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**Overall Impact of Climate-induced Natural  
Disasters on the Public Health Sector in Myanmar  
(2008-2017)**

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## Table of Contents

1. Introduction .....	1
2. Climate-induced Natural Disasters and their Effects on the Public Health Sector in Myanmar .....	2
2.1 Outbreaks of Diseases and the Number of People Affected .....	5
2.1.1 Cyclonic Storm Nargis 2008 .....	5
2.1.2 Cyclonic Storm Giri 2010.....	6
2.2 Damage to Health Facilities .....	6
2.2.1 Cyclonic Storm Nargis 2008 .....	6
2.2.2 Cyclonic Storm Giri 2010.....	8
2.2.3 2015 Floods and Landslides .....	8
2.2.4 Cyclonic Storm Mora 2017 .....	9
3. Review of Key National Policies addressing Climate Change and Health.....	10
4. Policy Options .....	11
5. Conclusion.....	11

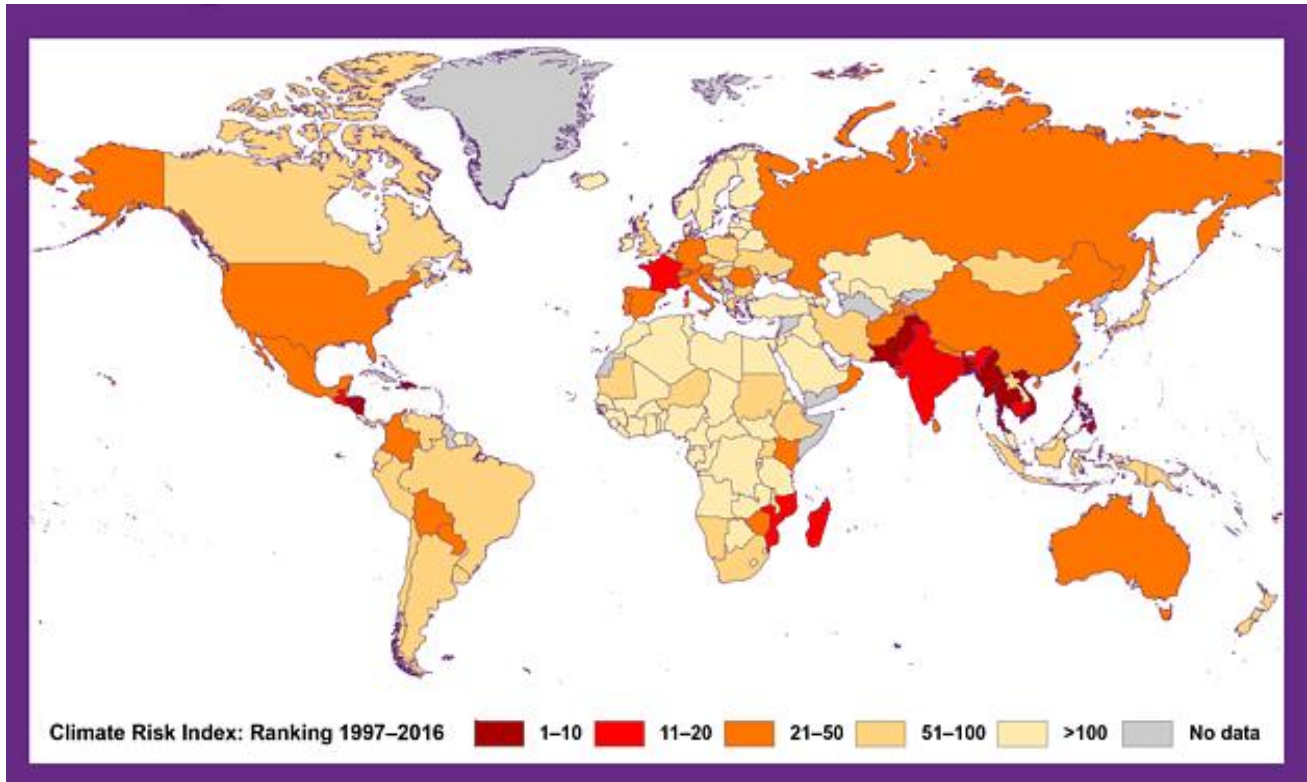
## List of Tables and Figure

Table 1. Climate-induced Natural Disasters in 2008-2017.....	4
Table 2. Daily Health Care Activities for the Victims by States/ Divisions (6.5.2008-30.6.2008).....	5
Table 3. Number of Patients by State/ Division (20.5.2008 to 30.6.2008).....	5
Table 4. Outbreaks of Diseases and Number of Patients by Township .....	6
Table 5. Damage to Public Health Facilities by Type .....	7
Table 6. Damage to Public Health Facilities by Township .....	8
Table 7. Damage to Public Health Facilities by State/ Region.....	8
Table 8. Damage to Public Health Facilities by District .....	9
Table 9. Government Response to Health Service Needs.....	9
Figure 1. Climate Risk Index 2018.....	1
Figure 2. Areas of Potential Vulnerability Based on Recent Natural Disasters Overview (2008-2017) 2	
Figure 3. Damage to Public Health Infrastructures by State/Division (%) .....	7

