'). This would provide a record of the quality of water across a range of sources, which might then be accessed quickly during a disaster.

The Samoa Tourism Authority has an advanced draft adaptation strategy and a number of adaptation activities underway. These include raising climate change awareness among tourism operators to assist with their business planning, working with operators to conserve water and energy. There are also education programs to assist with climate change mitigation and environmental conservation, in particular to reduce deforestation by operators and minimize coastal erosion. Most tourism operations occur on the coastal zone with flooding, erosion and water availability of concern. Tourism operators have disaster risk management and evacuation plans and are monitored for sanitation standards. The Ministry of Environment has developed Waste Management Plans, which includes activities to reduce greenhouse gas emissions.

Considerable progress has been made to integrate Disaster Risk reduction and Climate Change Adaptation, at both institutional and operational levels. This is mainly due to Samoa's Climate Change Unit and the Disaster Management Office (DMO) both under the MNRE, despite there being separate national plans for Climate Change Adaptation and Disaster Risk Reduction, it is recommended that, whether they be separate or joint, Disaster Risk Reduction and Climate Change Adaptation policies and plans should give high priority to joint implementation and strong coordination, in order to maximize the many synergies between Disaster Risk Reduction and Climate Change Adaptation.

The DMO-MNRE run programs in businesses such as preparation of fire drills for evacuation of buildings to help minimize risks/injuries during evacuation as well as preparation of plans for schools in terms of fire drills, evacuation plans. Hence the overall aim of the DMO division is to save lives and by doing so ensuring that plans are in place in times of extreme events, and people are equipped with knowledge and skills in times and disaster. Also they monitor the implementation of the National Disaster Management Plan recently reviewed in 2009. This plan incorporates the responsibilities of all relevant parties in the preparation s and responses before, during and after natural disasters. (Samoa's National Disaster Management Plan, 2011 – 2014).

The MNRE is the main implementing agency for all the nine National Adaptation Plan of Action (NAPA) profiles. They look at other areas that indirectly have an impact on our health such as building of coastal seawalls to protect from coastal erosion, land use and prevention of degradation soil, building climate resilient roads systems and enforcing Building codes to withstand strong winds.

Adaptation needs: additional public health and health-care policies and programmes to prevent likely future health burdens

Food, water and sanitation were identified as fundamental areas to address in climate change adaptation planning, and a number of needs for adaptation planning were identified.

1. Surveillance, testing and reporting

Communicable disease surveillance guidelines are implemented but lack of human resource is a major challenge.

Laboratory testing for diagnosis for communicable diseases is minimal. Improving diagnosis has been identified by the Public Health Sector as a high priority in order to identify and respond to a potential outbreak in a timely fashion.

The Samoan Water Authority carries out ongoing monitoring of improved water monitoring and more consistent treatment for improved water supply and quality is also seen as a priority for adaptation. This includes monitoring of alternative water sources, such as coastal springs, which are accessed primarily during times of drought and water rationing. Such sources are potentially very useful during a water crisis but their quality is unknown. Some monitoring occurs but it is not widespread.

The need to strengthen health information and surveillance systems is important for better decision-making, including for health adaptation. A key focus is the need to build staff capacity in the analysis and use of existing information and ability to produce reports.

Establishing or improving mechanisms in which baseline data relating to health and climate could be obtained. Such mechanisms should also provide for ongoing monitoring and surveillance of current known health risks as well as any emerging issues as a result of Climate Change.

2. Data collection, research and technical expertise

Basic information about climate-related health impacts is lacking and there is little current data available for analysis. In particular, inadequate data on vulnerability to climate impacts was flagged as a considerable barrier to adaptation planning.

This Climate information is disseminated to the Ministry of Health/focal points for Disaster Risk Management. The constant update of climate information and sharing of data enables to match health with weather and climate events, to improve the

Health Sector focus on climate health risk issues through monitoring and surveillance activities. The constant update of climate information and sharing of data enables to match health with weather and climate events, to improve the Health Sector focus on climate health risk issues through monitoring and surveillance activities.

The national STEPS survey provides information on current patterns of non-communicable diseases and mental health and the aim is to repeat this every ten years or as needed. A more general and frequent collection of health data (for example, an annual health survey at community level) was identified as important for understanding current patterns of disease and trends.

Climate Change is a major challenge that the Water Quality Unit experience from time to time. The quality of water is vulnerable to heavy rain and flooding as well as dry seasons. Water quality monitoring at all sources under Samoa Water Authority, Independent Schemes as well as Bottle Water Companies is ongoing. Microbiological and physical parameters are tested in accordance with the National Drinking Water Standards 2008. Other sources will be tested upon request or complaints from the public. Reports of these monitoring are submitted to the Management and relevant stakeholders to make inform decisions on water quality related issues. Sea level rise is being monitored to determine how fast it is affecting the water table. New water sources are being sought to supplement usual supply during disasters.

