

**Assessing how small island communities
prepare for a tsunami: A case study of Phi Phi
Island, Thailand**

Arissara Poompoe

A thesis submitted to
Auckland University of Technology
in partial fulfilment of the requirements for the
degree of
Master of Emergency Management (MEmMgt)

2016

School of Public Health and Psychosocial Studies

Table of Contents

Table of Contents	i
List of Figures	iv
List of Tables	v
List of Abbreviations	vi
Attestation of Authorship.....	vii
Acknowledgements.....	viii
Abstract	ix
1 Introduction.....	1
1.1 Introduction.....	1
1.2 Thailand and Tsunami Hazard	2
1.3 Research Problem.....	8
1.4 Study area “Phi Phi Island”	10
1.5 Significance of the Study	12
1.6 Outline of the Dissertation.....	13
2 Literature Review.....	14
2.1 Introduction.....	14
2.2 Individual preparedness to tsunami	14
2.3 Factors influencing disaster preparedness.....	15
2.3.1. Risk perception	15
2.3.2. Self-efficacy	17
2.3.3. Fatalism	18
2.3.4. Prior experience to disasters.....	19
2.3.5. Social influences.....	20
2.3.6. Tsunami mitigation measures	20
2.3.6.1 Community-Based Disaster Risk Management (CBDRM).....	20
2.3.6.2 Tsunami Early Warning System (TEWS)	21
2.3.6.3 Land-use planning	21
2.3.6.4 Tsunami communication and education	22
2.3.6.5 Trust in DRM authorities	23

2.4 Summary	24
3 Methodology	25
3.1 Introduction.....	25
3.2 Research Paradigm	25
3.3 Study Area.....	26
3.4 Methodology	28
3.4.1. A questionnaire survey	29
3.4.1.1. Questionnaire design	29
3.4.1.2. Selection of community people.....	30
3.4.1.3. Data collection procedures	32
3.4.2. Field observation	33
3.4.3. Analysis of relevant documents	33
3.5 Data Analysis.....	34
3.6 Chapter Summary.....	35
4 Findings.....	36
4.1 Introduction.....	36
4.2 Demographic Information.....	36
4.3 Adoption of Preparedness Behaviours to Tsunami	37
4.4 Tsunami Mitigation and Preparedness Measures	42
4.4.1 Community involvement.....	42
4.4.2 Tsunami warning systems	43
4.4.3 Tsunami warning signs.....	45
4.4.4 Tsunami evacuation facilities	47
4.4.5 Direct communication lines	48
4.4.6 Land use plan	49
4.4.7 Tsunami education materials	50
4.5 Chapter Summary.....	52
5 Discussion	54
5.1 Introduction.....	54
5.2 Preparedness Behaviours and Related Guiding Elements.....	54

5.2.1 Risk perception	55
5.2.2 Prior experience	55
5.2.3 Optimistic bias	56
5.2.4 Outcome expectancy	57
5.2.5 Availability resources	57
5.2.6 Socio-demographic characteristics	59
5.3 Tsunami Mitigation and Preparedness Measures	60
5.3.1 Community-Based Disaster Risk Management (CBDRM)	60
5.3.2 The ineffectiveness of TEWS	62
5.4 Conclusion	64
5.5 Limitations of the Study	67
5.6 Recommendations for Future Research	67
References	68
Appendices	79
Appendix A: AUTECH Approval	79
Appendix B: Survey Questionnaire	80
Appendix C: Participant Information Sheet	91
Appendix D: Consent Form	977

List of Figures

Figure 1-1 Map of Thailand.....	3
Figure 1-2 The Indo-Australian and Pacific Plates	4
Figure 1-3 The locations of major earthquakes in Indian Ocean and population distribution	4
Figure 1-4 The location of affected areas by the Indian Ocean tsunami in 2004	7
Figure 1-5 Phi Phi Island.....	11
Figure 1-6 Phi Phi Island's topography (Source: Calgaro, 2007)	12
Figure 2-1 The relationship between risk perception and preparedness	16
Figure 2-2 The chain model of disaster preparedness	18
Figure 3-1 Phi Phi Island.....	27
Figure 3-2 The study area.....	28
Figure 4-3 Insufficient tsunami warning signage	45
Figure 4-4 The obstructed tsunami warning signage.....	46
Figure 4-5 The obstructed tsunami evacuation route No.1 in Phi Phi Island.....	46
Figure 4-6 The obstructed tsunami evacuation route no.2	47
Figure 4-7 Evacuation building in Khao Lak, Phang-nga.....	48
Figure 4-8 Tsunami early warning towers and sirens	49
Figure 4-9 New commercial buildings in Phi Phi Island.....	51
Figure 4-10 The sample of the accommodation along the beach	51
Figure 4-11 Tsunami public information in Phuket and Phang-nga	52

List of Tables

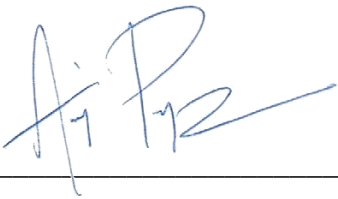
Table 1-1 Numbers of deaths, injuries and missing people from the 2004 IOT ..	5
Table 1-2 Impacts on housing	6
Table 1-3 The impacts from the 2004 tsunami to Patong, Phi Phi Island and Khao Lak	10
Table 4-1 Percentage of response to tsunami preparedness measures	37
Table 4-2 The percentage of adaption to tsunami preparedness measures presented by participants' characteristics	37
Table 4-3 The perception of the local residents to future tsunami's likelihood .	39
Table 4-4 The degree of adaptation to preparedness measures	41
Table 4-5 The feeling to the past tsunami false alarms.....	43
Table 4-6 Evacuation Intention.....	44

List of Abbreviations

ADRC	Asian Disaster Reduction Centre
AUTEC	Auckland University of Technology Ethics Committee
DDPM	Department of Disaster Prevention and Mitigation
DMR	Department of Mineral Resources
DPWTCP	Department of Public Works and Town and Country Planning
DRM	Disaster Risk Management
EWT	Early Warning Tower
FEMA	Federal Emergency Management Agency
IOT	Indian Ocean Tsunami
JICA	Japan International Cooperation Agency
GDP	Gross domestic product
HFA	Hyogo Framework for Action
NDWC	National Disaster Warning Centre
OTOS	One Tambon One Search and Rescue Team
TA	Thematic Analysis
TAO	Tambon Authority Organization
TMD	Thai Meteorological Department
TEWS	Tsunami Early Warning System
UNDP	United Nations Development Programm
UNISDR	United Nations Office for Disaster Risk Reduction

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed: _____

Date: _____

Acknowledgements

My heartfelt appreciation goes to my primary supervisor **Dr. Loic Le De** for his endless support, guidance, patience, generosity, encouragement, and many engaging discussions throughout this Masters dissertation journey.

I would like to thank **Chris Webb** for believing in me. He has inspired and motivated me since I first started studying with the Certificated in Emergency Management until now, the completion of my Masters. I would not have achieved this much in the field of emergency management if I had not received inspiration from him.

I would like to offer my sincere thanks to **Eve Coles** and **Kaisa Wilson** for their encouragement, cheering, and support at the beginning of my research.

I am highly indebted to the **Ministry of Foreign Affairs and Trade, New Zealand** Government for granting me the privilege of further studies, as well as supporting me to live in New Zealand through the New Zealand Aid Scholarship (NZ Aid) programme.

I would like to sincerely thank my scholarship officers **Margaret Leniston** and **Ruth Osullivan**, especially **Sacha Pointon** who always listened to my problems and supported me with all the processes related to sponsorship for my research; and for being my friend and my family over the last two years.

Moreover, I would like to give special thanks to my family and friends, especially **Corey Fung**, for giving me unique support and always being by my side. They all kept me cheerful and encouraged me with unconditional love and extraordinary care.

Lastly, I would like to thank the community of Phi Phi Island for their involvement and participation in this research.

This study has been approved by the Auckland University of Technology Ethics Committee (AUTC) on March 11, 2016, AUTC reference number is 16/50.

Abstract

The 2004 Indian Ocean tsunami revealed that the west coast, and many of its small islands, in the Andaman Sea are vulnerable to tsunamis. Such a devastating event also emphasised the importance of having local communities well prepared to deal with future tsunamis. Since the 2004 Indian Ocean tsunami, a number of risk mitigation measures have been developed in the tsunami prone-areas. However, about 11 years after the event, little is known about the levels of preparedness of Thai residents living on islands exposed to tsunamis. This study aims to identify the elements underlying preparedness of the local people residing in Thai small islands, and scrutinize the preparedness measures undertaken by the government agencies since the 2004 Indian Ocean tsunami.

Phi Phi Island was used as a case study as it is representative of the many small islands located in the Andaman Sea. The present research relied on a questionnaire survey carried out with over 20 permanent residents from Phi Phi Island – about 10 percent of the residents living in the study area. This research also utilised field observation and analysis of relevant documents, including policy documents, reports, and academic publications. Findings show that preparedness behaviours of the local residents was widely affected by their personal perception, belief, and bias of prior experience to tsunamis. The available resources within the local residents' daily context (e.g. time, finances) and trust in the authority were crucial factors that considerably affected making decisions in taking preparedness. Many preparedness measures have been addressed in the Island (e.g. Tsunami Early Warning, Tsunami Warning Signage, Land Plan Use Guideline); however, challenges regarding their effectiveness and insufficient maintenance of those measures are evident.

The present study recommends that local communities and the elements that shape their perception of tsunamis, should be, to a greater extent, integrated in the preparedness activities carried out by local government agencies. Moreover, strengthening Community-Based Disaster Risk Management (CBDRM) approach is likely to be useful in order to promote tsunami preparedness.

1 Introduction

1.1 Introduction

Disaster Risk Management (DRM) is increasingly important and placed at the forefront of the international agenda (The United Nations Office for Disaster Risk Reduction (UNISDR), 2015). Natural hazard-related disasters threaten global societies each year and their impacts, both human and economic, tend to be increasingly devastating due to both the augmentation of natural hazards occurring worldwide and the increasing vulnerability of people who live in hazardous areas (Khan, Vasilescu, & Khan, 2008; Nirupama & Simonovic, 2007; UNISDR, 2015).

Vulnerability is the degree to which a person, a household, or a community is susceptible to experience harm (Boin & Hart, 2007; Turner et al., 2003). People's vulnerability can be caused by many factors including living location, the strength of accommodation, education, age, economics, and gender. Women, children, people with disability, elderly, and people with limited income, seem to be more vulnerable to hazards due to their low ability to protect themselves (Cannon, 2008; McEntire, 2012). However, people's vulnerability to hazards is dynamic and can be reduced by adapting preparedness behaviours (Mileti, 1999; Shaw & Goda, 2004). Being prepared for disaster risk is an important approach to managing people's vulnerability to hazards and enhancing their capabilities in order to facilitate an effective response when such events occur (Godschalk, 1991; Kelman & Mather, 2008). In turn, a lack of preparedness at local community level may have terrible consequences when a natural hazard strikes.

One of the worst natural hazard-related disasters in history occurred in the Indian Ocean Tsunami (IOT) on December 26, 2004. The subduction of the Indo-Australian tectonic plate, beneath the overriding Burma plate, generated a massive quake measuring 9.3 on the Richter scale with a rupture length of 1,200 kilometres (UNISDR, 2006). The impact of this quake led to a series of tsunami waves that achieved run-up heights of up to 30 metres above sea level outward from the epicentres; and attacked countless coastal communities in 14 countries bordering the Indian Ocean (UNISDR, 2006). Consequently, over 280,000 people lost their lives, and the cost in recovery of both social and economic losses from this particular devastation were substantial (Department of Disaster Prevention and Mitigation, Thailand (DDPM), 2008; Thanawood, Yongchalermai, & Densrisereekul, 2006).