## 1. Introduction

Myanmar is the second most vulnerable country in the world in terms of the effects of climate change. Honduras is recognized as the most vulnerable due to Hurricane Mitch, and Haiti is third due to Hurricane Sandy. Myanmar ranked second due to the effects of Cyclone Nargis in 2008.[1] In addition, Myanmar suffered 38 natural disasters from 1990 to 2015 with more than 139,000 people dead and more than 13 million suffering losses amounting to USD 48 billion as a result.[2]

Figure 1. Climate Risk Index 2018



Source: Global Climate Risk Index 2018, Germanwatch

Climate change refers to “any change in climate over time, whether due to natural variability or as a result of human activity” (IPCC).[3] It is characterized by a relatively higher number of natural disasters in terms of frequency and intensity. Natural disasters can be defined as some sudden and profound events through which the natural environment has an impact on the socio-economic system that may be due to the effects of changing climate (David Alexander).[4] Climate-induced natural disasters can threaten public health throughout the world, but especially in Myanmar. Public health is defined as “the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society” (Acheson, 1988; WHO).[5] Because Myanmar’s public health sector is vulnerable, the government is implementing policies related to climate change and health to mitigate against climate-related risks to build a resilient health care system.

This research paper sets out the challenges for health services due to climate change and the government’s response.

## Objectives

- To identify the impact of climate-induced natural disasters on the Myanmar health sector
- To describe the challenges facing health services
- To address long-term strategies for dealing with climate-induced natural disaster impacts and the resilience of the health sector