Consider the surveillance of food and sanitation. There is also a need to encourage cross-sectoral, trans-disciplinary research and knowledge sharing for collaborative research and policy development and implementation at the government and community levels. Community adaptation capacity should also be enhanced using traditional environmental knowledge and cultural practices.

3. Information sharing and early warning

Upgrading of early warning systems and better information sharing is a must and seen as important for improving preparedness, especially to better prepare for an extreme climate event. Early warnings need to be understandable, believable and timely, in order for appropriate mitigation action to be put in place.

The Climate Early Warning Systems (CLEWS) was developed to provide information services to all Sectors, to inform planning and operations, assist in disaster risk reduction initiatives, and increase resilience in the health sectors. There is still a need to strengthen the collaboration of these sectors in order to provide good quality scientific data and deliver effective and efficient climate information to service providers. Need to strengthen the capacity of the Health Sector to provide Climate health early warning system tailored to stakeholders and communities to better respond and adapt.

Consider the need to address areas of research and pay particular attention to the most vulnerable population. Adaptation initiatives should be well-integrated with existing systems, structures, and policies. Hence, the Geographical Information System should

be strengthened to ensure that a holistic coverage of climate health risks can be captured in this System and to be able to produce effective reports.

Data sharing should be strongly encouraged through establishing agreements and arrangements to match health data with weather and climate events in order to improve the sector focus of weather climate advice. Health Sector impacts data needs to be matched with meteorological events to enable risk profiles to be better understood and where possible included in short term and seasonal forecasts.

4. Awareness and capacity building

Ongoing multi-media awareness about climate change is a priority. As the need for the public to become aware of the significant causes of climate sensitive diseases and preventive measures, therefore community engagement and development of climate change and health should be emphasized in health promotion and educational programmes.

Increasing immunisation coverage and encouraging people to use their district hospital rather than the main hospital in Apia were viewed as ways to improve health status and take pressure off the tertiary hospital for minor illness.

Improving the capacity of individuals and households, through education and consultation, to respond to the health risks posed by climate change was seen as essential, especially in rural areas where assistance during an event may be delayed.

Local level capacity building was seen as important, in particular strengthening the programs coordinated by the Ministry of Women and implemented at community level by the local Women's Committees. Local community members could receive training in hygiene, water safety and food handling to minimise communicable disease transmission. While it was recognised that changing people's behaviour can be challenging, there was generally good community support for such programs. Local tourist operators could be encouraged to inform their clients of access to local hospitals in case a disaster. Information on services such as these that are available could be usefully provided to operators.

Building capacity of human resources on Health Impact Assessments (HIA) will allow the Ministry of Health to analyse updated data on human resources for health (HRH) and the response in relation to climate change and health risks.

5. Communication

The potential for mobile phone companies to play a significant role in adaptation in Samoa is considerable. Mobile phones are widely used in all parts of the country, with two main providers competing for market share. The tsunami warning system includes mass messaging and this could also potentially be employed for extreme climate events. Taking this further, mass communication (or more targeted, say, to a specific area) could be used to raise awareness about (for example) contaminated or a shortage of water. There is potential for mobile phone companies to provide

information as well as disseminate it and therefore the Health Sector will see an engagement mechanism with the private providers to ensure a common response. Social media such as twitter, facebook can be utilized as well as the Feso'otai Centres.

6. Water and sanitation

The supply of safe water was identified as a current problem likely to be amplified by climate change. Pollution from inadequate dealing with wastewater, contribution to poor vector control and direct effects on health from contaminated water was considered important issues that urgently need to be addressed, especially in the Apia region. Fluctuating rainfall, especially as this may become more of a problem with climate change, needs to be addressed and suitable storage options developed to deal with drought, flooding.

Improving ecological health more generally, such as reducing deforestation, was noted as important for increasing environmental resilience and reducing climate sensitive health risks.

Water has been transported from unaffected to affected areas following past extreme events. Adaptation preparedness should include strategies to plan for and respond to more geographically widespread events which may render shipping in fresh water from unaffected areas or transferring personnel or patients more difficult.

7. Safety

Climate Change causes risk to safety of health, and it is important to make reference to the HIA, EIA and Emergency and Disaster Plans for safety purposes. Having a safe place for community members to gather in during or following an extreme event was considered a priority. This could be located near or onsite with the district hospital, be used as an emergency store for food and water and provide shelter for approximately 300 people. Such a facility could also be used as a health education or resource centre for the local community.