The 2004 IOT shone a spotlight on the lack of tsunami preparedness in many countries in the Indian Ocean region, particularly Thailand. The IOT in 2004 was the first experience by the Thai population of being impacted by a tsunami hazard (DDMP, 2008;

Thanawood et al., 2006). As a result of lacking in preparedness to tsunamis, the 2004 tsunami left Thailand as the second worst-affected country in the region. The high death tolls and severe loss in economics presented challenges and the urgent need to have the capability to effectively confront the likelihood of tsunamis in Thailand. After the 2004 IOT, over US\$1.5 billion has been paid for recovery and rehabilitation measures (DDPM, 2008; Thanawood et al., 2006; UN, 2006).

Eleven years after the IOT, very little research has assessed if, and how, this event has shaped people's preparedness to a future tsunami. This study aims to fill this gap by focusing on Thai local people living in tsunami-affected areas. This introduction chapter is presented in five sections as follows; section 1.2 will begin with a concise description on what problem this study attempts to address. This section will give better understanding of tsunami hazard in the context of Thailand. Section 1.3 will present the research question and the study objectives. Section 1.4 will provide some background information on Phi Phi Island in Krabi province, which is used as a case study in this research. The significance of this dissertation will be emphasised in section 1.5. Lastly, section 1.6 will introduce how the dissertation is structured.

1.2 Thailand and Tsunami Hazard

The Kingdom of Thailand is located between latitude 15.8700° north and longitude 100.9925° east. Thailand is bordered by Myanmar on the west, Laos on the north and east, Cambodia on the southeast, and Malaysia on the south. The southern coast of Thailand is bordered by two oceans: the Gulf of Thailand on the east and the Andaman Ocean (which is a part of the Indian Ocean) on the west. Thailand equates to a total area of 513,120 square kilometres, which is divided into 76 provinces and has over 2705 km of shoreline (Khunwishit & McEntire, 2012; Sinsakul, 2004; Thanawood et al., 2006). Thailand's population is approximately 66 million people with up to 68 percent of that population living in rural areas. Due to its topography, Thailand is divided into four main regions: north, northeast, central, and south; each region is different in terms of geographic features (refer Figure 1-1, p. 3). Thailand has many experiences with disasters especially from floods, drought, severe winter weather, and storm surges, which are perceived as major hazards facing Thailand. However, a tsunami can be recognised as the most destructive hazard risk faced by the Thai population (DDPM, 2008; Khunwishit & McEntire, 2012; Sinsakul, 2004).

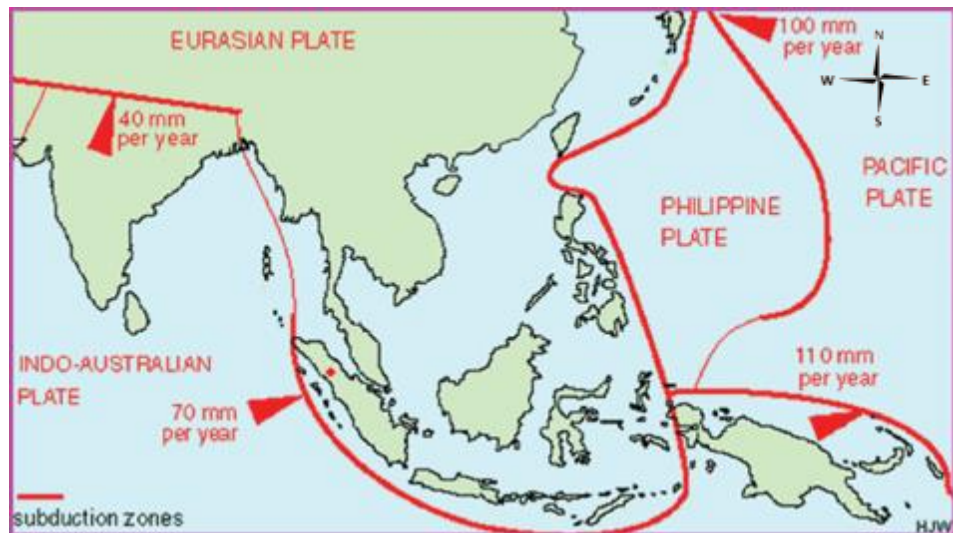
Figure 1-1 Map of Thailand



Source: DDPM (2008)

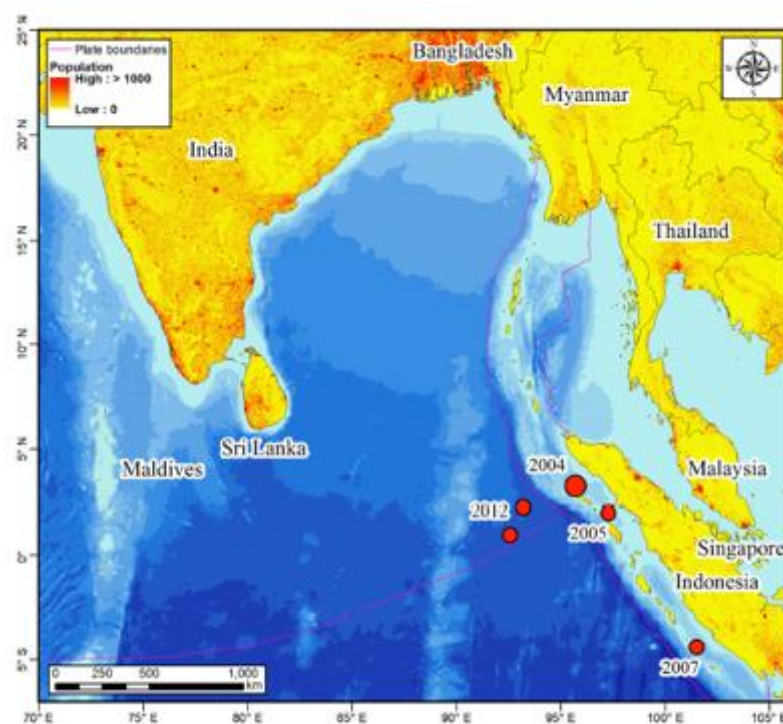
Thailand is considered a seismic active country. There are approximately 22 active fault lines with the potential to trigger tremors spreading across Thailand. Two of these fault lines are in the southern region (Department of Mineral Resources (DMR), 2011); however, they are expected to only generate minor quakes of magnitude 6 or below on the Richter scale which is not strong enough to create a tsunami event (Jarusiri, 2012; Sirirat, 2014). Therefore, Thailand is safe from local tsunamis, but vulnerable to tsunamis from distant sources from Sumatra (DMR, 2011; Rome, 2012). Thailand sits on the Eurasian tectonic plate which is flanked by the Indo-Australian and Pacific Plates (Figure 1-2, p. 4). Thailand has been affected by many tremors from many major earthquakes within this region in the past (DMR, 2011). The most significant event being the tsunami in December 26, 2004 which generated the magnitude 9.3 earthquake. The magnitude of the quake was the second large event following the magnitude 9.5 earthquake in Chile in 1960 (Ghobarah, Saatcioglu, & Nistor, 2006). Figure 1-3 presents the vulnerability in this region.

Figure 1-2 The Indo-Australian and Pacific Plates



Source: DMR (2011)

Figure 1-3 The locations of major earthquakes in Indian Ocean and population distribution



Source: Suppasri et al. (2015)

The simulation studies by Nadim and Glade (2006) used seismicity statistics to forecast that an incredible tsunami, with potential to cause significant losses and damages, would affect the western coastal region of Thailand again within the next 50 to 100 years. However, records in the past decade have revealed that tsunami

warnings in Thailand, due to underwater quakes in the Indian Ocean, have occurred multiple times in tsunami prone areas such as in March 2005, September 2007, April 2011 and, most recently, more than twice in 2012 (Paton, Burgelt, & Prior, 2008). Although, these quakes did not create tsunamis, unlike the 2004 tsunami, it does highlight that a tsunami can hit Thailand at any time.

Based on past experience of the tsunami on December 26, 2004, the quakes the in Indian Ocean have generated the largest oceanic tsunami in past decades (DDPM, 2008). The first tsunami waves with 6-7 metres height struck the west coast of Thailand at 9.30am local time, followed by 10 metre waves arriving at 10.05am, and 5 metre waves at 10.20am (Nidhiprabha, 2007; Thanawood et al., 2006). The impacts of this catastrophe were significant to Thailand as it was the first time that the Thai population was ever impacted by a tsunami disaster. Six provinces in the west coast of Thailand along the Andaman Coast; Phuket, Pang-nga, Krabi, Trang, Satun, and Ranong, were hit by the disastrous tsunami resulting in over 5,395 casualties, 8,457 injuries and 3,062 people missing (DDPM, 2008; Nidhiprabha, 2007; UN, 2006). Phang-nga province was the most severely affected area with the highest numbers of the deaths, injuries, and missing persons, as well as the numbers of damaged houses (refer to Tables 1-1 and 1-2).

Table 1-1 Numbers of deaths, injuries and missing people from the 2004 IOT

Province	Dead				Injured			Missing		
	Thai	Foreigners	Unidentified	Total	Thai	Foreigners	Total	Thai	Foreigners	Total
Phuket	151	111	17	279	591	520	1,111	245	363	608
Phang Nga	1,389	2,114	722	4,225	4,344	1,253	5,597	1,352	303	1,655
Krabi	357	203	161	721	808	568	1,376	314	230	544
Ranong	153	6	-	159	215	31	246	9	-	9
Trang	3	2	-	5	92	20	112	1	-	1
Satun	6	-	-	6	15	-	15	-	-	-
Total	2,059	2,436	900	5,395	6,065	2,392	8,457	1,921	896	2,817

Source: Nidhiprabha (2007)

Table 1-2 Impacts on housing

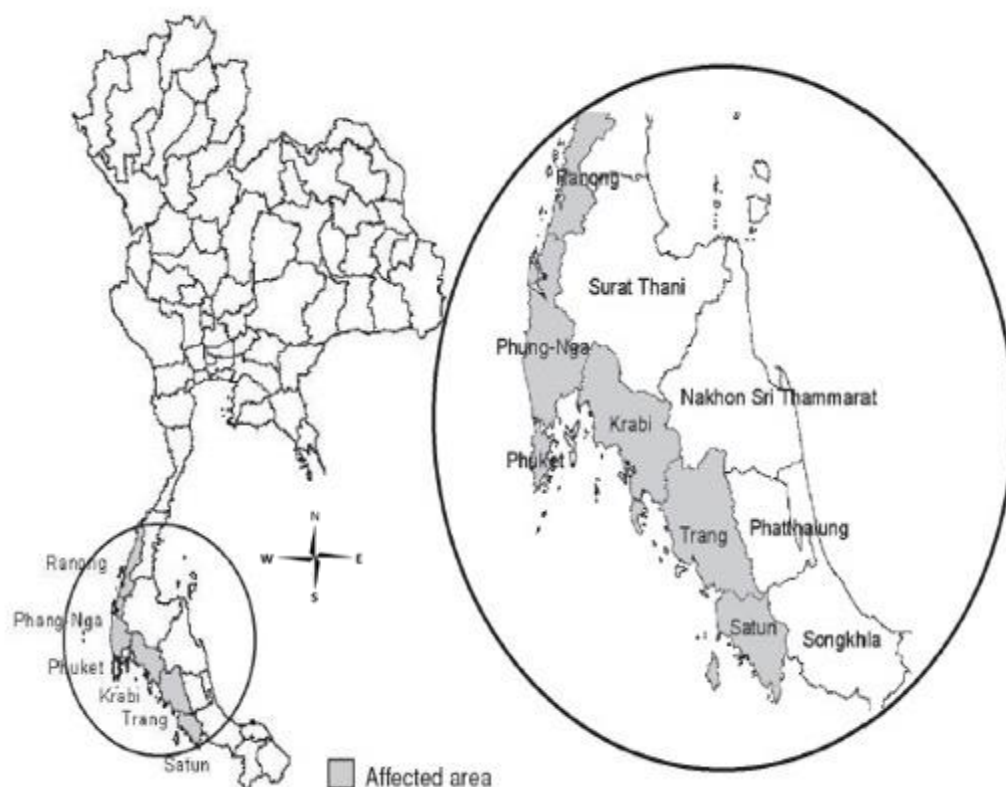
Province	Number of people affected		Unit of residence affected		Total (number of houses)	Number of affected villages
	persons	households	destroyed	damaged		
Phang Nga	19,509	4,394	1,904	604	2,508	69
Krabi	15,812	2,759	396	262	658	112
Phuket	13,065	2,616	742	291	1,033	58
Ranong	5,942	1,509	224	111	335	47
Trang	1,302	1,123	34	156	190	51
Satun	2,920	414	2	80	82	70
Total	58,550	12,815	3,302	1,504	4,806	407

Source: Nidhiprabha (2007)

Krabi sustained the second heaviest loss in life; however, the damages to infrastructure and business sections were the highest, approximately US\$100 million. Similarly, Phuket was another province with significant negative impacts from the tsunami as it is a popular tourist destination. Fortunately, Ranong, Satun and Trang suffered with only minor effects from the tsunami, mainly to their fishing industry (DDPM, 2008; Nidhiprabha, 2007). The location of affected areas by the 2004 tsunami is presented in Figure 1-4 (p. 7). Table 1-1 (p. 5) provides the number of the deaths, injuries, and missing people of the six Thai provinces hit by the tsunami. Moreover, there were also significant effects to the natural environments, especially the beach and coral reefs (Thanawood et al., 2006).