## Research Questions

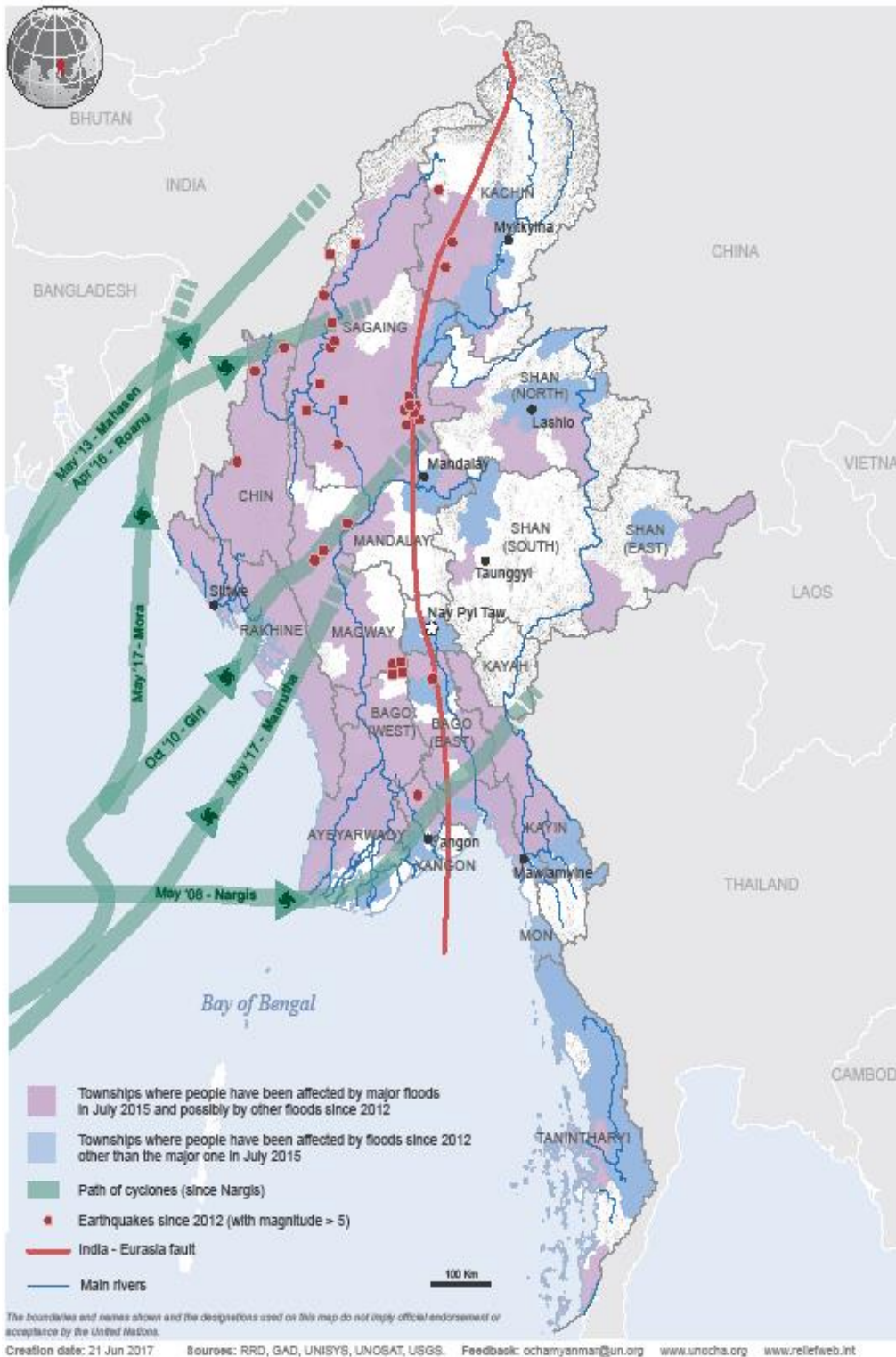
- What are the impacts that natural disasters exert on the health sector in Myanmar?
- What action plans will be implemented by the government for dealing with natural disasters and their impacts and for improving the health sector to cope with these in the future?

In this paper, secondary data collected from online sources such as official government documents, assessments, reports and international organization situation reports have been used as sources of information.

## **2. Climate-induced Natural Disasters and their Effects on the Public Health Sector in Myanmar**

The effects of climate change - more natural disasters such as storms, floods, droughts, earthquakes and cyclones, can be abrupt and felt all throughout the world, especially in Myanmar.[6] Most of Myanmar's population live in two main areas: the Delta region which is at risk from storms, floods and cyclones, and the Dry Zone that is exposed to drought and other risks.

