

# DISASTER AND EMERGENCY PREPAREDNESS IN TONGA

Pratap Jayavanth<sup>1</sup>, Maliu Takai<sup>2</sup> and Siale Akau'ola<sup>3</sup>

<sup>1</sup>World Health Organization, Tonga; <sup>2</sup>National Emergency Management Office, Ministry of Works; <sup>3</sup>The Ministry of Health, Nuku'alofa, Tonga

**Abstract.** The Kingdom of Tonga, geographically fragmented into 172 islands, is located within the "Ring of Fire" in the South Pacific. It is vulnerable to external economic shocks and natural disasters. The government is committed through legislation, plans and strategies to address disaster risk reduction and strengthen emergency management in all sectors to achieve national sustainable development in the priority areas: economic, social and environmental. An Emergency Fund with TOP15 million (USD 7.8 million) was established in 2008. Several stakeholders have provided assistance for an ongoing capacity-building program (both institutional and human resources). A recent initiative through the churches to establish a community-focused integrated disaster preparedness and response plan in 24 of the most vulnerable villages in Tonga is underway. The challenge, however, is to mainstream disaster risk reduction strategies into the operational plans of all government sectors and to coordinate relief measures with affected communities in the event of a major disaster.

## INTRODUCTION

The Kingdom of Tonga is made up of 172 named islands, of which only 36 are inhabited, and covers a total land area of 747 km<sup>2</sup> spread over 720,000 km<sup>2</sup> of territorial sea (Fig 1). Located within the "Ring of Fire" in the South Pacific Ocean where the Indo-Australian Plate and the Pacific tectonic plate meet, Tonga is inherently vulnerable to natural disasters such as cyclones, flood, earthquakes, volcanic eruptions, and many others. The Tongan archipelago, situated on the western side of the Tonga Trench, consists of four clusters which extend over a north-south axis with Tongatapu the main island,

'Eua in the south, Ha'apai and its group of islands in the middle, Vava'u and its group of islands in the north and the two Niuas (Niuafu'ou and Niuatoputapu) farther north (Government of Tonga, 2008a).

The total estimated population of the country for 2008 was 102,724 giving a population density of 158/km<sup>2</sup>, with 68% living on the main island, Tongatapu.

The ratio of the urban to rural population is roughly 1:3. The population is young with 36% in the 0-14 year-old age group (WHO-WPRO, 2009).

The economy is based on agriculture and fishing with tourism gradually increasing in importance. Remittances from abroad account for nearly 55% of the gross domestic product (GDP) which was estimated to be USD 189.6 million in 2004. The Government is heavily dependent on development

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Correspondence: Pratap Jayavanth, World Health Organization, PO Box 70, Nuku'alofa, Tonga.  
Tel: (676) 23 217; Fax: (676) 23 938  
E-mail: who.ton@wpro.who.int

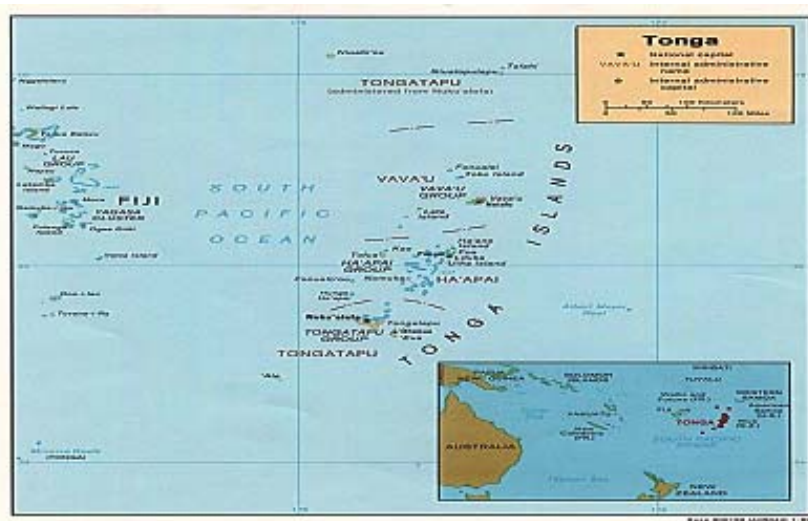


Fig 1 Maps of Kingdom of Tonga.

support for capital investments. It is placed 55<sup>th</sup> on the UNDP's Human Development Index (HDI) which is the highest ranking of any Pacific Island country. It is estimated that 4% of the population live on less than USD 1.00 per day and about 6.7% of households live below the food poverty line (WHO-WPRO, 2009).