Thai People living in those affected areas by the 2004 IOT are greatly reliant both directly and indirectly on the tourist industry. In 2004, those six provinces earned 17 percent of Thailand's total tourism revenue which accounted for almost 7 percent of Thailand's Gross Domestic Product (GDP) (DDPM, 2008; Nidhiprabha, 2007). Thailand experienced US\$ 2.2 billion in economic losses. The GDP growth rate dropped from 6 percent in 2004 to zero in the first quarter of year 2005. The government's budget indicated nearly US\$1.7 billion were allocated out for tsunami relief and reconstructions: US\$112 million were used for relief measures for large entrepreneurs, US\$1.487 billion was used for rehabilitation measures, and US\$73 million was for reconstruction of infrastructure. Moreover, government agencies also provided monetary support of approximately US\$20 million for the reconstruction of houses of the affected residents (DDPM, 2006; Nidhiprabha, 2007; Thanawood et al., 2006).

Figure 1-4 The location of affected areas by the Indian Ocean tsunami in 2004



Source: Charnkol & Tanaboriboon (2006)

Due to a lack of preparedness to tsunamis, the 2004 IOT left Thailand with disastrous impacts (DDPM, 2008; Thanawood et al., 2006; Nidhiprabha, 2007). The suddenness and the scale of the event emphasised the vulnerability of such an area and pointed out the need for local communities to be better prepared for future tsunamis. After the 2004 IOT, both governmental and non-governmental organisations have become increasingly aware of such issues, and have applied tsunami risk mitigation and preparedness measures and actions targeting disaster risk reduction (Thanawood et al., 2006; UN, 2006). Studies by Thanawood et al. (2006) and Thomalla, Metusela, Naruchaikusol, Larsen and Tepa (2009) revealed that a number of measures to reduce vulnerabilities and build tsunami-prepared communities post 2004 IOT were particularly undertaken in the affected areas. Both studies identified that government agencies have paid considerable attention in establishing tsunami warning systems, land use planning, risk communications and public education programmes. The emergency evacuation plans for coastal communities were also adopted in most tsunami-prone areas in order to facilitate an appropriate response to such event. Moreover, tsunami emergency evacuation drills were developed at DRM provincial level (Thanawood et al, 2006).

1.3 Research Problem

In the past, disaster occurrences were seen as solely caused by nature or as an act of God (Bortolin, 2006; White, 1945). It is now widely accepted that natural hazards may trigger disasters but that natural hazards themselves do not necessarily lead to disasters, unless a vulnerable population is exposed to such hazards (Cannon, 2008). A natural hazard may, therefore, turn into a disaster, especially when the population is unprepared to respond to hazards. Thus, limited preparedness may potentially result in tremendous damages and losses (Rigg, Grundy - Warr, Law & Tan - Mullins, 2008). Recognition of this fact has underlined that disaster preparedness among the population is needed in order to reduce people's vulnerability and reduce the risk of disasters.

Vulnerability is defined as the degree that a person is susceptible to harm, or unable to anticipate, respond and withstand harm (Boin & Hart, 2007; Handmer, 2003). Vulnerability of any individuals to hazards is based on many factors such as age, gender, physical strength, education, and especially the locations where people live (Cannon, 2008; McEntire, 2012). However, vulnerability is not a permanent status; rather, it is dynamic and changes over time and space. Disaster/hazard preparedness programmes targeting a vulnerable population are seen as indispensable since, in the wake of hazards, community people frequently are affected victims and help each other during the period that assistance from external sources is not available (Handmer, 2003; Simpson, 2008).

Disaster preparedness at an individual level is defined by Lindell and Perry (2000) as the steps that individuals take to be able to protect themselves during and after a disaster. Being prepared for a disaster is seen as the most effective way to minimise people's vulnerability and enhance their capacity to deal with hazards, resulting in minimising the adverse consequences of such hazards (Mileti, 1999). Well-prepared people can more effectively deal with hazards, quickly recover and return to normality. One example of community preparedness to disaster is found in the wake of the 1995 Kobe earthquake in Japan where roughly 80 percent of the affected people enabled themselves to survive and assist their neighbours. Consequently such actions resulted in minimising both collateral damage and casualties (Shaw & Goda, 2004). Another example can be seen from the Tohoku earthquake on March 11, 2011, where the success of establishing effective emergency warning systems and disaster preparedness among the Japanese population saved many lives and minimised the losses even though a tsunami arose rapidly after the earthquake struck (Fraser, Matsuo, Leonard, & Murakami, 2012). In contrast, the IOT was a catastrophic loss to Thailand due to the absence of tsunami warning systems, as well as the lack of tsunami

preparedness among the population at risk (Rigg et al., 2008; Rachmalia, Hatthakit, & Chaowalit, 2011).

Thailand is one country that is at risk of tsunamis. A number of local Thai citizens are living in tsunami prone areas where preparedness to such event needs to be addressed in order to reduce the risk of a disaster. However, very little is still known about the preparedness of tsunami-affected communities for a future tsunami (Thanawood et al., 2006; Thomalla et al., 2009). In the past, only a few studies have focussed on tsunami preparedness among high risk citizens in Thailand. The first, conducted by Muttarak and Pothisiri (2013), investigated how well Thai residents are prepared for tsunami and focused on individual factors, particularly educational background, which is one of the cognitive influences to risk perception. The second study by Witvorapong, Muttarak and Pothisiri (2015) mainly focussed on how social participation could foster acquiring risk reduction behaviours of people in tsunami prone areas such as following the news, preparing emergency kits, and intention to evacuate. Whereas in Western countries, research has repeatedly attempted to gain better understanding on what influences people's decisions and whether or not to prepare for future hazards. Several factors which may affect individuals' adaptation to disaster risk preparedness, including personal perception to dangers, severity of the impacts, likelihood and feeling, have also been studied (Paton et al., 2008; Raaijmakers, Krywkow, & van der Veen, 2008; Slovic, 1987). Moreover, social environment, culture, education, and constraints from daily context are also believed to affect preparedness behaviours (Gaillard, 2008; Slovic, 1987; Witvorapong, Muttarak, & Pothisiri, 2015). It is showed that the studies in preparedness behaviours to hazards relating local residents at tsunami risk in Thailand is still limited, but very much needed to address issues of preparedness and DRM. It is indeed questionable how well current local communities and the government agencies in tsunami-affected areas in Thailand are prepared for tsunamis, after their first experience to tsunami in 2004, and if anything can be done to improve the local people's preparedness.

In this dissertation, Phi Phi Island is selected for being a study area for the following reasons. First, the coast on Phi Phi Island was one of the areas that suffered a significant impact from the 2004 tsunami. The impacts from the 2004 tsunami on Phi Phi Island compared to other tourist destinations, namely Patong and Khao Lak, are presented in Table 1-3. Second, during the recovery phase from the past tsunami, the residents on Phi Phi Island experienced delayed support from the government due to the affected areas being situated on an island, and therefore somewhat isolated and difficult to access (Calgaro, 2011). Thirdly, Phi Phi Island can be representative of many touristic islands locating in tsunami prone areas in Thailand such as Koh Yao Yai, Koh Yao Noi

and Koh Phi Phi Le. These islands are shown in Figure 1-5 (p. 11). However, none of the studies carried out on preparedness among local residents has ever been done on those islands.

Table 1-3 The impacts from the 2004 tsunami to Patong, Phi Phi Island and Khao Lak

Destination	Run-up height range (metres)	Inundation distance (metres)	Number of deaths	Room capacity lost (%)	Change (%) in tourist flows 2004 vs. 2007
Patong	4.90–5.48	200–1200	152	15	+4.4
Phi Phi Don	4.58–6.89	100–1000	692	71	–7.2
Khao Lak	4.48–11.62	500–3500	4224	83	–60

Source: Calgaro, Dominey-Howes & Lloyd (2014)

This study seeks to address the following research question: to what extent do the tsunami-prone residents in Thai island prepare for tsunami hazard?”

This dissertation endeavours to achieve the following three objectives:

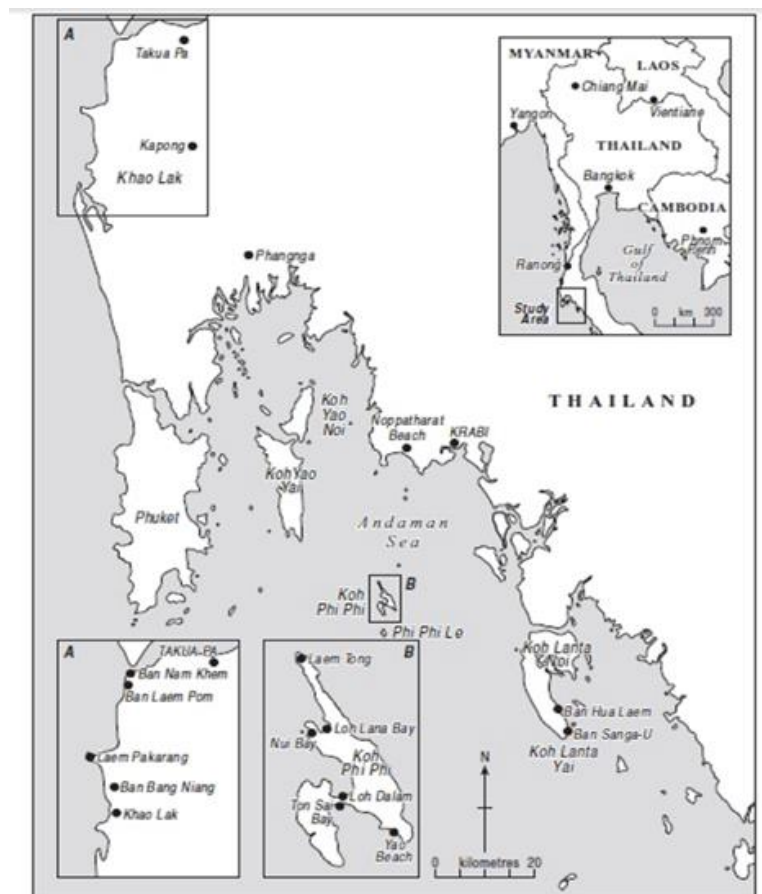
1. To identify what are the elements that guide local residents’ preparedness to tsunami;
2. To identify the preparedness barriers from the government agencies measures and actions post-tsunami targeting preparedness;
3. To identify implications for measures and actions to foster preparedness for tsunami among local residents.