### **Figure 2. Areas of Potential Vulnerability Based on Recent Natural Disasters Overview (2008-2017)**



Source: United Nations Office for the Coordination of Humanitarian Affairs (2017)

Myanmar has experienced many natural disasters due to the effects of climate change. Between 2008-2017, Myanmar experienced six major cyclones, three earthquakes, two severe floods and landslides and other smaller-scale disasters.[7, 8]

**Table 1. Climate-induced Natural Disasters in 2008-2017**

No.	Year	Natural Disasters	Affected Areas
1	May 2008	Cyclone Storm Nargis	Kayin, Kayah and Mon State and Ayeyarwady, Bago and Yangon Region
2	July 2009	Floods and Landslides	Northern Kachin State
3	Jun 2010	Floods and Landslides	Northern Rakhine State
4	Oct 2010	Cyclone Storm Giri	Rakhine State
5	Mar 2011	Earthquake Tarlay	Shan State
6	Oct 2011	Floods	Magway, Mandalay and Sagaing Region
7	Aug 2012	Floods	Kayin State and Ayeyarwaddy Region
8	Nov 2012	Earthquake	Sagaing Region and Northern Mandalay Region
9	May 2013	Cyclone Storm Mahasen	Rakhine State
10	Aug 2013	Floods	Kayin, Mon and Rakhine State and Taninthayi and Ayeyarwaddy Region
11	July 2014	Floods	Kayin, Kachin, Rakhine and Shan State and Ayeyarwady, Bago, Magway, Tanintharyi and Yangon Region
12	July 2015	Floods and Landslides (Cyclone Komen)	Kachin, Kayin, Chin, Mon, Rakhine and Shan State and Ayeyarwady, Bago, Magway, Mandalay, Sagaing and Yangon Region
13	April 2016	Earthquake	Sagaing Region
14	May 2016	Cyclone Storm Roanu	Chin State and Sagaing Region
15	June 2016	Floods	Chin and Rakhine State and Ayeyarwady, Bago and Sagaing Region
16	May 2017	Cyclone Storm Mora	Northern Rakhine State
17	July 2017	Floods and Landslides	Kayin State and Magway, Sagaing, Bago and Ayeyarwady region

Source: United Nations Office for the Coordination of Humanitarian Affairs (2017)

Climate-induced disasters have affected the public health sector in three ways. First, the damage to health facilities and transportation can disturb the provision of health care and health support services. Second, the spread of infectious diseases can affect communities and result in significant health risks. Third, the loss of water and sanitation facilities, malnutrition, overcrowding and displacement can increase the danger of communicable diseases. [9]

Climate-induced natural disasters can result in new challenges and problems for the public health sector. In Myanmar, the population affected by natural disasters can suffer from outbreaks of waterborne, foodborne and vector-borne (e.g. diseases transmitted by insects) diseases.[10] In affected areas, most of the health facilities have been destroyed by such disasters. For example, in the 2008 Nargis storm, more than 1,000 public health facilities were damaged and such devastation can hamper the delivery of health care for the people affected.[11] Medical services in affected areas require enough medicine, adequate medical equipment and health personnel to prevent and control the spread of diseases. Although the government has provided health facilities to deliver

help to the people affected, there can sometimes be delays in reaching the relevant areas due to lack of transportation.[12]

Although people cannot control natural disasters, they can prepare for them. Early warning systems and risk assessment can reduce the impacts of natural disasters, and disaster preparedness is essential for safeguarding human health in advance of such crises.[13] Therefore, Myanmar’s health sector must prepare a climate-responsive health system, encompassing disaster preparedness and risk reduction through an early warning system to protect people from the effects of disasters. [14]

Climate-induced natural disasters are a major health concern and they can hinder the progress of the health sector in Myanmar. Over the last 10 years natural disasters demonstrated the vulnerability of the health sector. This was evident through an increase in the number of communicable diseases, the number of people affected and the degree of damage and destruction to health facilities.

### **2.1 Outbreaks of Diseases and the Number of People Affected**

The main health problem caused by climate-induced natural disasters is the spread of communicable diseases – such as malaria, diarrheal diseases, dengue fever and conjunctivitis. The chief causes of death are malaria and diarrheal diseases.[10]

#### **2.1.1 Cyclonic Storm Nargis 2008**

Cyclone Nargis hit the delta region of Myanmar on 2 and 3 May 2008 and affected six areas: Ayeyarwaddy Division, Yangon Division, Bago Division, Mon State, Kayin State and Kayah State. More than 84,000 people died, some 53,000 went missing and a total of nearly 2.4 million were affected.[11] It was the worst natural disaster in the country’s recorded history.