The Strategic Development Plan Eight (SDP8) developed by the government included disaster risk management under one of the goals to "ensure environmental sustainability and disaster risk reduction (Government of Tonga, 2006).

Through the National Emergency Management Plan, responsible committees at national, district and village levels would address the needs of the community during response and recovery phases. In addition, plans to integrate disaster risk reduction strategies into all aspects of the government's planning and operations, is a priority (Government of Tonga, 2008a). In 2008, by an act of Parliament, an Emergency Fund with TOP15 million [Tonga Pa'anga (TOP) 1 = USD 0.52] to tackle the post-impact phase of emergencies was established.

## OVERVIEW OF NATURAL DISASTERS AND ITS IMPACT ON THE KINGDOM

### Tropical cyclones

Historical records indicate an increased trend in tropical cyclone (TC) frequency in the South West Pacific since the 1960s. The tropical cyclone season in Tonga is usually from November to April, with an average of one TC per year. Exceptions were in 1990, when there were four cyclones in one year, while TC Keli came in June 1997.

In 1982, TC Isaac, which hit Tongatapu and Ha'apai, caused 6 deaths and extensive damage to property (TOP18.1 million). TC Ofa in 1990 affected Niuatoputapu and de-

stroyed 70% of the houses; the estimated loss being TOP 3.2 million. In 1998, Ha'apai, Tongatapu, and 'Eua faced the onslaught of TC Cora, and the loss was estimated at TOP 19.6 million. Between December 2001 and January 2002, the damage caused by TC Waka was enormous (TOP 104.2 million). TC Eseta, in 2003, damaged the wharf and resort buildings on Tongatapu and Ha'apai; the loss estimated at TOP 1.5 million (Government of Tonga, 2008a).

### Storm surges and flooding

Many low-lying areas in Tongatapu have a high exposure to inundation. The most severe storm surge occurred in March 1982 during Tropical Cyclone Isaac when nearly 30% of the main island was inundated. All the houses close to the waterfront were pushed away from their foundations for a distance of 10 meters. In March 2003, storm surge from Cyclone 'Eseta affected the Nafanua Harbour in 'Eua, which was closed for two weeks.

Surface flooding as a result of heavy rainfall has often affected homes, commercial buildings, and agricultural farms, but usually it does not pose a high risk as the water dissipates within 48-72 hours once the rains have ceased. On 9 February 2008, Tongatapu witnessed the greatest ever rainfall, and the Tonga Defense Services sent quick reaction teams to assist families whose homes were submerged.

### Tornados

In September 2004, a tornado affected 4 villages on Tongatapu and damaged property and crops worth several hundred thousand Tongan dollars.

### Earthquakes

Tonga is highly vulnerable to seismic-related activities. One of the largest earthquakes, which occurred on 23 June 1977 with magnitude of 7.2, damaged houses,

churches, and public utilities. The old Vuna Wharf in Nuku'alofa was badly damaged.

On 4 May 2006, a powerful earthquake with a magnitude of 7.9, struck the island of Ha'apai, and severely damaged the hospital and staff quarters, several buildings, and the wharf. In 2007, there were 283 seismic events, and in 2008, 322. On 19 March 2009, Tongatapu was jolted by an earthquake of 7.6 magnitude that triggered a tsunami warning, which was subsequently cancelled. Moreover, there were no reported casualties or damage to property (Government of Tonga, 2005).

### **Tsunami**

Since the 19th century, about 21 small tsunamis (<1m wave) have impacted Tonga. In 1919, a major tsunami (>2.5 m) occurred in Ha'apai. Fifty-two tsunami warnings were issued by the Pacific Tsunami Warning Centre (PTWC) during 2007, but no tsunami reached Tonga, although there were other disasters associated with tsunami such as earthquakes, volcano eruptions, and marine landslides (Government of Tonga, 2005).

### **Volcanic eruptions**

There is a very active chain of marine volcanoes that runs in a north-south direction. In 1946, a violent volcanic eruption destroyed many buildings, crops, and copra sheds in Niuafu'ou. The entire population of about 1,300 people was evacuated to 'Eua. Despite there being no recent highly destructive eruptions, this remains an ever-present hazard.

### **Drought**

During 1997-1998, the drought caused by El Niño cost the government about TOP200,000 just to ship drinking water to Ha'apai and the outer islands.

### **Civil unrest**

On 16 Nov 2006, civil riots erupted in

the capital, and over 80% of buildings in the central business area were significantly damaged due to arson and looting. A state-of-emergency was declared, and the army was called to safeguard property and prevent further escalation.

### **Global warming/Climate change**

Since 1993, records show a general trend of increase in the sea level (14 mm/year).