1.4 Study area “Phi Phi Island”

Phi Phi Island is located in the Andaman Sea in the Krabi province, around 42 kilometres away from mainland of Krabi Province and 48 kilometres from Phuket. Phi Phi Island covers the areas of 10.25 square metres. Phi Phi Island is an important tourist destination of Krabi, in which the tourist industry was the major income for a thousand local residents in the island. Annually, Phi Phi Island attracted approximately 300,000 visitors and generated on average US\$113 million in revenue (Department of Public Works and Town and Country Planning (DPWTCP), 2005; Rigg et al., 2008; Thomalla et al., 2009).

The geography of Phi Phi Island is dominated by high mountains; only the flat area in the middle of the island is a very narrow isthmus. Due to its geography, the community and tourist infrastructures such as hotels, guest houses, hospital, restaurants, and retail shops are packed in the narrow part of the island, where it is flat and connects with the bay from both sides. When Phi Phi Island was hit by the tsunami in 2004, the island was struck twice by the tsunami waves from Ton Sai bay and Loh Dalum Bay due to its geography. Consequently, it resulted in being an inescapable death trap; some victims were washed out to the ocean. As a result from the 2004 IOT, 700 people were killed and 1,300 are still missing (Calgoro, Naruchaikusol, & Pongponrat, 2009; Thomalla et al., 2009). Figures 1-5 and 1-6 show the topography of Island.

Figure 1-5 Phi Phi Island



Source: Rigg et al. (2008)

Figure 1-6 Phi Phi Island's topography



Source: Calgaro (2007)

1.5 Significance of the Study

This study is significant to the local members of Phi Phi Island as it allowed them to share their perspectives regarding the tsunami protective measures in their community. The findings of this study will bring better understanding of how local residents living in a small Island perceive tsunamis after the 2004 IOT, including how they prepare for a future tsunami and what elements underlie their preparedness behaviours from both personal factors as well as the influences from government measures.

This study is significant for policy makers working in the field of disaster risk management in Thai small islands, including Phi Phi Island. This study will provide recommendations on what measures could be done to improve community preparedness to tsunamis in Phi Phi Island and other small Islands with similar limited resources and exposure to tsunami.

This study also endeavours to be relevant to disaster and emergency management scholars, as it is the first to study aspects of preparedness influences among people living in small Islands in Thailand. Therefore, the result of this study may serve as basis for further study, which aspects are further identified in Chapter 5.

1.6 Outline of the Dissertation

In order to address the research question and objectives of this study, this dissertation is organised into four chapters that follow this introduction chapter. The next chapter is a review of the literature which will analyse the existing research done on preparedness and its influent factors. Chapter 3 will outline the paradigm, the methodology design, and the field method, in both collecting and analysing data used in this study. Chapter 4 will present the findings; while Chapter 5 will situate them in existing literature and provide a discussion, recommendations, limitations and conclusions of the study.

2 Literature Review

2.1 Introduction

Chapter 1 introduced this dissertation, highlighting the importance of preparedness to disaster, especially at local community level. Preparedness to disaster is crucial in order to reduce vulnerability and increase ability to cope with future hazards (Mileti, 1999; Shaw & Goda, 2004). To gain better understanding of individuals' and local communities' preparedness, this chapter will review the existing studies undertaken on this topic and will focus on the different factors that guide preparedness, with a focus on tsunamis. This chapter is divided into three sections. Section 2.2 will provide the information related to taking preparedness actions to tsunami. Section 2.3 will discuss the factors that guide individuals' and local communities' preparedness. The last section 2.4 is a summary of this chapter.

2.2 Individual preparedness to tsunami

Disaster preparedness at an individual level is defined by Lindell and Perry (2000) as the steps that individuals take to be able to protect themselves during and after a disaster. Being prepared for a disaster is seen as the most effective way to minimise people's vulnerability and enhance their capacity to deal with hazards, resulting in minimising the adverse consequences of such hazards (Mileti, 1999).

Many scholars and organisations have described the measures for being well-prepared for a tsunami. At a household level this typically involves undertaking two distinct actions: survival actions and mitigation actions (Spittal, McClure, Siegert, & Walkey, 2008). "Survival actions" relate to making sure there are enough necessary items such as food, water, and medicine, to use for survival during and after a disaster. Emergency management planners suggested that individuals and families should be well-prepared and self-sufficient for the first 72 hours after any disaster (Spittal et al., 2008). This is because services and supplies from emergency response teams can be interrupted, or maybe not immediately available (Basolo et al., 2009). "Mitigation actions" are the actions that people undertake before a disaster to reduce losses and damages from such an event. Examples of mitigation activities are ensuring that moveable items within a house will not move or fall down, and ensuring the building is capable of enduring a tsunami (Kirschenbaum, 2004). An individual, family, or local community should prepare its own emergency plan that allows them to know what is needed to be done in an emergency, how to access disaster information and stay in contact or join together if they are separated. Moreover, every household should acquire hazards knowledge

about their nature, and how to cope with them in various scenarios such as evacuation, as well as follow the news. With these actions, they will be able to effectively cope with hazards resulting in less losses and damages (Howell & Bonner, 2005; Kirschenbaum, 2004).

2.3 Factors influencing disaster preparedness

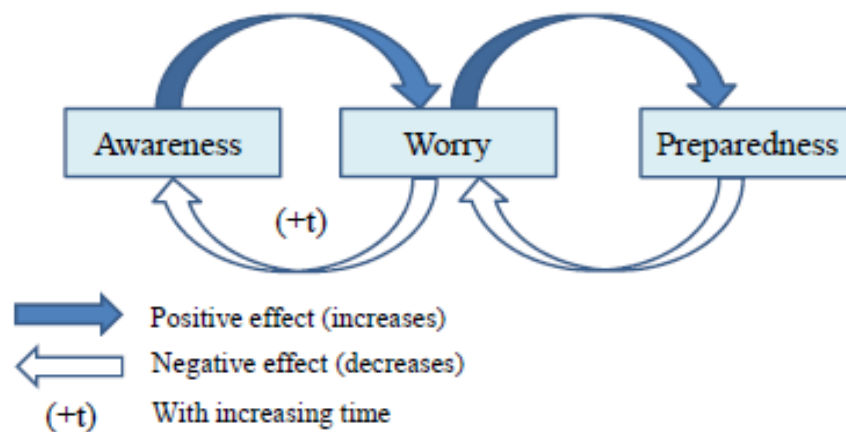
Preparedness behaviours of local people are complex. There are many possible factors which could affect people's preparedness, which will be reviewed in the following sub-sections.

2.3.1. Risk perception

Risk perception is defined as an evaluation of individuals to the likelihood and consequences of risk (Solvic, 1987). Early research on risk perception identified that how people perceive hazards strongly links to their hazard preparedness. Kapucu and Wilson (1990) described that perception to risk is the first step that motivates an individual to transform the inputs of threats to preparedness actions. People are likely to take actions to hazards when they recognise that the hazard is imminent or it can be significant to them (Solvic, 1987). Similarly, Raaijmakers et al. (2008) posited that people's feelings of "dread" and "anxiety" which they perceive from hazards significantly influence them to decide what to do. Raaijmakers et al. (2008) explained the relations between risk perception and people's preparedness behaviours via awareness and worrying (See Figure 2-1, p. 16). The high awareness to hazards potentially increases worrying which results in more preparedness. However, the authors explained that if the awareness is not high enough to make people feel worry, they are unlikely to take actions. Moreover, when people feel safer due to having appropriate knowledge, experiences, and other protective constructions (e.g. early warning systems), their feeling of worry would be reduced and result in a decrease in preparedness (Mulilis et al., 1999; Raaijmakers et al., 2008). In general, high-risk perception is believed to lead to higher preparedness.

Apart from perception of likelihood and consequences of hazards, risk perception is complex and influenced greatly by cognitive factors including biases, prior experiences to hazards, and education background.

Figure 2-1 The relationship between risk perception and preparedness



Source: Raaijmakers et al. (2008)

Risk perception can be affected by “personal bias”. Researchers declared that the people’s perspectives to risks are not always rational and based on scientific information but they often rely on their bias appraisals and feelings. These unrealistic beliefs can lead people to underestimate hazard risks resulting in less preparedness (Paton, Smith, Daly, & Johnston, 2008). “Optimistic bias” happens when people hold positive thinking that hazards would not happen or even it happens, it will not affect them. Individuals with optimistic bias always rate themselves being well prepared, and therefore less vulnerable to hazards than others (Lindell & Whitney, 2000; McClure, Sutton, & Sibley, 2007). For example, before the Canterbury earthquake in 2010 the citizens in Canterbury, New Zealand knew that they were at earthquake risk due to living close to several fault lines, but they thought that an earthquake was more likely to occur in Wellington than in Canterbury. Due to their optimistic bias, they ignored measures related to earthquake preparedness. As a result, the 2010 earthquake in Canterbury caused massive damages and loss. Similarly, Couling (2009) found that many people thought that a tsunami was less likely to happen, so they spent time gathering their belongings and contacted families and friends even after the tsunami warning had been issued, resulting in ineffective evacuation.

Outcome expectancy presents considerable influence on whether individuals will take actions against the consequences of hazards. “Outcome expectancy” is the way that an individual assesses the effectiveness of being prepared (Lion et al., 2002; Paton, 2003; Paton et al., 2008). Individuals tend to take preparedness actions when they believe that a hazard is manageable and a disaster is avoidable, or their efforts on preparation can result in positive consequence to himself/herself and others (named “positive outcome expectancy”). With positive outcome-expectancy, the motivation to

prepare is likely to happen. For example, in the survey of preparedness among US citizens it was found that the citizens who had strong belief in the effectiveness of disaster preparation were likely to engage themselves with preparedness behaviours approximately 7 to 30 percent higher than those who had weaker preparedness beliefs (Paton et al., 2008). In contrast, an individual will not take the preparation actions if he or she holds negative outcome expectancy. Lion et al. (2002) and Paton et al. (2008) explained that when people perceived that a disaster is too devastating to handle and their preparation will not make any difference in a disaster, consequently they will not prepare for a disaster. Couling (2009) discussed that unrealistic optimistic bias and negative outcome expectancy potentially decreases people preparedness actions.

Many studies emphasise that sociodemographic characteristics, including gender, age, and education, can influence the perception of risk differently, and thus preparedness to disasters. Jonkman and Kelman (2005) found that women are likely to have high-risk perception and consider hazard warnings more seriously than men, while men tend to have higher risk-taking behaviours than women. For example, many men drove their cars during flooding resulting in car crashes, or tried to support services resulting in drownings. As a result, they found that 70 percent more men than women lost their life due to lack of preparedness and over presenting in flooding. Additionally, Solberg, Rossetto and Joffe (2010) found that age influenced individual risk perception; elderly people frequently perceived earthquake risk lower than younger people, especially the elderly who had many experiences of hazards resulting in less preparedness.

In terms of education background, Asfaw and Admassie (2004) found that people with high education are likely to have greater awareness and preparedness to hazards. Their evidences showed that higher education could indicate the higher ability of acquisition of hazard knowledge and assessing risk information. Similar with the study of Muttarak and Pothisiri (2013), their investigation of the preparedness levels of residents in earthquake and tsunami prone areas clearly demonstrated that higher educational attainment of residents also indicated the more success of disaster-related education programmes and training. However, recent studies identified that high risk perception alone does not always motivate people to adopt disaster preparedness (Becker, Paton, & McBride 2012; Paton et al., 2008). There are still many variables that affect the decision for preparedness, which will be described as follows.