**Table 2. Daily Health Care Activities for the Victims by States/ Divisions (6.5.2008-30.6.2008)**

State/ Division	OPD Hospital	OPD Camp	OPD Total	Inpatient	Diarrhea	Referral
Yangon	36,413	80,686	117,099	9,468	4,590	139
Ayeyarwaddy	56,448	143,920	200,368	35,431	6,284	231
Total	92,861	224,606	317,467	44,899	10,874	370

Source: Post-Nargis Joint Assessment, Tripartite Core Group (2008)

**Table 3. Number of Patients by State/ Division (20.5.2008 to 30.6.2008)**

State/ Division	Traditional Medicine Professionals	OPD (Floating Hospital)	Diarrhea (Floating Hospital)	Referral (Floating Hospital)
Yangon	85,163	-	-	-
Ayeyarwaddy	40,684	44,988	767	45
Total	125,847	44,988	767	45

Source: Post-Nargis Joint Assessment, Tripartite Core Group (2008)

Note: OPD stands for outpatient department.

As a result of the Nargis storm, 317,467 outpatients and 44,899 inpatients were treated in Yangon and Ayeyarwaddy Division, while 44,988 outpatients living along the sea coast, streams and creeks



were treated in the floating hospital in Ayeyarwaddy Division. Moreover, traditional medicine professionals treated 125,847 patients in Yangon and Ayeyarwaddy Division.

### 2.1.2 Cyclonic Storm Giri 2010

Cyclonic storm Giri struck Myanmar on 22 October 2010, making landfall in eight townships of Rakhine State, particularly in the Townships of Kyaukphyu, Myebon, Minbya and Pauktaw.[15] The disaster caused infectious diseases among the people in the affected areas. The outbreaks of diseases are shown below.

**Table 4. Outbreaks of Diseases and Number of Patients by Township**

No.	Township	Diseases	Number of patients		Total
			Hospital	Temporary Clinics	
1	Kyaukphyu	Diarrhea	11	226	237
		Conjunctivitis	-	400	400
		Minor injuries	15	40	55
		Other diseases	20	993	1013
		Total	46	1659	1705
2	Myebon	Diarrhea	48	77	125
		Conjunctivitis	63	36	99
		Minor injuries	161	972	1133
		Other diseases	50	1433	1483
		Total	322	2518	2840
3	Pauktaw	Diarrhea	14	31	45
		Conjunctivitis	5	87	92
		Other diseases	361	102	463
		Minor injuries	-	168	168
		Dysentery	-	18	18
		Total	380	406	786

Source: Ministry of Social Welfare, Relief and Resettlement (2010)

In Table 4, it can be seen that most of the disease outbreaks occurred in Myebon Township. The Ministry of Health and Sports sent health workers and established 26 temporary clinics in Myebon Township, five temporary clinics in Kyaukphyu Township and some mobile clinics in Pauktaw Township to control these outbreaks.[16]