## **LEGISLATION, PLANS, AND STRATEGIES FOR EMERGENCY MANAGEMENT**

### **Emergency Management Act, 2007**

The Emergency Management Act 2007 defined an emergency as "an event, actual or imminent, which endangers or threatens to endanger life, property, or environment and which requires a coordinated response". The events as interpreted in the Act include:

1. Cyclone, earthquake, tsunami (natural disasters);
2. Explosion, fire, chemical spill;
3. Infestation, plague, epidemic;
4. Failure of essential services or infrastructure;
5. Terrorist attack against the Kingdom of Tonga;
6. Other similar event.

This Act endorsed the emergency management structure and empowered the National Emergency Management Committee to effectively manage emergencies and coordinate recovery and rehabilitation work.

### **Emergency Fund Act, 2008**

The Legislative Assembly passed an Act on 28 October 2008, which authorized the establishment, funding, and operation of an Emergency Fund. A sum of TOP 5,000,000 from the Public Fund of the Kingdom (established under the Public Finance Manage-

ment Act 2002) would be available for providing timely and efficient relief and reconstruction in any emergency.

#### **National Emergency Management Plan, 2008**

The first National Disaster Management Plan was developed in 1987 and revised in 1999. In 2006, the National Emergency Management Bill was drafted under the Cyclone Emergency and Risk Management Project (CERMP), funded by World Bank. The present National Emergency Management Plan-2008 was developed under the provisions of the Emergency Management Act 2007, to establish a comprehensive, integrated and "whole of government" institutional practices within the Kingdom of Tonga for undertaking emergency management activities. It replaced the National Disaster Plan and Emergency Procedures (1999) and all the preceding plans (Government of Tonga, 2008b).

#### **National Emergency Management System**

**The National Emergency Management Committee.** The National Emergency Management Committee (NEMC) is chaired by the Minister of Works and consists of high level representatives from the Cabinet, concerned Ministries (Health; Finance and Planning; Agriculture, Forestry, Fisheries and Food; Works; Lands, Survey, Natural Resources and Environment; Education) and includes the Commander of Police and Commander of the Tongan Defense Services. The Manager of the National Emergency Management Office (NEMO) serves as the Secretary and the national focal point for emergency/disaster management.

Briefly, the functions of the NEMC are to formulate policy decisions of national significance and to coordinate the development and implementation of emergency management, to ensure arrangements with other nations and organizations are in place to

provide support during major emergencies, and to review the National Emergency Management Plan regularly. In addition, it provides guidance and support to the District Emergency Management Committees and coordinates effective emergency management and response in communities before, during and after the impact of an event. As stated in the Emergency Management Act 2007, the NEMC should meet on a regular basis (at least once a quarter) and provide an annual report to the Cabinet (Government of Tonga, 2008b).

**The National Emergency Management Office.** The National Emergency Management Office is located in the Ministry of Works and is responsible for (1) public education and awareness and (2) institutional strengthening. As part of the International Disaster Reduction Day and at the start of the cyclone season every year, a quiz competition is held for primary schools. The office works closely with other government sectors, Tonga Red Cross, NGOs and the media to promote public awareness and community resilience activities (Government of Tonga, 2007a,b).

**The District Emergency Management Committee.** The District Emergency Management Committee (DEMC) chaired by the Governor/ Government Representative, is responsible for the development of the District Emergency Management Plan, update the NEMC on disaster risk reduction (DRR) and emergency management activities conducted in the district, identify resources, review communication systems, and manage emergency operations in accordance with national policies and plans. In addition, the DEMC is responsible for ensuring awareness in the community on emergency management and response and recovery plans (Government of Tonga, 2008b).



**The Village Emergency Committee.** The Village Emergency Committee (VEC) chaired by the Town Officer is responsible for the development and implementation of the emergency management plan in the village. The VEC undertakes community awareness on emergency management including identification of local resources for emergency operations. It plays an important role in ensuring that information about an event or emergency is communicated immediately to the DEMC. The VEC is also involved with the community in the response and recovery phase (Government of Tonga, 2008b).

**National Emergency Operations Committee.** National Emergency Operations Committee (NEOC) consisting of the Minister of Works, Director of Works, Secretary of Foreign Affairs, Commander of the Tongan Defense Services and the Manager of the National Emergency Management Office, is responsible for activating the ministries and concerned organizations in the event of an emergency to ensure the effective implementation of the emergency management plans and procedures. The NEOC would also carry out the initial damage assessment, collate and prioritize disaster relief requirements and manage the distribution of relief supplies.