National building codes that detail requirements, for example, for cyclone proofing, are in place but could be better monitored and enforced. The building code for Samoa should include mandatory water harvesting. Better climate health facilities need to be identified in accordance to HIA e.g hotels and temporary shelters to be cyclone proof.

Moving essential infrastructure to climate safe areas was identified as an important adaptation strategy. There may be significant economic costs associated with relocating infrastructure.

8. *Monitoring and Evaluation*

The importance of considering the wider implications of any adaptation activity prior to implementation and evaluating the impacts of activities after implementation were noted as necessary to identify actions that work best, are sustainable, and that minimise adverse and unintended consequences. Including an evaluation component, a ‘situational analysis’, into any adaptation project is essential in order to assess efficacy and cost-effectiveness, and to develop and improve the program. Needs may vary between areas, as might climate, behaviours and other contexts. Adaptation activities should include consultation with stakeholders in their planning and development, implementation, and evaluation.

Some potential adaptation activities that could be considered may have adverse consequences, such as provision of water storage facilities (if poorly maintained these could contribute to future dengue transmission through provision of additional suitable habitats for vector breeding), or introducing chemical control of vectors (this could affect other species, vectors may develop resistance, or there could be human health consequences). Attempts to eradicate filariasis with mass drug administration could drive pathogen resistance (if inconsistently applied).

Monitoring of climate change and disaster risk management outcome indicators is one of the roles of the Ministry of Health. This will allow the Health sector to anticipate on outbreaks and emergencies related to climatic conditions.

Priority setting for public health policies and programmes

Deciding on priorities for adaptation to climate change is difficult, due to incomplete information on existing health risks as well as the effectiveness, feasibility, cost and equity implications of potential actions. However, many “no-regrets” or “low-regrets” adaptation policies are available, which would be beneficial regardless of the projected impact of climate change on health.

In consultation with stakeholders and using the identified climate sensitive health risks, a matrix was developed to help inform decisions on priority-setting for health adaptation activities (Table 2). Public health in Samoa is vulnerable to climate change, especially as it relates to flooding and other extreme events, but also to longer term changes to climate averages. Samoa is already subject to a number of climate-sensitive health problems that are not well addressed, and Samoa’s vulnerability to these may be increased with climate change.

There was broad agreement on the important climate sensitive health risks that should be considered in climate change adaptation planning. All participants agreed that the health impacts of extreme events, water and food borne communicable disease, vector borne disease and malnutrition were important priorities for climate change adaptation. NCDs could potentially be accommodated under the ‘malnutrition’ category, but this is a problem of ‘overnutrition’ (consumption of large quantities of overly energy dense foods), generally of greatest concern in adulthood, rather than ‘undernutrition’, generally a concern among young children and the usual target of

programmes to address malnutrition. Heat-related morbidity and mortality may become an increasing concern in Samoa, especially with the high prevalence of chronic disease.

Prioritizing adaptation strategies to address the health impacts of climate change should take into account the likelihood and extent of the problem and how feasible it is to address. Determining priorities could take an approach similar to that in Table 2, where burden and feasibility were approximated, through expert opinion, along a number of dimensions; likelihood of occurrence, the extent of the problem (population and geographic area), severity (e.g. mild illness / significant morbidity / significant mortality), vulnerable populations, current activities in place, significant limitations, implementation costs and timeframes. Health risks that score highly on likelihood, extent, severity and low on implementation costs and timeframes might be considered to be top priorities, where the most benefit can be gained at the lowest costs and in the short term. The results from the initial discussion with stakeholders to populate this table as a first step to prioritize adaptation plans to health risks show that it may be difficult to prioritize these without a more detailed analysis. For example, all health risks were considered to be costly to address. A more detailed analysis would require more data on baseline risks, for example, in order to determine future likelihood and burden.

Many of the needs identified for adaptation planning relate to data and information. A lack of data was noted as a significant limitation across sectors. Data is required to establish baseline relationships, for example, climate variables and health outcomes, in order to estimate future risks, plan appropriate adaptation activities and evaluate the impacts of such activities. Improved laboratory testing and surveillance is a high priority, as are research projects to establish baselines and trends in climate sensitive health risks. A process for sharing information across sectors would improve understanding of responsibilities and relationships between sectors and add value to research. Increasing technical expertise, for example in monitoring as well as in community resilience was also identified as an important need.

Resources required for programme implementation and potential barriers

Substantial resources are required to implement the proposed actions. It is recommended that applications for further external funding are developed.

The Health Sector is encouraged to engage with the national climate coordination mechanisms and work closely with the Ministry of Environment / GEF focal points and other development donors for accessibility to funds to support the implementation of the adaptation needs in the CASH.