## 2.2 Damage to Health Facilities

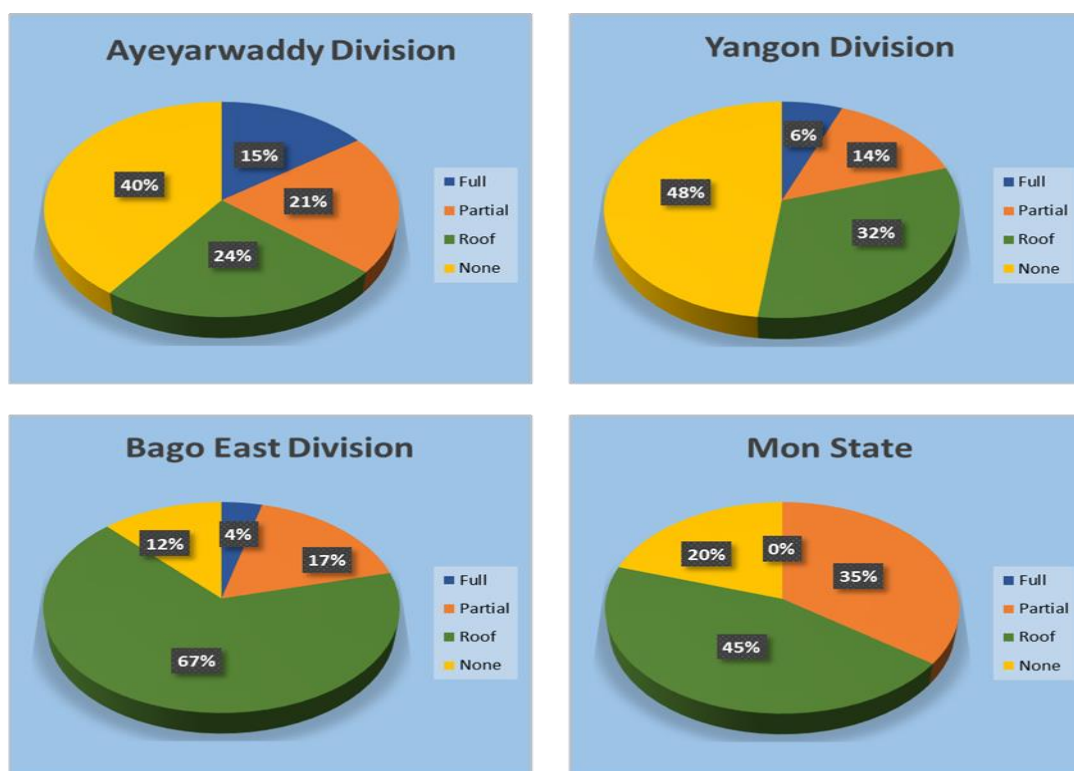
Climate-induced disasters caused difficulties for the health sector by damaging health facilities. Most were primary health facilities including hospitals, clinics, rural health centers and sub-rural health centers.

### 2.2.1 Cyclonic Storm Nargis 2008

Cyclone Nargis was the worst natural disaster in the memory of the people of Myanmar. The disaster destroyed approximately 800,000 homes and much of the infrastructure in the areas

affected.[11] The damage to public health infrastructures in both States and Divisions are set out in Figure 3.

Figure 3. Damage to Public Health Infrastructures by State/Division (%)



Source: Post-Nargis Joint Assessment, Tripartite Core Group

The figures above show that damage to health infrastructures was the highest in Ayeyarwaddy Division and lowest in Mon State. In every Division and State, the roofs suffered the most. The total value of the damage and loss to the health sector was about K19 billion.[11] Table 5 shows that all health training schools were partially damaged while over 50 percent of health facilities were destroyed by the cyclone.

Table 5. Damage to Public Health Facilities by Type

No.	Facility Type	Full	Partial	Roof	None	Total
1	100+ Bed Hospitals	-	13	5	10	28
2	50-100 Bed Hospitals	-	4	8	5	17
3	16- 25 Bed/ Station Hospitals	11	21	22	31	85
4	RHCs/ Clinics	19	65	107	66	257
5	Sub- RHCs	99	118	196	408	821
6	Training Schools	-	1	8	-	9
	Total	129	222	346	520	1217

Source: Post-Nargis Joint Assessment, Tripartite Core Group (2008)

### 2.2.2 Cyclonic Storm Giri 2010

In cyclonic storm Giri, 44 people died and 13 went missing while a total of 224,212 people and 48,272 households were affected, and more than 20,000 houses were completely destroyed. [16] The damage to the health sector is set out in Table 6.