The operational functions of the emergency management committees at the district and village levels carry out the initial damage assessment, collate and prioritize disaster relief requirements and manage the distribution of relief supplies and thereby provide support to the communities to ensure effective emergency management before, during and after the impact of an event (Government of Tonga, 2008b).

**National Emergency Response Plans and Procedures.** The National Emergency Recovery Committee (NEOC), which is headed by the Minister of Works, includes representatives

from the Cabinet, concerned Ministries (Foreign Affairs, Finance and Planning), Commander of the Tongan Defense Services and co-opted members of non-government organizations (NGOs). The Manager of the National Emergency Management Office (NEMO) serves as the Secretary for National Emergency Recovery Committee (Government of Tonga, 2008b).

The government through the NEOC has been involved in the recovery and rehabilitation of public infrastructure, public utilities, housing, agriculture, schools, community water supply and health facilities. FAO, UNESCO and WHO have provided guidelines and the line ministries have developed standards including the building code. Resources are provided by multilateral and bilateral development partners including the World Bank.

Following the devastation by TC Waka, the government established the Tonga Cyclone Emergency Recovery and Management Project (CERMP) supported by the World Bank, European Community and AusAID with funds totaling TOP15.4 million. Under the CERMP, the Housing Reconstruction Program was launched in 2002, with the construction of 470 cyclone-resistant houses in Vava'u and the two Niuaus. During the same period, rehabilitation of community buildings and provision of water and sanitation facilities in affected areas were also undertaken, including retrofitting of existing houses and small business structures nationwide.

#### **National Disaster Risk Reduction Strategy**

The second part of the National Emergency Management Plan focuses on Disaster Risk Reduction (DRR). The plan aims to integrate DRR by establishing:

a) an institutional strategy (National Risk Reduction Strategy) which is the formal process to streamline risk management

and risk reduction in all aspects of the government's planning and operations; and b) a program (National Risk Reduction Program) using the model- Comprehensive Hazard and Risk Management (CHARM) developed by the South Pacific Geoscience Commission (SOPAC) (South Pacific Applied Geosciences Commission, 2002).

The steps for developing and implementing the national risk reduction program in Tonga with guidance for district and village levels are included in this section. There would be mechanisms for ongoing review of the risks at all levels to ensure that the risk management program and its implementation remain relevant to changing circumstances. In addition, the effectiveness of the risk management process itself would be monitored and reviewed periodically.

#### **Ministry of Health Disaster Management Plan**

The Ministry of Health (MoH) is responsible for initiating hazard and vulnerability assessment of health facilities/personnel, logistics, in preparation for various disaster scenarios, to ensure that the MOH, at all times, has the highest achievable state of preparedness to enable it to mobilize the resources required, to safely and expeditiously provide emergency medical and public health care to victims of disaster.

#### **Public Health Bill 2008**

In 2007, the Ministry of Health with technical and financial assistance from WHO, reviewed the Public Health Act of 1992 and made certain amendments in order to comply with the regulations of the International Health Regulations 2005. This was approved by the Legislative Assembly and came into force as the Public Health Act 2008. The Minister of Health may declare an emergency if the event is related to the outbreak of a disease that threatens the health and welfare of the community.

#### **Fu'amotu International Airport Emergency Plan**

Under the Civil Aviation Act 1990 of Tonga and the Civil Aviation Regulations (Amendment) 1996 and the New Zealand Civil Aviation Rules, the Fu'amotu International Airport conducts an annual exercise to test the Airport Emergency Plan. This exercise involves other sectors including the police, fire services, health, ambulance services, army and the Red Cross.

#### **United Nations Country Security Risk Assessment 2008**

The UN Department of Safety and Security based in Suva, Fiji, in collaboration with the UN Country Security Focal Point for Tonga, who incidentally is the WHO Country Liaison Officer based in Nuku'alofa, conducted a Security Risk Assessment (SRA) in 2008 to ensure compliance with the minimum operating security standards (MOSS) and minimum operating residential security standards (MORSS) for UN staff.

The SRA table covers four critical areas, namely, threat assessment (threat and situation); vulnerability assessment (weaknesses and strengths); risk analysis (impact, likelihood and risk level) and risk management strategies (mitigation measures). In addition to crime, political instability (*eg*, coup) and unintentional human inspired incidents (and accidents), the SRA focuses on natural hazards and disasters (UN, 2008).

#### **Pacific Emergency Health Initiative**

The Pacific Emergency Health Initiative (PEHI) was established in 2000 by the Center for Disease Control (CDC), USA, to assist Pacific Island Countries on (1) vulnerability assessment (public health and medical preparedness; health and medical facility mitigation; (2) education and training (emergency medical services and emergency planning); and (3) technical assistance through (a) PEHI-HELP and (b) PEHI-NET.