Proposed Climate Change and health adaptation plan

The Operational Framework for Climate Resilient Health Sector Response will allow the country to monitor and communicate but also to prepare for changing climate health risks. The frameworks for Samoa will operate from five components which are crucial to emphasize that continues investment in primary health care and essential

public health services is vital, which helps to reduce population and health system vulnerability to climate change.

Key Strategic area 1: Health Governance, Policy and Management

Key Strategic area 2: Cross-sectoral collaboration and partnership

Key Strategic area 3: Capacity Development

Key Strategic area 4: Vulnerability and adaptation assessment

Key Strategic area 5: Cross sectoral prevention and risk management

Within these Key Strategic Areas and taking into account the eight adaption needs identified, the main highlighted recommendations are:

- Mainstream climate change considerations into all Health Sector activities
- Strengthen community health education and health promotion and programmes on food and water safety, hygiene, sanitation, healthcare and hazardous waste management, vector control, breastfeeding and nutrition and psychosocial support.
- Strengthen communicable disease surveillance and control, especially as this relates to climate sensitive diseases.
- Strengthen non communicable diseases surveillance including mental health and injuries in order to pre determine a proactive response in times of disasters.
- Conduct further research linking health and climate information, (including CLEWS, EWARS, GIS and HIS, climate risk maps).
- Consider the effect of climate change on future health risks: especially Health Impact Assessment and risks related to water and food supplies, sanitation and vector control, NCDs including nutrition, psychosocial and mental health .
- Consider the review of Outcome 7 indicators: Risk Management and Response to Disasters, Emergencies & Climate Change to ensure that it is aligned with revised HSP 2008 – 2018 outcome indicators.
- Note that the Ministry of Health is the lead agency for the Health Sector and is the National Focal Point for monitoring the Climate Adaptation Strategy for Health.

The need to strengthen health information and surveillance systems is important for better decision-making, including for health adaptation. A key focus is the need to build staff capacity in the analysis and use of existing information and ability to produce reports

Annexes

Table 1: Vulnerability and Adaptation Assessment

Climate Change Risks	Vulnerabilities and Adaptation Assessment	Baseline Information	Response		Responsible Agency
			Current	Future	
Vector borne diseases	<p>Assessment:</p> <ul style="list-style-type: none"> - Dengue fever - Filariasis - Worm infestation - Skin disease - Viral diseases. <p>Laboratory data</p> <p>PATIS</p> <p>Number of patients admitted or seen at OPD</p> <p>Vulnerability:</p> <ul style="list-style-type: none"> - Poor and lack of awareness and knowledge of community groups about their respective roles and responsibilities; Climate Change Adaptation technical information and language for necessary actions and response; Climate change impacts of health; Climate Change Adaptation/DRR measures against health impacts - Poor or no water supply 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS ✓ NHS Laboratory Data ✓ DHS ✓ Health sector partners corporate plans ✓ Operation plans ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Existing health policies ✓ Private Clinics Data 	Surveillance is ongoing and contact tracing	Improve surveillance Consolidating data	MOH
			Coordination and monitoring through Multi-sectoral approach	Strengthen and sustain partnership with other sectors through Multi-sectoral approach	MOH
			Ongoing awareness and prevention education programs	Strengthen ongoing awareness and prevention education programs	All sector partners
			Conduct Infection Control Programs	Strengthen and continue Infection Control Programs in line with the National Infection Control Policy.	MOH, NHS and relevant sector partners
			Conduct community disaster and climate risk management project (CDCRM) in 50 village communities;	Financial Support for Climate Change Adaptation Strategy for Health when needed.	