**Table 6. Damage to Public Health Facilities by Township**

No.	Township	Hospital	Rural Health Centers (RHCs)	Sub- Rural Health Centers	Total
1	Myebon	2	7	13	22
2	Pauktaw	1	1	1	3
3	Minbya	-	-	2	2
4	Kyaukphyu	1	2	1	4
	Total	4	10	17	31

Source: Ministry of Social Welfare, Relief and Resettlement (2010)

Table 6 above shows the damage to public health facilities by type in each Township. It can be seen that more health facilities were damaged in Myebon Township compared with its counterparts.

### 2.2.3 2015 Floods and Landslides

In July 2015, floods and landslides occurred in 12 of the 14 States and Divisions in Myanmar. Heavy rain began on 16 July 2015 in several parts of Myanmar and on 30 July cyclone Komen in Bangladesh brought more heavy rain. As a result, 1.6 million people were displaced from their homes and more than one hundred people died.[9]

**Table 7. Damage to Public Health Facilities by State/ Region**

No.	State/ Region	Damaged Health Facilities	Facilities with Loss of Medicine and Damaged Equipment	Non-functioning Health Facilities	Total
1	Ayeyarwaddy Region	98	2	1	101
2	Rakhine State	69	25	2	96
3	Bago Region	25	3	-	28
4	Sagaing Region	13	19	5	37
5	Magway Region	11	8	-	19
6	Chin State	7	2	1	10
7	Yangon Region	1	-	-	1
8	Shan State	-	1	-	1
	Total	224	60	9	293

Source: National Natural Disaster Management Committee (2015)

In the 2015 floods and landslides, one-third of the damage to public health facilities took place in Ayeyarwaddy Region.[17] Climate-induced disasters usually occur more in the delta region than in other parts of the country and therefore, more health facilities experienced more damage and destruction in this region.

#### 2.2.4 Cyclonic Storm Mora 2017

Cyclonic storm Mora made landfall in Bangladesh on 30 May 2017 and it affected the northern Rakhine State, Chin State and Ayeyarwaddy Region.

**Table 8. Damage to Public Health Facilities by District**

No.	State/ Region	District	Hospital/ Clinic
1	Rakhine State	Sittaw District	20
		Myauk U District	33
		Kyaukphyu District	1
		Maungtaw District	49
		Total	103
2	Chin State	Harkhar District	1
		Total	1

Source: Ministry of Social Welfare, Relief and Resettlement (2017)

The damage to health facilities is shown in the Table above. The cyclone destroyed health facilities in Rakhine State, while there was no similar damage in Ayeyarwaddy Region, and only one hospital was destroyed in Chin State.[18]

The Ministry of Health and Sports supported health facilities and services to provide fundamental health care and to prevent the spread of diseases in the areas affected by the cyclone. It distributed medicines for domestic use, insecticide-impregnated bed nets, hygiene kits, insect repellent lotion and antifungal creams to the relevant households. Moreover, mobile and temporary clinics were set up to help the people affected. The National Natural Disaster Management Committee acknowledged the government's support for health services in the areas affected by the 2015 floods and landslides.[9]

**Table 9. Government Response to Health Service Needs**

No.	State/ Region	Mobile Clinics (number)	Temporary Clinics (number)
1	Ayeyarwaddy Region	208	202
2	Sagaing Region	112	349
3	Rakhine State	35	77
4	Bago Region	26	203
5	Magway Region	5	82
6	Yangon Region	3	33
7	Mandalay Region	8	55
8	Chin State	9	19
9	Kachin State	-	15
10	Mon State	-	85
11	Shan State	-	13
12	Kayin State	-	12
13	Tanintharyi Region	-	1

No.	State/ Region	Mobile Clinics (number)	Temporary Clinics (number)
	Total	406	1146

Source: Ministry of Health and Sports (2015)

As a result of the 2015 floods and landslides, the government established mobile and temporary clinics in the affected areas to provide fundamental health care for the people. A total of 112 mobile clinics and 349 temporary clinics were set up in Sagaing Region with one temporary clinic in Tanintharyi Region.