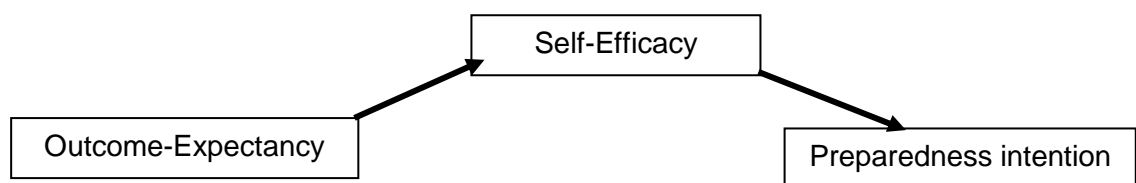
2.3.2. Self-efficacy

Self-efficacy is one of the imperative elements that influences people for developing protective reaction to perceived risk (Paton, 2003). Self-efficacy is a belief that individuals

have about themselves regarding their capability to do something to control hazards (Lindell & Whitney, 2000; Paton, 2003). The findings of Marceron and Rohrbeck (2014) described that individuals with high self-efficacy will have high potential to transform their risk perception to taking actions in preparedness to deal with risk. Conversely, individuals with low self-efficacy will less likely take preparedness behaviours. Giallard (2008) identified that the limit in economics, time, and skill can reduce people's self-efficacy. For example, people with low financial capacity might see taking preparedness actions (such as storing food for at least 72 hours) difficult for them to afford, even if they find that the particular preparedness measure is useful (Bandura, 1982).

Bandura (1982) stated that self-efficacy has greater impact on adaptation intention than outcome-expectancy. Scholars explained that after individuals find any preparedness actions effective, they will first assess their capacity if they have potential to take those actions (Samaddar, Chatterjee, Misra, & Tatano, 2014). Therefore, people with high outcome expectancy may not commit with preparedness actions if they have low self-efficacy, in which the relationship model of outcome-expectancy, self-efficacy and preparedness intention can be demonstrated in Figure 2-2 (p. 18). One example was presented in the study of hurricane preparedness in US society after the Katrina disaster (FEMA, 2015). The result showed that over 30 percent of those who were not well prepared cited lack of money as a reason. Katrina also reflected that most victims did not evacuate even though they had received warning, because they did not have cars or money to afford other options to leave the area. Additionally, time available may also significantly affect people's motivation to prepare for a disaster. Becker et al. (2012) acknowledged that a lack of available time generally decreases people's intention to adopt preparedness measures.

Figure 2-2 The chain model of disaster preparedness



Source: Paton (2003)

2.3.3. Fatalism

Fatalism is another common influence that prevents people from taking preparedness actions. Fatalism strongly relates to the perception of the origins of disasters and the

belief that it is an act of, or punishment from, God (Bortolin, 2006; McIvor, Paton & Johnston, 2009). Fatalism implies that people hold the feeling of hopelessness and believe that the hazard will overtake their preparedness efforts. People with fatalism believe that if a disaster is too devastating and beyond human actions, there is nothing that they can do to deal with such an event. As a result, fatalism hinders people from being prepared for a disaster (Lindell & Whitney, 2000; McIvor et al., 2009). However, McClure et al. (2007) argued that the consequences of a hazard can lead to varying degree of damages, some of which can be coped with. Furthermore, McClure et al. (2007) suggested that the perception of fatalism can be reduced by providing specific information regarding the degree of damages led by the hazard or why damage as occurred. Correct and reliable information will help the public to fix their negative belief of a disaster, and understand that a disaster is actually preventable and controllable.

2.3.4. Prior experience to disasters

Prior experience of disasters can significantly effect to people's perception and preparedness to hazards. Prior experiences potentially increase the feeling of worry and fear, which may raise in people's risk perception and preparedness intention (Raaijmakers et al., 2008; Terpstra, 2010; Wagner, 2007). For example, Rachmalia et al. (2011) studied the level of preparedness of people living in tsunami prone areas in Indonesia. The researchers found that people who had experience with a disaster were likely to prepare for future hazards. On the other hand, people who had not experienced a hazard for a long time were less likely prepare for a future hazard (Davis et al., 2005).

Nonetheless, some authors suggested that having prior experience of disaster can have negative effects on preparedness. Kates (1962) found that people with prior hazard experience often expected that such hazards would always be the same as they used to occur. This so called "prison of experience" implies that people who experienced hazards with minor effects would tend to not prepare for something more severe, such as a devastating event. Similarly, Mileti and O'Brien (1992) found that people with no personal loss or serious disruptions from the first event were likely to be more optimistic about the possible effects from a future hazard. These people would not think that a hazard could be severe resulting in low preparedness. Likewise, Fraser et al. (2012) indicated that having no personal experience with a tsunami led to low preparedness, thus resulting in taking proper actions such as evacuation belatedly.

Moreover, having experienced a devastating disaster can also lead to "denial" of preparedness actions (McClure, 2006; Paton & Johnston, 2006). Being exposed to devastating events can make people scared and anxious to deal with future events, believing in fatalism (McClure, 2006; Paton et al., 2008). Overall, feeling worry or scared

from past experiences potentially increases preparedness actions (Raaijmakers et al., 2008); however, too much anxiety can lead people to a belief in fatalism and low outcome expectancy which may result in denial towards taking any preparedness actions (McClure, 2006; Paton et al., 2008).

2.3.5. Social influences

Recently, many studies have identified that a social factor plays an important role in hazard preparedness decisions. Paton, Smith, Daly, and Johnston (2008) found that the decisions to prepare or not prepare was dominantly influenced by the sense of community. People who had strong connections with their community frequently perceived that it is their responsibility to protect their people and the members of their community, resulting in taking preparedness measures. In a similar sense of community, people with home ownership, children, or elder members at home are likely prepare themselves for hazards, because those bonds enhance their sense of responsibility or sense of community bondedness (Russell, Goltz, & Bourque, 1995).

Moreover, social networks are an effective way for promoting risk preparedness behaviours. People who are surrounded by prepared neighbourhoods tend to engage themselves to preparedness behaviours. For example, Solberg et al. (2010) indicated that many people undertook more preparedness behaviours to hazards after they observed that other people adopted those behaviours. FEMA (2015) found that almost 80 percent of the respondents received preparedness information from neighbours, friends, family, schools, work and community organisations; on the other hand, only 50 percent of them received the information from the government agencies. Importantly, Willroth, Massmann, Wehrhahn, and Revilla Diez (2012) indicated that after the 2004 tsunami, people in the same community helped each other to get a job or offered temporary work, which resulted in improving their financial resources so they could afford preparedness measures and actions.

2.3.6. Tsunami mitigation measures

In order to promote preparedness to tsunami among local community people, many measures could be provided.

2.3.6.1 Community-Based Disaster Risk Management (CBDRM)

CBDRM is seen as a sustainable approach in managing risk, in which the community members are decentralised, the local people become a centre of identifying, assessing, and managing risk at the local level under the umbrella supported by national, regional

and local government (UNISDR, 2014). CBDRM's advantage is that it draws upon the community context and local people experiences. Empowering community people as a part of the DRM will increase their intention in adapting preparedness measures, while a lack of their involvement in DRM might result in an ineffective DRM plan. Gaillard (2008) supported this idea with a case of the volcano eruption of Mt. Pinatubo in the Philippines, where a lack of involvement from local people in policy planning of resettlement led to the failure in implementing DRM policies. The government rushed to provide those victims with infrastructures and facilities that were not wanted by the victims. As a result, the resettlement plan placed more constraints on the victims and finally the victims moved back to their native land.

2.3.6.2 Tsunami Early Warning System (TEWS)

TEWS is an important tsunami mitigation measure which can detect and monitor a tsunami hazard and then provide an early warning. The advantage of TEWS is to allow people more time to take protective actions such as evacuation to a safe zone (Gregg & Houghton, cited in Paton & Johnston, 2006). The presence of TEWS potentially saves losses and lives. In turn, an absence of TEWS would leave tremendous losses, such as the case of the 2004 IOT in Thailand (Thanawood et al., 2006). An important concern is that the government should regularly inspect the effectiveness of TEWS to ensure it can work effectively. The technical failures of TEWS could lead to tsunami false alarms resulting in injuries; additionally this could affect the feeling of public trust to TEWS (Calgaro et al., 2009). Moreover, in the area with multiple hazards (e.g. tornado, tsunami, earthquake, fire) the government should ensure if residents understand the meaning of warning alerts. To enhance the effectiveness of TEWS in reducing risk, educational programmes regarding TEWS for local people is crucial (Gregg & Houghton, Eds.).

2.3.6.3 Land-use planning

Land-Use planning has been increasingly important to tsunami mitigation strategies. Burby, Dyle, Godschalk and Olshansky (2000) noted that the concept of land-use planning is to avoid , or maintain, low population in hazardous areas. However, applying land-use planning to hazard prone communities can be difficult, because people often wish to live close to the ocean, river, and lake; hence they can be hesitant if they need to move out from the original land (Gregg & Houghton, cited in Paton & Johnston, 2006). Paphavasit, Chotiyaputta, and Siriboon (n.d.) described that land use plan is crucial for tsunami affected areas in order to control development of constructions and other activities in tsunami prone areas. In order to achieve land use guidelines within community and avoid conflicts, Paphavasit et al. (n.d.) suggested that CBDRM is needed in which the fit of a land use plan, within the local context, can be developed. Ignoring

local people's context can lead to an ineffective plan. The significant example can be seen from the case of resettlement of the community at Mt. Pinatubo as mentioned in sub-section 2.3.6.1 CBDRM.

2.3.6.4 Tsunami communication and education

Risk communication and education plays an important role in shaping public perception to risk and promoting information on what measures the public should prepare for hazards (Terpstra, Lindell, & Gutteling, 2009). The government conveys tsunami hazards and appropriate responses to local people. Effective risk communication should be disseminated through various channels including pamphlets, television, radio, books, and websites, so that the public can easily access hazard information. An example of successful risk communication can be seen from the devastating tsunami caused by an earthquake in Japan on March 11, 2011. The magnitude of tsunami was as severe as the 2004 IOT; however, 96 percent of affected people were safe (Fraser et al., 2012). This was due to the effective hazard-education programme, which resulted in the high level in preparedness to tsunami among citizens (Fraser et al., 2012). On the other hand, a lack of hazard information sources can be a great barrier that limits the ability of individuals in effectively prepared for a disaster. For instance, due to the lack of effective hazard public education towards tsunamis in Thailand, the 2004 IOT led to devastating effects for the Thais.

Raaijmakers et al. (2008) identified that being better informed with hazard information may reduce people's preparedness actions, as having information could reduce people's worry. An example can be seen from the study of people with volcanic eruption risk in Auckland, New Zealand. The risk communication programmes of volcanic eruption have been successfully established in the area; the awareness among the residents was over 90 percent. Nonetheless, only 10 percent of Aucklanders stored food and water and less than 10 percent prepared first aid kit (Paton, Smith, & Johnston, 2000). This showed that even if communication programmes are successfully put in place, it does not guarantee the adaption to preparedness behaviours of citizens (Couling, 2014; Paton & Johnson, 2006).

There are still challenges to promoting hazard information to the public. Many past studies found that information about risk which was broadcast to the public was sometimes inaccurate and confusing, as a result the public misunderstood and applied ineffective responses in times of disasters (FEMA, 2015). A national survey that measured the understanding of protective action among US residents by FEMA (2015), for instance, found that over 60 percent of them gave the inappropriate responses that it is safe to get in a doorway during an earthquake.

In order to ensure the high effectiveness of risk communication, passing hazards information to public needs to be more controlled. Firstly, hazards information for public should be available, clear, correct, and easy to understand; even for people with lower literacy levels (FEMA, 2015; Tanaka, 2005). Tanaka (2005) carried out a survey in Japan and San Francisco, USA, and found that the degree of preparedness among those people were high and correlated to the high number of education sources (e.g. newspaper, magazine, brochures) which had been accessed by the population. Secondly, it is important to note that risk communication does not mean communicating only on risk characteristics but with supporting strategies on what the public can or needs to do. Otherwise, the information may decrease the public perception of their responsibility in coping with risk, and transfer their responsibility to other agencies (Ballantyne et al., 2000; Johnson et al., 2005; Terpstra, 2010).