	<p>Poor or no sanitation facilities</p> <p>People's inaccessibility to school health services (immunizations, family planning etc) and other necessities in life due to exclusion (ostracized) from village systems or inconsistent public health services in communities</p> <p>Overcrowded in poor household facilities</p> <p>Urbanization</p> <p>Internal migration</p> <p>Coast and low lying settlements</p>		<p>Conduct MDG project in 1200 most vulnerable households in the country, include:</p> <ul style="list-style-type: none"> - assessments 'VCA' in 1200 house holds; - basic hygiene education on water and sanitation (WASHE), incl, water/vector/food borne diseases. - Provide and install 1200 water tanks, 1200 VIP latrines ie gardens - train identified vulnerable house holds on growing vegetable gardens & sustaining them for nutritious diets and subsistent income - provide seedlings for veggie gardens for above reasons - ongoing Monitoring and Evaluation - Awareness and prevention 	<p>Enhance continuity and sustainability of programs and activities</p>	<p>WHO</p> <p>Samoa Red Cross Society</p>
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			<p>education programs</p> <ul style="list-style-type: none"> - Infection control programs Currently NHS can only test ✓ <i>E.coli</i> ✓ <i>S.typhi</i> ✓ Dengue (Rapid Test) ✓ Leptospirosis (Rapid Test) 	<ul style="list-style-type: none"> - Increase Laboratory Capacity to detect other causative agents of waterborne/foodborne/ vector-borne Diseases ✓ Chikungunya virus ✓ Norovirus ✓ Enterovirus ✓ Vibrio Cholera ✓ Subtyping Dengue <p>- Provision of clean water</p> <p>Regular inspections of food outlets</p>	NHS/MOH/SWA
Waterborne diseases	<p>Assessment:</p> <ul style="list-style-type: none"> - Diarrhoea - Typhoid - Skin infection - Worm infestation <p>Vulnerability:</p> <ul style="list-style-type: none"> - Poor and lack of awareness and knowledge of community groups about their respective 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS ✓ NHS Laboratory Data ✓ Private Clinics Data ✓ DHS ✓ Health sector partners corporate plans ✓ Operation plans 	<p>Surveillance and contact tracing are ongoing.</p> <p>Ongoing Coordination and monitoring through Multi-sectoral approach</p>	<p>Improve surveillance</p> <p>Consolidating data</p> <p>Strengthen and sustain partnership with other sectors through Multi-sectoral approach</p>	<p>MOH</p> <p>MOH</p>

	<p>roles and responsibilities; Climate Change Adaptation technical information and language for necessary actions and response; Climate change impacts of health; Climate Change Adaptation/DRR measures against health impacts</p> <p>Poor or no water supply</p> <p>Poor or no sanitation facilities</p> <p>People's inaccessibility to school health services (immunizations, family planning etc) and other necessities in life due to exclusion (ostracized) from village systems or inconsistent public health services in communities</p> <p>Overcrowded in poor household facilities</p> <p>Urbanization</p> <p>Internal migration</p> <p>Coast and low lying settlements</p>	<ul style="list-style-type: none"> ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Existing health policies 	Breastfeeding is encouraged for infant feeding.	<p>Strengthen breastfeeding awareness and education programs</p> <p>Financial support for procurement of equipments and tools required.</p>	<p>MOH & relevant sector partners</p> <p>WHO/Development Partners</p>
Malnutrition	<ul style="list-style-type: none"> - Food poisoning - Diarrhoea - tyhoid 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS ✓ NHS Laboratory Data ✓ DHS 	Surveillance	<p>Improve surveillance</p> <p>Consolidating data</p>	MOH

		<ul style="list-style-type: none"> ✓ Health sector partners corporate plans ✓ Operation plans ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Private Clinics Data ✓ Existing health policies 	<p>Ongoing Coordination and monitoring through Multi-sectoral approach</p> <p>Breastfeeding is encouraged</p> <p>Formulas provided to Breastfeeding mothers</p>	<p>Strengthen and sustain partnership with other sectors through Multi-sectoral approach</p> <p>Provides financial support when needed</p> <p>Ensure provision of formula AND clean water to mothers</p>	<p>MOH and all sector partners</p> <p>WHO</p> <p>MAF/MOH/NHS</p>
NCDs	<ul style="list-style-type: none"> - hypertension - high blood pressure - diabetes - obesity - cancer - mental health - injury 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS ✓ NHS Laboratory Data ✓ Private Clinics Data ✓ DHS ✓ Health sector partners corporate 	<ul style="list-style-type: none"> - STEP Survey for NCD - Health education and promotion awareness program - Surveillance - Advocacy groups in place (SPAGHL, WINLA) - Syndromic surveillance 	<p>Strengthen health education and promotion programs</p> <p>Strengthen monitoring</p>	<p>MOH and relevant sector partners</p> <p>MOH</p>