### 3. Review of Key National Policies addressing Climate Change and Health

The government is working to achieve the Myanmar Health Vision 2030, with the goal of “health for all” based on primary health services that prioritize vulnerable groups, especially women, children and the elderly.[14] Myanmar is also striving to achieve the health-related Millennium Development Goals (MDGs), although climate-induced natural disasters hinder these efforts.

Myanmar has made progress in disaster management policies, plans and procedures since 2008. The government launched the disaster risk reduction (DRR) initiative in 2008 and implemented the Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) in 2009 and 2012. Under the guidance of the Natural Disaster Management Committee, the Myanmar Action Plan on Disaster Risk Reduction 2017 has started to realize a long-term vision to build the country’s capacity to deal with disasters by 2030.[19]

Moreover, the Myanmar Climate Change Alliance is preparing a National Climate Change Policy and finished the first draft in March 2017. This policy will provide long-term strategies to undertake climate change action plans for adaptation and mitigation in Myanmar and to create a climate-resilient society. The vision of Myanmar is to strengthen resilience to climate change and to reduce the production of carbon dioxide in order to build a sustainable, inclusive and prosperous society. [20]

The government has been implementing the Myanmar Climate Change Strategy and Action Plan (2016-2030) to protect against climate-related risks and to build a resilient society. Its aim is that the Myanmar people and the country’s economic sectors will be responsive and able to recover from climate-induced natural disasters, risks and health impacts, and to build a healthy and resilient society by 2030.[14] Policies to deal with climate-related risks, disaster preparedness, risk reduction and climate-responsive health services are being implemented.

The Myanmar Parliament enacted the Natural Disaster Management Law on 31<sup>st</sup> July 2013.[21] It has five objectives:

- to implement natural disaster management programs systematically and swiftly in order to decrease disaster risks;
- to organize the National Natural Disaster Management Committee and Local Bodies in order to implement natural disaster management programs systematically and expeditiously;

- to cooperate with all organizations, national and international, in carrying out natural disaster management activities;
- to preserve and restore the environment affected by natural disasters; and
- to provide health, education, social and livelihood programs in order to bring about better living conditions for victims of natural disasters.

#### 4. Policy Options

**Promoting health care and strengthening health facilities:** The spread of communicable diseases and the damage to health infrastructures from natural disasters are critical challenges for the health sector. To address this, the government could consider establishing climate resilient infrastructures and systems, including those related to health care and social protection, in areas that are prone to disasters and also in remote and rural locations. In addition, more regulations, action plans and strategic guidelines are still needed to respond to, and to aid recovery from, climate-induced natural disasters and their impact on people's health currently and in the future.

**Preparing for disasters and reducing disaster risk:** Disaster preparedness and risk management are essential to secure a country's social development and to build a resilient society.[14] Disaster risk management and disaster response plans need to be developed at the national, Region/State, District and Township levels. The Myanmar government's action in improving and providing disaster forecasting knowledge and technology to communities at different levels - to enable them to prepare and respond to natural disasters - is a positive initiative in this area.

#### 5. Conclusion

This paper deals with the challenges regarding health services and long-term action plans for climate-induced natural disasters and the health sector. Climate-induced natural disasters can exert a significant impact on the health sector by destroying health facilities in the areas affected and by causing communicable and infectious disease outbreaks among the people. The Ministry of Health and Sports supports the development of health infrastructures and health services including the supply of medicines and basic necessities to the communities in the areas affected. For their part, the government is developing and implementing policies, strategies and action plans to address current and future climate change issues, to address the impact of climate-induced natural disasters and to achieve the Myanmar Health Vision 2030.

Over the past 10 years, climate-induced natural disasters have highlighted the country's need to take actions to reduce, mitigate and manage disaster risks in the future. While the government has taken steps to strengthen climate-responsive health care initiatives, facilities and systems, and disaster preparedness and disaster risk reduction through early warning systems for community protection, further work to strengthen these initiatives will bring more resilience to the country in dealing with these crises.

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