2.3.6.5 Trust in DRM authorities

The feeling of trust between people and authorities is crucial in whether or not people would adapt the above mitigation measures (Arlikatti, Lindell, & Prater, 2007). "Trust" is defined as knowing that you can rely upon others, and is a mediating factor between public and authority. People are likely take authority's suggestions only when the public have trust in authority. Lion et al. (2002) and Slovic, (1993) indicated that people would follow preparedness measures if they trusted in the information from DRM; a lack of trust in authority/agency will lead to the opposite reaction. However, some evidence showed that having trust in DRM agency or measures can also negatively lead to low preparedness to hazards. Levac, Toal-Sullivan, and O'Sullivan (2012) found that many people pay less attention to being prepared to hazards when they trusted that the hazard protections and emergency team would protect them from dangers.

For example, TEWS is one of many tsunami mitigation measures. In the past, TEWS saved many thousands of live from tsunamis, allowing people to take protective responses before tsunamis arrived on the coasts (Couling, 2014). Fraser et al. (2012) found that being exposed to false tsunami alarms frequently led the survivors to commit with optimistic bias resulting in reducing in evacuation intention. For example, during the tsunami in Japan on March 11, 2011, many residents in Natori delayed evacuations (Fraser et al., 2012). The evidence presented suggested that people in Natori city received the warning of a major tsunami which could have generated by the Chili earthquake; however, the actual earthquake generated tsunami with the height of only 0.5-0.6 metres to Natori city. Therefore, when they were informed to evacuate due to major tsunamis again, two days after the Chili earthquake, people did not take the

warning seriously due to the effect of the previous false tsunami alarms, resulting in unnecessary deaths.

2.4 Summary

This chapter had reviewed past studies and identified what factors could guide people's preparedness behaviours. It can be seen that there are many activities that people living in tsunami risk areas should take for both survival and mitigation actions. Whether or not people take preparedness actions is dependent on many possible factors such as perception of risk, belief, outcome expectancy, self-efficacy, social network, and the influences from the DRM actions and measures provided by governments and aid agencies. The information presented in this chapter will be used as a framework to guide the present study, such as in identifying what factors may guide local residents' preparedness and how tsunami preparedness can be improved. The next chapter will present the research methodology design and the process for collecting data to fulfil the aims of this study.

3 Methodology

3.1 Introduction

Preparedness is highlighted as an important measure in reducing people's vulnerability and enhancing their capacity to cope with hazards. This study aimed to identify the factors underlying their preparedness behaviours and the elements guiding these, as well as to appraise what measures the government agencies had taken to increase people's preparedness. The information about preparedness behaviours has been reviewed in chapter 2; this chapter will describe how the study has been designed and carried out to achieve the study objectives.

This chapter is divided into three sections. Section 3.2 will begin with the research paradigm for clarifying the perspective that the researcher used in this study in order to acquire knowledge. Section 3.3 will describe the study area. Section 3.4 will detail the research processes using questionnaire survey, field observation, and document analysis. The process, including recruitment of participants and the ethical issues related to conducting research with the participants, is discussed in the section 3.4.1. Section 3.5 will detail how the research data was analysed.

3.2 Research Paradigm

Paradigm is described as a belief system, worldview or framework that guides researchers in a field of study (Crotty, 1998; Grant & Giddings, 2002). In this study, a pragmatic paradigm is applied as a study framework. For a pragmatic paradigm, quantitative and qualitative research can be considered as being complementary rather than antipathetic (Cresswell, 2003).

Under the "positivism paradigm" or "quantitative research" framework, researchers believe that knowledge can be obtained or generated by observation and systematic experimentation (Grant & Giddings, 2002). Therefore, the relationship between researcher and researched will be just an observer and an object of study. This paradigm is considerably reliable and precise because the data is validated and interpreted systematically without the researcher's biases (Crotty, 1988; Grant & Giddings, 2002). A positivism paradigm is successfully used in driving for theory, best practice and strategies (Barnham, 2015). However, this paradigm is criticised due to the lack of detailed individuals' subjective explanations (Crotty, 1988; Grant & Giddings, 2002; Taylor, 1999). Some scholars insisted that this paradigm is not useful for addressing many kinds of issues because human experiences are not observable, such as feeling and thinking (Cocks, 1989; Crotty, 1988).

On the other hand, under the “interpretive paradigm” or “qualitative research”, it is argued that different people can perceive the truth differently (Crotty, 1988; Kuhn, 1970). Therefore, the truth can be found from self-understanding from those individuals who experienced the phenomenon. Within this paradigm, the researched becomes a participant who is allowed to share his or her perspective and concerns resulting in providing a deep insight for the study (Grant & Giddings, 2002; Kuhn, 1970). Therefore, the strength of this paradigm is that it can lead to better understanding of human experience, the participants’ meaning, and how they may feel and think (Cole, 2006; Crotty, 1988; Kuhn, 1970). The researched becomes a participant who has less social distance from the researchers than merely being a subject, as in positivism. However, some scholars raised concerns that the results from the interpretive paradigm might not be as accurate or reliable as the data from a quantitative approach, because an interpretive researcher does not just observe but also has to interpret the significance of the understanding to knowledge, which may insert his or her biases to the study (Bryman, 2008; Grant & Giddings, 2002).

From the above discussion, it can be seen that positivism and interpretive paradigms have their own strengths and weaknesses. Under a pragmatic paradigm, therefore, it is believed that the researcher should rely on a variety of research methods as one can feed off another, leading to richness of understanding of phenomena (Gorard, 2004; Grant & Giddings, 2002). Moreover, the researcher can both observe and take part in interpreting the data, in which the rich data from applying this paradigm can help the researcher limit the biases which may arise when the researcher interprets the data. Thus, due to its benefits, the pragmatic paradigm is chosen for this study.

3.3 Study Area

For this study, the tsunami affected areas on Phi Phi Island in Krabi province was selected. The study area is presented in Figure 3-1 (p. 27). Phi Phi Island is located in the Andaman Sea, around 42 kilometres away from the mainland of Krabi Province (Rigg et al., 2008). To travel from the main land to Phi Phi Island, the researcher had to take a ferry, which took approximately an hour and cost around US\$20 for one-way trip.

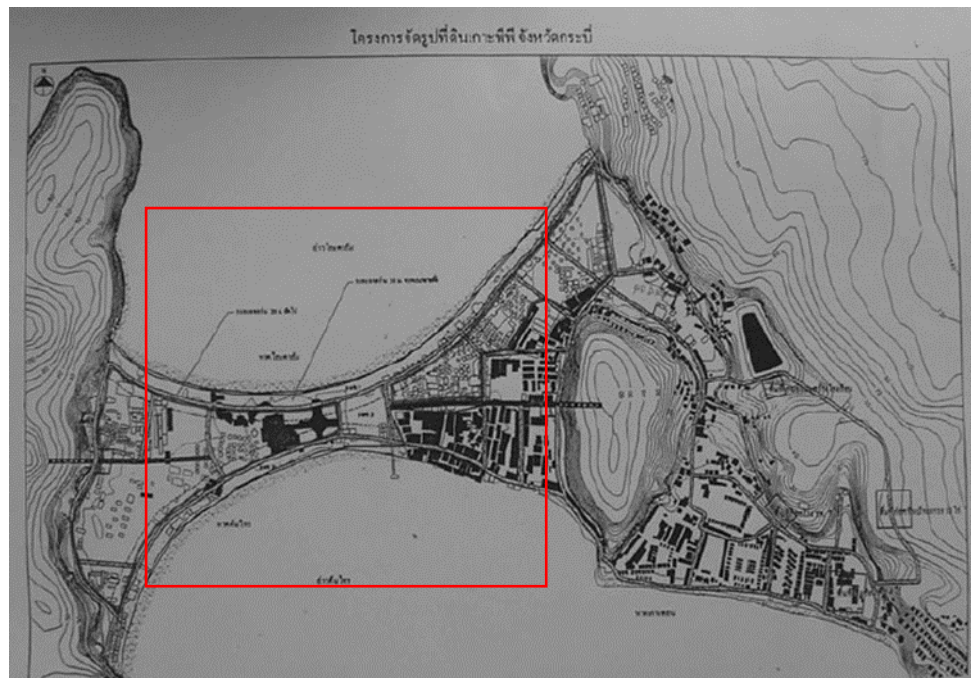
Figure 3-1 Phi Phi Island



Source: Rigg et al. (2008)

The study area was selected due to its vulnerability to tsunami. The study area was described as the most vulnerable area to tsunami as a result of Phi Phi Island being badly affected by the tsunami in 2004 (Rigg et al., 2008; Thomalla et al., 2009). The study area is the narrow part of the island which is bound by the ocean from both sides. As a result of its geography, and significant view of these two beaches, this area has a high density of local people and a huge number of tourists. However, due to time limitations, the study was particularly focused on local residents at the central area, approximately 20 square kilometres from one mountain to another. The study area is presented in Figure 3-2 (p. 28). Importantly, Phi Phi Island is a good representative of other islands, such as Phi Phi Leh Island, in Andaman Sea, which are also at tsunami risk. Other small islands located in tsunami risk can be seen in Figure 3-1 above.

Figure 3-2 The study area



Source: adapted from Rigg et al. (2008)

3.4 Methodology

With a pragmatic paradigm, both quantitative and qualitative information might be used in a single approach design (SAD) or multi approach design (MAD) (Bazeley, 2004). In this study, MAD is applied in order to achieve the research goals. A questionnaire survey was predominantly used to collect data from the participants in order to evaluate their preparedness and identify the factors affecting the preparedness behaviours. Data was also collected through analysis of relevant documents (e.g. policy documents, reports, academic papers) and field observation to supplement survey data and identify the preparedness measures by government agencies.

The period of collecting data at Phi Phi Island was two weeks, from April 1 to 16, 2016, which is over 11 years following the 2004 IOT. Each research method in this study will be discussed in the following sections. Moreover, it is important to note that to carry out this study with the residents in Phi Phi Island was guided by the ethical principles on research with human participants set out by Auckland University of Technology Ethics Committee (AUTEC). The approval from AUTEC was granted on March 11, 2016 (See Appendix A).

3.4.1. A questionnaire survey

The questionnaire survey was chosen because it has been successfully applied in many research projects to evaluate hazard preparedness among the public. Some successful examples are demonstrated as follows: the survey on flood risk reducing behaviour of public officials along the Rhine river in German (Becker et al., 2012); the survey on tsunami preparation among the residents in Alaska (Paton et al., 2008); and the investigating of community residents' preparedness to flood risk in Italy (Miceli, Sotgiu, & Settanni, 2007).

In this study, a questionnaire survey with the combination of both close- and open-ended questions was used as a research method. The questionnaire survey administrated in Phi Phi Island contained a total of 24 questions. The questionnaire is presented in Appendix B. The questionnaires were comprised mainly of close-ended questions, with a few open-ended questions that allowed the participants to freely share further views giving better understanding of their stories, beliefs, reasons, and barriers underlying their preparedness for tsunami (Creswell, 2003). The standardised questionnaires from previous studies, including Becker et al. (2012), Couling (2014), Krongkant and Ahmad (2010), and Pishief (2007), were carefully considered and modified into the context of Phi Phi Island. The researcher chose and adjusted the questions to fit with the local context in terms of the preparedness measures, cultures, and the reality based on using the information from literature reviews, physical visit, plus the knowledge of the researcher because she is a Thai. For example, the preparedness measures in the questions were designed to ensure consistency with what the Thai government agencies promoted to the local community. Applying the adjusted pre-existing questionnaires is useful, as the questions have been already tested for their reliability (Bird & Dominey-Howes, 2008; Mathers, & Hunn, 2009; Siniscalco & Auriat, 2005). Moreover, the questionnaire design process of this study underwent supervisor's examination to ensure that the questions were carefully selected and to eliminate any faults in questionnaire design. The researcher kept in mind that the quality of questionnaire design can affect the quality of the research data. Vague questions can result in unintentional answers (Oppenheim, 1992).