		<p>plans</p> <ul style="list-style-type: none"> ✓ Operation plans ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Existing health policies 		<p>and regulatory role of MOH</p> <p>Improve coordination with and between agencies to ensure maximum and effective service delivery</p> <p>Identify shelters in terms of emergency/disasters for patients and evacuation centres for casualties.</p> <p>Establish counseling unit with qualified local staff in health sector entities.</p> <p>Ensure drug and medication availability.</p> <p>Strengthen community based program and engage communities to be proactive especially with regards to healthy living.</p>	<p>MOH & all sector partners</p> <p>All sector partners</p> <p>All sector partners</p> <p>NHS & MOH</p> <p>All sector partners</p>
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			<p>Awareness and Prevention Education Programs</p> <p>Primary and Secondary health care Response</p> <p>Drug Availability</p>	<p>Need to improve coordination within and between agencies to ensure maximum and effective service delivery</p> <ul style="list-style-type: none"> ✓ Improve service delivery <p>Identify shelters in terms of emergency/disasters (in particular for NKF patients)</p> <p>Need to improve or create solid infrastructure</p> <p>Establish counselling unit with qualified local counsellors (rather than get counsellors from overseas like in the case of the 2009 tsunami)</p> <p>Ensure drug availability</p>	MOH/NHS
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			Counseling	Need to strengthen community based program and also engage communities to be proactive, especially with regards to healthy living.	
Mental Health	<ul style="list-style-type: none"> - Social stress - Anxiety - Bipolar 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS ✓ NHS Laboratory Data ✓ Private Clinics Data ✓ DHS ✓ Health sector partners corporate plans ✓ Operation plans ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Existing health policies 	<ul style="list-style-type: none"> - Improve mental health services - STEP Survey 2013 sub-survey - Mental Health Act 2007 - Mental Health Policy 2006 review completed. 	<p>Strengthen health education and promotion programs</p> <p>Strengthen monitoring and regulatory role of MOH</p>	MOH
Injury	<ul style="list-style-type: none"> - Infectious diseases 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS 	<ul style="list-style-type: none"> - Improve and strengthen health 	Strengthen health and education	MOH

		<ul style="list-style-type: none"> ✓ NHS Laboratory Data ✓ Private Clinics Data ✓ DHS ✓ Health sector partners corporate plans ✓ Operation plans ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Existing health policies 	<p>promotion and awareness programs</p> <ul style="list-style-type: none"> - - Infection Control Policy and Manual in place - Strengthen monitoring and regulatory role of MOH 	<p>promotion programs</p> <p>Strengthen monitoring and regulatory role of MOH</p>	MOH
Maternal & Child health	<ul style="list-style-type: none"> - Disruption to essential services in terms of access and access of: <ul style="list-style-type: none"> i. Pregnant mothers to antenatal & perinatal care ii. Infants to immunization iii. Mothers to reproductive and family planning services - Increase in maternal and infant mortality and morbidity due to trauma from severe storms and flooding etc. 	<ul style="list-style-type: none"> ✓ PATIS-MOH & NHS ✓ NHS Laboratory Data ✓ Private Clinics Data ✓ DHS ✓ Health sector partners corporate plans ✓ Operation plans ✓ IEC Materials ✓ MoUs/Contracts ✓ National statistics ✓ Existing health 	<ul style="list-style-type: none"> - Improve and strengthen health promotion and awareness programs - Strengthen monitoring and regulatory role of the Ministry. - Disaster emergency nursing and midwifery competencies in place to guide preparation and response for safe 	<p>Strengthen health education and promotion programs</p> <p>Strengthen monitoring and regulatory role of MOH</p> <p>Strengthen capacity building and raising awareness of nurses and midwives on disaster</p>	<p>MOH</p> <p>MOH</p> <p>MOH/NHS</p>

	<ul style="list-style-type: none"> - Increase number of pregnant mothers and infants vulnerable to/affected by infectious diseases outbreaks. 	<p>policies</p>	<p>maternal child health services.</p> <ul style="list-style-type: none"> - Credentialing programs for midwives and doctors in Obstetrics Emergencies - Capacity building for nurses and midwives competencies on disaster and emergency preparedness and responses. - Nursing and midwifery disaster management plan in place that links to the National Disaster/Management Plan 	<p>and emergency competency.</p> <p>Continuous simulation drill using new approaches “the table top drills” for nurses and midwives including the auxiliary assistants.</p> <p>Strengthen coordination of services and working collaboratively with TBAs, village mayor, and sui tamaita’i o nu’u on how to manage pregnant mothers in time of a disaster or emergency.</p>	<p>MOH and sector partners</p> <p>All sector partners</p> <p>MOH/NHS</p>
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Table 2 Health risk and adaptation matrix, developed in consultation with stakeholders. 1=Low (or *small or **short), 2=Medium, 3=High (or *large or **long)

Health risk	Likelihood	No. People	Geographic area*	Severity of impact	Vulnerable groups	Current activities	Limitations / needs / gaps	Costs to address	Timeframe to implement**	Timeframe for benefits**
Extreme climate events	2-3	3	3	2	Children, elderly, women, coastal areas			3	1-3	1
Water and foodborne communicable disease	3	3	3	1	Children, <5, elderly, immunosuppressed, tourists		Changing behaviour	3	Potentially 1, with will	2 (5-10 years)
Vectorborne disease	2-3	2	2	2	Tourists, everybody		Funding, attitudes, human resources	3	2	1
Malnutrition	3	3	3	2	Children	Infant and Young Child Feeding promotion programme	Financial, seasonal local foods, living costs, affordability, awareness	3	2	2
NCDs	3	3	3	3	Everyone	Media, policies: Physical activity program, school nutrition program. Salinity, bore holes and hypertension	Cost of living high	3	3	3
Heat effects	u/k									