However, as of date, Tonga has not approached PEHI for any assistance.

### **Strengthening Disaster and Emergency Preparedness and Response in Tonga**

In 2006, the National Influenza Pandemic Preparedness and Response Plan was drafted in consultation with the National Epidemic Task Force to address the threat of bird flu. The South Pacific Geoscience Commission (SOPAC) conducted a 2-day training course in June 2007 for the staff of the Geo Source Unit of the Ministry of Land Survey Natural Resources and Environment (MLSNRE) in the use of GIS and other computer-related equipment to map disaster affected communities through a tabletop exercise.

In February 2008, the International Health Regulations (IHR)/Asia Pacific Strategy for Emerging Diseases (APSED) Work Plan (2008-2010) was developed with WHO support to minimize the health, economic and social impact of newly emerging diseases.

The Japan International Cooperation Agency (JICA) conducted a training course (May-July, 2008), on Disaster Mitigation, Preparedness and Restoration for Infrastructure at Kobe, Japan for selected staff from Tonga. As part of the Hyogo Framework for Action 2005-2015 (HFA 2005-2015), in 2008, JICA conducted a needs assessment study in Tonga to draft a framework for assisting the country in the disaster risk reduction program under the Project Formulation Survey on Natural Disaster Risk Management in the Pacific Region.

The National Public Health and Emergency Management for Asia and the Pacific (PHEMAP) course was organized by WHO in collaboration with the Ministry of Health and the NEMO in Tonga in August 2008. This was based on the PHEMAP course developed by the Asia Disaster Preparedness

Centre (ADPC), Bangkok in collaboration with the Regional Offices of WHO in South-East Asia and the Western Pacific.

In 2008, Tonga participated in the Pacific Wave Tsunami Exercise conducted by the Pacific Tsunami Warning Centre (PTWC) based in Hawaii and the International Tsunami Warning System, as a follow up to the one in 2006.

In February 2009, the Pacific Community-focused Integrated Disaster Risk Reduction Project (PCIDRR) was initiated by the National Council of Churches of Australia and the National Council of Churches of Tonga in collaboration with the National Emergency Management Office. It is a 3-year AusAID-funded project that aims to develop a community-focused disaster preparedness and response plan in 24 most vulnerable villages in Tonga.

The Pacific Tsunami Warning Centre (PTWC) based in Hawaii conducted a 1-day awareness workshop on Tsunami in Tonga in July 2009. The Ministry of Health organized an emergency evacuation drill at the surgical department of Vaiola Hospital as a response to an earthquake and fire accident, to test the Hospital Emergency Plan in collaboration with the Police and the Fire Department. The Ministry of Aviation and the Tonga Airport Limited in collaboration with other sectors and Red Cross will conduct the annual exercise to test the Airport Emergency Plan. It is proposed that SOPAC would assist in the development of the National Action Plan on disaster risk management and would support the training of the National Task Force, ministries, NGOs, private sector, in the planning and implementation process. All these initiatives and exercises are expected to strengthen the capacity of the institutions and personnel in disaster preparedness and response.



There are several non-government organizations (NGOs) actively involved in disaster management such as the Tonga Red Cross (TRC) which has its own emergency response manual for disaster, conducts capacity assessment, involved in disaster management including awareness program and training; in addition, the TRC has a 20 feet container with relief supplies for 1,000 people, located in each of the three main islands. Caritas Oceania has an action plan for disaster management and has been involved in training and response, including rehabilitation (reconstruction of 42 houses for cyclone victims in Vava'u, 2001). Another NGO, Tonga Trust, that runs a rural governance project, includes disaster prevention as part of community development and has been involved in disaster preparedness in Ha'apai and Vava'u.

### CONCLUSION

There is high-level political commitment for disaster preparedness and response and disaster risk reduction in the Kingdom. This reflected in the enactment of the legislation, development of policies, plans and strategies and mobilization of resources to address the impact of any disaster or emergency. In addition, several stakeholders have invested in capacity building, both institutional and human resources, to raise the standard of emergency management to an international level. Simultaneously, there are initiatives to strengthen vulnerable communities through "hands on" training in disaster risk-reduction programs that are integrated with the National Emergency Management Plan. The challenge however is to mainstream disaster risk reduction strategies into the operational plans of all sectors of the government and to coordinate relief and response measures through the NGOs and civil society to reach affected communities

in a timely manner, in the event of a major disaster or emergency.

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