3.4.1.1. Questionnaire design

The question list was divided into three main sections. The first section consisted of six general questions to gather demographic information from the respondents and two questions asking if they had experiences from the last tsunami. In the second section, there were three questions. The residents were asked about their risk appraisal which

were evaluated on Likert scale questions about the perception of future tsunami hazards likelihood and severities. In the third section, there were 10 questions. The respondents were asked if they adopted any of the listed preparedness activities (e.g. searching for tsunami information, following tsunami news, participating in tsunami drills, storing emergency supplies, preparing emergency getaway kits, and having family emergency plan), and how they perceived tsunami preparedness. In this section, there were also spaces for the respondents to freely leave comments about the reasons underlying their behaviours. Furthermore, there was one question asking the respondents for the recommendations to foster better preparedness of local people respectively.

The questionnaires were translated to Thai language by the researcher and proof read by a Thai person. Moreover, before the beginning of data collecting process, the questionnaires were tested with two local residents to ensure that the language used in the questionnaire was easy to understand by local people who may have limited literacy. It is important to ensure that everyone can be involved in the research including those with limited literacy. It was found that this pilot test was very useful to ensure that the questionnaire would fit with the local context, many vague descriptions in the questions were found and minimised. After the pilot test, the Thai language used in the questionnaire was adjusted to the level that those local residents (same people from the pilot test) could comfortably understand.

3.4.1.2. Selection of community people

The researcher began by informing the head of village about conducting the particular study in Phi Phi Island on the first day of her arrival; thus showing respect according to Thai norm and culture as well as to build trust at community level (Pimpa, 2012). It is noted that there was only one village in the study area. At this meeting, concerns related to possible risks to participants such as privacy, confidentiality, and cultural sensitivity were discussed. After the discussion, the head of the village took the researcher around the village and introduce her to most of its community members. The personal contacts made with the key local government agency considerably assisted the researcher to cooperate with, and participate in the community.

During the first few days after arrival to Phi Phi Island, the researcher spent time visiting the tsunami-affected and surrounding areas. Additionally, she participated in community activities such as having food and snorkelling with locals. This was for her to gain an understanding of the community that she was about to 'work' with, and make people feel familiar to her which positively affected their trust and rapport. The lack of understanding in cultural values of participants could potentially hamper and limit the

capacity of the research (AUTEC, 2014). Moreover, the researcher went to the Local Disaster Prevention and Mitigation organisation in Krabi province in order to get information on how the agency encourages the local population to be prepared for tsunami and get a better understanding of the preparedness policy in place.

In terms of recruiting the participants, the head of the village offered assistance to provide participants for the research. However, the researcher decided to utilise a random sampling method as established per the study plan. Random sampling was seen as the most suitable sampling technique in this study. It allowed every resident to have an equal chance to be selected (Mathers, Fox, & Hunn, 2009). Moreover, it could also eliminate any bias which may result from the head of the village. With the random sampling method, the researcher ensured that the invited residents volunteered to take part on their own, and not be forced by any influences which may affect the research results. Without the participants' own accord, it may result in unintentional or unreal answers (Siniscalco & Auriat, 2005).

To recruit participants, the researcher requested the population name list in Phi Phi Island from the department of house registration. However, this process of recruitment was not successful because a number of local residents had moved out from the island after the 2004 IOT. From the house registration data, there were around 1,300 people living in Phi Phi Island, of which the head of village suggested that there were probably 200 original local people living in the study area. Thus, the researcher randomly contacted local people instead. The researcher minimised the bias on how she selected people by randomly selecting the location of their house in the study area map, before doing personal interaction (Mathers et al., 2007).

In this study, 10 percent of the local residents in the study area (20 people) were invited to participate in the survey. There were two criteria in recruiting samples: (1) the participant needed to be a permanent resident living in the affected areas from 2004 tsunami (within the red frame in the map, Figure 3-2, p. 29), and (2) aged 20 years or over. The 20 residents who met with such criteria were invited to take part in the research and provided with information sheet and consent forms. This study mainly focused on the perspectives from the community people. They were allowed to share their information and concerns regarding tsunami risk preparedness. Permanent residents who work in emergency management, including local authorities, were excluded from the questionnaire survey because they may hold a biased point of view towards the subject matter. Moreover, other vulnerable people, including tourists and labour migrants, were not involved in the present research due to time constraints of this dissertation.

All potential participants were fully informed about all aspects of the research including the objectives of the study, potential risks, benefits and how their confidentiality, as well as how their responses, would be protected and used, through the information sheet (Norris, 2006). The information sheet and the consent form of this study are presented in Appendices C and D respectively. Moreover, the researcher also made clear that consent was entirely voluntary. The potential participants were given seven days to decide whether or not to participate in the study (AUTEC, 2014). These processes were to ensure that voluntary participants are treated with respect and in partnership, which fits with research ethics (AUTEC, 2014; Jastone, 2006).

3.4.1.3. Data collection procedures

After the participants agreed to take part in the study, by returning the signed consent form to the researcher, the process of gathering data from the participants began. The researcher arranged one-to-one meetings with each participant at a time that was convenient to them. The nearest coffee place for them was proposed to be the meeting point due to safety reasons for both the participants and the researcher. However, the most suitable location and time for each participant was chosen.

On the meeting date, the participants were asked to answer the questionnaire-based survey. The researcher read the structured questionnaires and wrote down the answers for them. The participants could choose to self-administer if they would like to. However, all participants chose to have the researcher write down the answers for them. This approach worked effectively for the participants as they could ask for clarification when they did not understand the questions. It significantly helped some participants who may have had limited literacy skills regarding reading and writing. Moreover, the response rate was high.

The questionnaires and all communications between the participants and the researcher were conducted in Thai language, which is the first language of both participants and the researcher. This was significantly helpful as using Thai language helped the researcher to build rapport and trust among community members. Every interview went well and the participants felt comfortable to talk and ask the researcher when some questions were not understandable for them.

To complete the questionnaire of this study it took each participant approximately 30 minutes, with further time, around 10 minutes, required to verify the answers. During the session, some participants experienced negative flashbacks regarding loss of family members in the past tsunami event. Some people became upset, quiet, or angry.

Therefore, the researcher offered a break and waited until they were ready to be interviewed for the rest of the questions. Most of the participants who experienced discomforts during interviews felt better after a few minutes break. None of them decided to withdraw from the study.

At the completion of the data collecting, the researcher presented a token of appreciation of their contribution in this study. This is recommended in AUTECH as the way to present a mutual understanding between two parties. However, it is important to note that the participants were not informed about any gifts until the end of the engagement of each participant. By doing this, it eliminated the chance of the gift to be seen as coercive (AUTECH, 2014).

3.4.2. Field observation

The field observation method was undertaken to supplement the data from other methods. By participating in field observations, this useful method allowed the researcher to observe the reality of tsunami preparedness among the community (Mulhall, 2003). This particular method was used to help the researcher develop more insight from the local context, particularly to understand how people live with tsunami risk and how the tsunami preparedness measures by the government were fitted in local people's lives.

During the first three days that the researcher used to develop trust and rapport with the community, the researcher also took the particular opportunity to observe the preparedness measures in Phi Phi Island for the first time. The researcher went across the study area within three days looking at what measures had been taken and how they fitted into Phi Phi Island context. In this phase, taking photos and notes was used to document the field observation. In the second week, the researcher repeated the visiting route to ensure that a deep understanding of the area and community was developed and to ensure that all the areas covered in this study scope had been visited.

It is important to note that the researcher intended to use this method to observe preparing measures to tsunami and potential barriers towards being a tsunami well-prepared community. During observation there was no interaction between the researcher and people in order to collect research data; therefore consents were not required (Mack et al., 2005; Mulhall, 2003).

3.4.3. Analysis of relevant documents

Relevant policy documents, reports, academic papers, and lesson learned documents were analysed as part of the data collection process. This method was conducted to find the information regarding the preparedness measures that the government has adopted

in the tsunami-affected areas since the 2004 IOT. The documents were chosen based on their content and relevance to the research. Only the documents which had information about the Thais' mitigation and preparedness to tsunamis, taken after the 2004 IOT, were used. Four documents were mainly used as data; the first two documents were the Disaster Risk Management Strategy (DRM) Plan of the Department of Disaster Prevention and Mitigation (DDPM). While, the rest of the documents were the academic paper documents of Stockholm Environment Institute: (1) the report of Disaster Reduction and Tsunami Early Warning Systems in Thailand: a case study on Krabi province (Thomalla et al., 2009) and (2) Comparative Destination Vulnerability Assessment for Khao Lak, Patong Beach and Phi Phi Don (Calgaro et al., 2009). After the researcher read these documents to gain understanding regarding tsunami preparedness by the government agencies, key information was printed and then highlighted with colour pen according to themes identified in this study. This information was then used in the data analysis process.

3.5 Data Analysis

A sequential mixed analysis was used to analyse the research data in order to answer the research question. Firstly, the data collected with the questionnaires were analysed using simple descriptive statistics, particularly "Microsoft Excel" because the number of participants was small.

Moreover, a Thematic Analysis (TA) was used to analyse and make meaning across a two dataset from questionnaire survey and other research methods. TTA is applied to analyse the qualitative data from the questionnaires and other study methods, because it is the most common analysis method for a qualitative research which is flexibly used in analysis information across many sets of data (Braun & Clark, 2006). With TA, the researcher began with reading the existing literature followed by the data collected. These documents were repeatedly read in order to become familiar with them and develop the understanding of the dataset. During this phase, the researcher highlighted the repeating words. After a good understanding of the data was gained, the researcher coded the data manually into related groups based on repeating words and content. Once all data had been organised into groups, the researcher started to analyse and think how each group of data correlated, searching for data themes by linking back to the literature review. Herein, the themes were the factors influencing people' preparedness behaviours (e.g. perception to tsunami, prior experience to tsunami, outcome expectancy, preparedness measures by the governments). It is noted that one

disadvantage of TA is that it was time consuming, as the researcher had to read the data over and over until she could get a clear understanding of the data.

3.6 Chapter Summary

In regards to the study interest on how the 2004 IOT had shaped the tsunami-prone local residents' and organisations' targeting preparedness, the pragmatic paradigm was employed as the research framework. A questionnaire survey was applied as the main research tool. Additionally, field observation and the study of policy documents, reports, and academic papers, was undertaken to facilitate a questionnaire survey leading to a better understanding of tsunami preparedness in Phi Phi Island. In this study, a few criteria about the study location and recruiting participants were set due to time constraints: only 20 square-kilometre of the tsunami affected area in Phi Phi Island and only 20 permanent residents were included. Twenty participants represented approximately 10 percent of the residents living in the study area. The participants were not randomly chosen from the house registration because many local residents had move out from Phi Phi Island but their names still remained in the house registration; instead random sampling from the map was applied. Collecting data with the participants of this study was carried out in an ethical way, guided by AUTECH, who granted study approval in March 2016. The statistical data were analysed using simple statistics particularly "Microsoft Excel"; the qualitative data were analysed using TA which helped the researcher to analyse the data across different datasets and approaches under the study's goals. The next chapter will present the findings of this study.

4 Findings

4.1 Introduction

Phi Phi residents are living with tsunami risk. However, very little is known about their preparedness to this particular hazard. The present study is an attempt to identify, about 11 years after the 2004 tsunami, what elements affect local people's preparedness behaviours. It also aims to investigate what measures the government agencies have taken, since the IOT event, to promote preparedness at local community level and if those measures contribute to tsunami preparedness. The previous chapter explained how the questionnaire survey, field observation and document analysis were applied for obtaining deep insights about preparedness on Phi Phi Island. This chapter will present the data collected within the research process. This chapter is divided into four sections. Section 4.2 presents demographic characteristics information about the participants. Section 4.3 will present how well the population in Phi Phi Island adapted to tsunami preparedness measures. In this section, data regarding the elements influencing people's preparedness, including those sociodemographic characteristics, will also be presented. In section 4.4, the preparedness measures provided by the government agencies will be identified. The last section is the summary of this chapter.