Table 3: Comparison of National, Health sector and NHS plans

NATIONAL PLAN Strategy for the Development of Samoa 2008-2012 Goal 4: Improve Health Outcomes	HEALTH SECTOR PLAN 2008-2018 Strategic Objectives	NHS Corporate Plan 2011-2014 Key Priority Areas
<ol style="list-style-type: none"> 1. Reduce in infant mortality rate 2. Increase 1 year old immunized against measles 3. Decrease maternal mortality 4. Increase immunisation rate of children in rural areas 5. Increase percentage of births attended by skilled health workers 6. Decline prevalence of NCD's 7. Decline number of attempts and deaths associated with suicide 8. Contain prevalence of death rates associated with HIV/AIDs 9. Decrease prevalence rate of STD 10. Decrease prevalence of TB death rates 	<ol style="list-style-type: none"> 1. Health promotion and primordial prevention 2. Quality Health Care Service Delivery 3. Governance, Human Resources for Health and Health Systems 4. Partnership Commitment 5. Financing Health 6. Donor Assistance 	<ol style="list-style-type: none"> 1. Primary Health Care 2. Patient Care 3. Governance 4. Service Delivery 5. Medical Products & Supplies 6. Information & Communication Technology 7. Infrastructure, Plant and Equipment 8. Human Resources 9. Finance 10. Emergencies & Disasters 11. Partnerships

Table 4: Relevant policies in the Health Sector Plan

Outputs	Indicator	Implications of climate change	Strategies
Healthy public policies	<ul style="list-style-type: none"> • Compliance with International Health Regulations 	Communicable diseases more difficult to control	Strengthen communicable disease surveillance and control
	<ul style="list-style-type: none"> • Evidence of appropriate policies developed in response to emerging health issues 	Climate change threatens the determinants of health and wellbeing	Climate change should be mainstreamed into all Government portfolios;
Environmental health	<ul style="list-style-type: none"> • Evidence of collaboration with and between health sector partners to create safe and healthy village environments for Samoan families and children 	More frequent and severe extreme climate events	Consider the effect of climate change in planning of settlements, building construction, infrastructure
	<ul style="list-style-type: none"> • Evidence of strengthened programs related to poverty, vulnerability and hardship 	May increase vulnerability and hardship	Vulnerability mapping and targeting of social support programs
	<ul style="list-style-type: none"> • Design and implement effective programs to reduce endemic typhoid, diarrhea, filariasis and tuberculosis in Samoa 	Potential to worsen these diseases, as well as dengue and leptospirosis	Consider the effect of climate change on disease risks: GCM projections; spatial models and early warning systems
	<ul style="list-style-type: none"> • Design and implementation of programs to reduce all communicable diseases in Samoa 		
	<ul style="list-style-type: none"> • Develop a safe water policy and Plan of Action 	Water safety may be compromised by flooding, drought and sea level rise	Consider effects of climate change on water safety, sanitation and vector control

Community action	<ul style="list-style-type: none"> Evidence of collaboration with community, cultural, and religious social structures in health promotion and primordial prevention campaigns 	More frequent and severe extreme climate events	
Personal skills	<ul style="list-style-type: none"> Evidence of increasing sector partner programs aimed to enhance life skills and healthy choices. 	Potential worsening of water and food borne communicable diseases vector borne diseases and malnutrition (enteric disease, ciguatera)	Food safety, hygiene, waste management ,vector control, breastfeeding and nutrition education;
Reorienting health services	<ul style="list-style-type: none"> Health sector research and surveillance capacity improved for evidence based policy and clinical strategies. 	Increases in morbidity and mortality, potentially emergence of new diseases	Strengthened surveillance and response systems, mapping of disease risks; Research linking health and climate information, (early warning systems)?
	<ul style="list-style-type: none"> Increased availability of appropriately qualified and skilled health workforce 		Focal point for climate change and health

Table 5: Strategies and actions in the Water and Sanitation Sector Plan (Tables 11 and 12 from the Water and Sanitation Sector Plan 2012-2016)

Table 11: Drinking Water Quality and Health Surveillance Logical Framework

Drinking Water Quality Sub-Sector				
OBJECTIVE 4: To improve surveillance of drinking water quality and water borne diseases				
Strategies				
4.1 To improve drinking water quality	4.2 To increase surveillance of water-borne diseases	4.3 To build capacity of MOH to improve monitoring of drinking water quality and health surveillance of water-borne diseases	4.4 To increase public and sector stakeholder awareness on drinking water quality issues	4.5 To strengthen communication and coordination between SWA, IWSA, MNRE, bottled water companies and MOH
Actions				
4.1.1 Review National Drinking Water Standards.	4.2.1 Identify data needs for collection, analysis and reporting	4.3.1 Upgrade water quality laboratory	4.4.1 Design and implement targeted awareness and educational programs on drinking water quality issues through media and other IEC materials	4.5.1 Develop MOU to strengthen coordination and information sharing between MOH, IWS, MNRE and MOH
4.1.2 Finalize and implement Guidelines for Drinking Water Quality Standards.	4.2.2 Circulate monthly surveillance bulletins on water borne diseases to sector stakeholders	4.3.2 Recruit qualified staff for drinking water monitoring and health surveillance		4.5.2 Engage SWA, IWSA and MNRE continually through subsector committee meetings
4.1.3 Monitor development and implementation of water safety plans	4.2.3 Circulate Alert Reports to relevant Authorities when diarrhoea and typhoid exceed threshold level	4.3.3 Upgrade knowledge and skills of staff on water safety plans. (study tour)		
4.1.4 Monitor water service providers including bottled water companies	4.2.4 Map out prevalence of typhoid fever and diarrhea cases	4.3.4 Upgrade public health officials knowledge on epidemiology		
4.1.5 Conduct annual audits of the water safety planning process				
4.1.6 International accreditation of drinking water quality tests every 2 years				
4.1.7 Formalise certification process for compliant bottled water companies.				
4.1.8 Publish water quality results for bottled water companies				
4.1.9 Procure and install water treatment system for all health centers				

Table 12: Sanitation Summary Logical Framework

Sanitation Sub-sector				
Objective 5: To increase access to basic sanitation, improved wastewater systems and improved hygiene practices				
Strategies				
5.1 To increase access to basic sanitation	5.2 To develop and implement effective nationwide education and awareness campaign sanitation and wastewater management	5.3 To strengthen regulatory framework and compliance	5.4 To improve knowledge and capacity of Sanitation Implementing Agencies	5.5 To develop sustainable wastewater and sanitation infrastructure
Actions				
5.1.1 Explore and pilot alternative onsite wastewater technologies such as biogas and waterless technologies etc for upscaling where applicable	5.2.1 Coordinate and Implement awareness programmes for targeted groups/communities on good hygiene practice, maintenance of wastewater	5.3.1 Develop and implement MOU to guide programme implementation in line with agreed institutional arrangements and roles including coordinated monitoring with relevant	5.4.1 Conduct annual surveys to gauge level of compliance and feedback with 2010 National Sanitation Survey as a baseline	5.5.1 Construct new public toilets where feasible and upgrade existing public toilet facilities at the Flea Market in Savalalo and possibly Mulinuu.
5.1.2 Provide subsidised support targeting installation of VIP toilets for those low income and vulnerable families reliant on open privies and in rain water harvesting areas	5.2.2 Strengthen collaboration with local services providers to increase understanding on existing sanitation related policies, legislation, regulations and standards	5.3.2 Enforce and update on a regular basis the approved Code of Environmental Practice for Odour control for Wastewater Treatment Plants	5.4.2 Conduct an assessment of Vaiusu Bay, Apia Harbour/ Fugalei, Asaga, Vaiusu and Mulivai stream to determine level of contamination from leaking septic tanks	5.5.2 Monitor and maintain sludge facilities at Tafa'igata and Vaiaata
5.1.3 Develop best practice guidelines for the construction and maintenance of VIPs	5.2.3 Annual commemoration of the World Toilet Day targeting schools	5.3.3. Develop and implement national effluent discharge standards	5.4.3. Identify and address human resource development needs where relevant	5.5.3 Monitor and maintain Public Toilet Facilities
5.1.4 Provide subsidised support targeting improvements to septic tank systems for low income households in reticulated water supply areas	5.2.4. Strengthen community engagement and feedback using existing initiatives such as the Aigama Nuu Manuia and National Beautification Committee (NBC) led by MWCSD, village committees such as Komiti	5.3.4 Enforce and undertake periodic reviews of the National Sanitation Guidelines for school sanitary facilities and public toilets		5.5.4 Model existing sewer network and design expansion of network
	5.2.5 Strengthen political advocacy on sanitation related issues through the SPAGL			5.5.5 Connect remaining commercial properties within existing service area to the wastewater treatment plant
				5.5.6 Reduce ingress of storm water to sewer network
				5.5.7 Upgrade Wastewater Office

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