4.2 Demographic Information

The questionnaire survey was conducted with 20 local residents which represents 10 percent of the local people living permanently in the study area. None of the participants worked in the Department of Disaster Prevention Mitigation or any organisation relating to managing tsunami hazards. The sociodemographic characteristics of participants are described in Table 4-2 (p. 37). The portion of male and female respondents was equal. All of the participants were adults.

In regards to education level, a majority of the participants (70%) had attended secondary school, 15 percent had professional certificates or diploma, 10 percent had a university degree and only one participant had no formal education. Results indicate that 90 percent of participants worked full-time; 40 percent were employees, 50 percent were self-employed. Only 10 percent comprised housewives.

Based on tsunami experience, 19 out of 20 participants (95%) had prior experiences from the 2004 tsunami which 17 respondents (85%) reported involvement with direct loss. Only 2 respondents had indirect experiences. Only one participant had no tsunami experience.

With respect to family composition, one respondent was living by himself, four respondents (20%) were living with family without children, 13 respondents (65%) were living with family with children, and two respondents were living with flatmates.

4.3 Adoption of Preparedness Behaviours to Tsunami

In facing the tsunami risk, the residents on Phi Phi Island have displayed a wide range of preparedness adjustments since the 2004 tsunami. Table 4-1 represents the frequencies of specific preparedness behaviours adopted by participants.

Table 4-1 Percentage of response to tsunami preparedness measures

Preparedness	Percentage
Searching tsunami information	40
Following the tsunami updates	90
Participating in the drill	35
Know how to respond to tsunami hazards	100
Prepared emergency supplies: food, water, medicine, etc.	65
Prepared personal getaway items	80
Prepared family emergency plan	75

Table 4-2 The percentage of adaption to tsunami preparedness measures presented by participants' characteristics

Variables	Percentage of samples	Percentage of adaptation to 7 mentioned preparedness measures
Gender		
Male	50	66
Female	50	71
Education		
No education	5	71
Secondary	70	72
Certificate	15	70
University	10	50
Occupation		
Self-employed	50	67
Full-time	40	66

housewife	10	86
Tsunami experiences		
Yes	95	68
No	5	71
Living Status		
Alone	5	86
With family	85	70
- have children	65	70
- no children	20	68
With friends	10	50

The participants in this study, regardless of sociodemographic characteristics, adopted at least three out of the seven preparedness activities (percentage of adoption to preparedness measure is 43%). The average of adoption to preparedness is 5 measures (71%). According to sociodemographic characteristics of participants (Table 4-2), the female participants tended to demonstrate more preparedness behaviours than male participants (71% versus 66%). The finding is consistent to the past study of Jonkam and Kelman (2005), who explained that women are likely to have higher risk perception and take risk precaution more seriously than men.

Results showed that education factors did not lead to significant differences in being prepared for a tsunami. Findings revealed that people with low to no education attainment engaged themselves with preparedness measures (71%), similar with the participants who had a secondary school degree (72%) or a professional certificate (70%). In contrast, the participants with a university degree took only 50 percent of all preparedness activities, indicating the level of their adoption is less than others.

Based on occupation status, it seems that people who were either self-employed or employed full-time prepared less than people who did not have work. From the results, the participants who were housewives demonstrated high preparedness (86%). It can be reflected that having available resources, particularly time availability, may positively result in better preparedness behaviours, as suggested by Becker et al. (2012). According to the results, people with more free time prepared for a tsunami hazard more than those who have less time available. The sense of business ownership did not make significant differences in preparedness behaviours. Self-employed participants adopted tsunami preparedness measures similarly to people who work as a full-time employee (67% versus 66% respectively).

Results indicated that having prior tsunami experience led preparedness behaviour of residents to both positive and negative outcomes. Some of the participants with tsunami experience took many preparedness measures for a future tsunami. On the other hand, many of the participants presented low level of preparedness. The average of preparedness adoption of the participants with prior experience to tsunami was 66 percent, which was lower than people who had no tsunami experience (71%). However, the absence of any tsunami during the past decade may have negatively reduced the residents' perception of risk. This is reflected in the statement of two participants who said:

"In the past, there were many tsunami waves occurring but the waves were small unlike the 2004 tsunami. So I think if a tsunami happens again, it would be a moderate one which is not as severe as in the past."

"A tsunami is too devastating to think about."

To evaluate the perception to tsunamis, the participants were asked to estimate the possibility and consequence of a future tsunami. The results are presented in Table 4-3. Results showed that only 20 percent of them perceived that a tsunami could happen anytime in this year, most of the respondents (90%) thought that a tsunami could occur in their community again in the future. However, some participants perceived the tsunamis likelihood in an optimistic way. One participant commented: *"A tsunami will never happen again."*

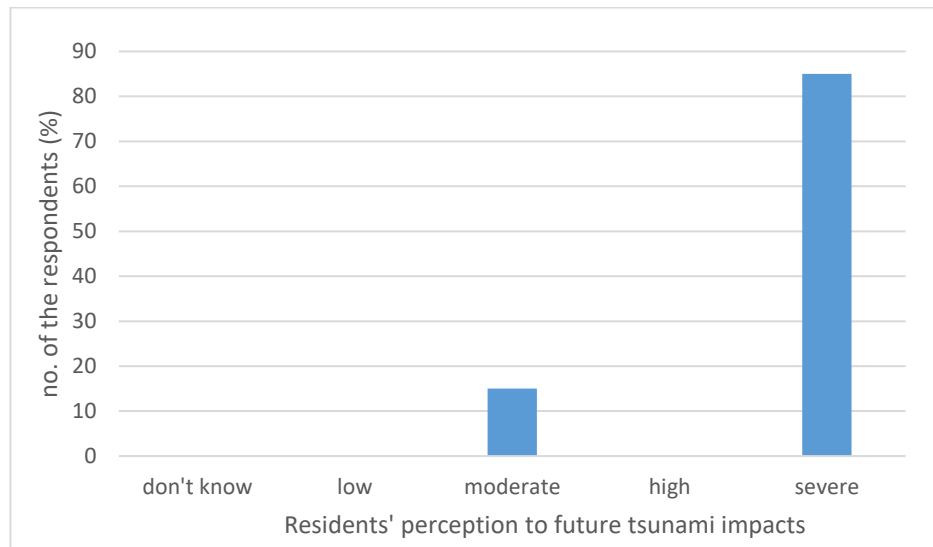
Table 4-3 The perception of the local residents to future tsunami's likelihood

	The number of responses	Percentage of the responses
this year	4	20
1-10 years	3	15
10-100	11	55
>100	0	0
never	1	5
don't know	1	5

In terms of tsunami's consequences, most of the participants (85%) perceived that the impacts of a future tsunami can be severe (Figure 4-1). However, another 15 percent of the participants perceived that the consequence of a future tsunami may be just moderate. In some residents it was found that their personal belief in God could reduce their perception to tsunami. For example, one participant said:

“Tsunami is the act of God, and God already punished us quite hard in 2004, so he will not punish us that bad in a soon future.”

Figure 4-1 The perception of the local residents to future tsunami impacts



Apart from the risk perception and sociodemographic characteristics, outcome expectancy is one of the important elements of preparedness behaviours (Paton et al., 2008). Scholars identified that people who positively believe in the effectiveness of being prepared tend to engage themselves with preparedness behaviours. However, people are unlikely to prepare for hazards if they think that being prepared would not benefit them (Lion et al., 2002; Paton, 2003; Paton et al., 2008). In this research, the participants mostly demonstrated a positive outcome expectancy. When participants were asked if those mentioned preparedness measures in section 4.3 are generally useful, the majority of the respondents (75%) answered “yes” and 20 percent answered “not sure”. Only one participant answered “no” and commented as following:

“I have direct experience with the tsunami, I know what a tsunami is, what its nature warning signs are, and what to do in time of tsunami. Therefore, I do not need to search for more information. I just need to follow the updates from local authority and news of tsunami from media, which I do... Moreover, in the reality my life is more important so he would rather evacuate quickly than taking anything with him.”

Findings on residents’ outcome expectancy showed that up to 20 percent of the participants were not sure about the benefits of adopting preparedness measures. Additionally, it is found that the direct experience of the 2004 tsunami increased

participant confidence in their knowledge of how to deal with a future tsunami. As a result, the participants saw that taking further preparedness was not going to benefit them.

Moreover, it was found that being well-prepared had different meanings among the participants. From the survey, when the participants were asked to rate their performance of being prepared to tsunami using four scales (not prepared, low, moderate, well), most participants rated themselves as being well-prepared to tsunami, even if they had engaged themselves less than the average number of preparedness activities. Table 4-4 indicates that most participants adopted five tsunami preparedness activities out of seven activities (71%). There were eight participants who adopted preparedness measures lower than the average, in which almost half of these participants (3 out of 8) believed that they were well-prepared for tsunamis. The result may imply that the meaning of preparedness may be interpreted differently among the residents, as some people might feel safe after taking just three preparedness measures. The vague meaning of “being ready” for a tsunami may limit the preparedness behaviours of the residents.

Table 4-4 The degree of adaptation to preparedness measures

The adaptation to preparedness measures	The number of the participants	Percentage of the participants
involved with 1 activities	0	0
involved with 2 activities	0	0
involved with 3 activities	2	10
involved with 4 activities	6	30
involved with 5 activities	7	35
involved with 6 activities	4	20
involved with 7 activities	1	5

In this section 4.3, personal and social factors were investigated to determine if these factors could positively or negatively affect residents’ preparedness behaviours. In the next section, the influences from institutions, particularly government agencies, will be studied. The mitigating and preparedness measures for a tsunami will be identified; however, in depth analysis of the relationship between the institutional influences and people preparedness behaviours will be described in the next chapter.

4.4 Tsunami Mitigation and Preparedness Measures by Government Agencies

Before the 2004 tsunami, the Thai population had never prepared for any tsunamis. Indeed, Thailand had never expected or experienced tsunami hazards before such an event (DDPM, 2011; Thanawood et al., 2006). However, after the lesson learned from the disastrous 2004 IOT, many measures were undertaken targeting the tsunami affected areas in order to prevent and mitigate the impacts from a future tsunami. In this study, five improvements in preparedness measures by the government agencies are focused on and described in the following sub-sections.

4.4.1 Community involvement

Thailand became a member of the Indian Ocean Early Warning System and also signed in the Memorandum of Agreement between Thailand National Disaster Warning Centre (NDWC) with the United States of America for the technical operation in tsunami system analysis and tsunami warning. Thailand also cooperated with many international organisations such as the Japan International Cooperation Agency (JICA), United Nations Development Programm (UNDP), Asian Disaster Reduction Centre (ADRC) and many other private sections in order to manage risks (DDPM, 2011, Larsen et al., 2011).

At first, a top-down approach, which was the traditional approach in DRM, was used in managing tsunami risk. The department of Disaster Prevention and Mitigation (DDPM) at a provincial level played an important role in locating funds and providing a DRM framework to their suborganisation. Tum-bon Administration Organizations (TAOs) were empowered in managing the risks in the areas. These sub-district administration organizations were empowered in managing the hazards in their responsible area. A TAO in each sub district is a primary organisation which was, and is still, responsible for community prevention and relief; thus playing a significant role in DRM including promoting preparedness at community level (Thanawood et al., 2006; Thomalla et al., 2009).

However, after 2006, a CBDRM, or bottom-up approach, has been encouraged in Thailand (DDPM, 2006). Within a CBDRM approach, community members aimed to promote people's involvement in the planning and coordinating in regard to warning, preparing, responding to, and mitigating tsunami hazard (Virapat, n.d.). Search and rescue teams in each sub-district, known as 'One Tambon One Search and Rescue Team' (OTOS) were established. Each Tambon (sub-district) in Thailand had to set teams that comprised 10 local people to join the training in order to enhance local community capacity to deal with emergencies (DDPM, 2006). Local government executives were also required to attend a training course in disaster prevention and mitigation. In 2008, there were 4,474 OTOS out of 7,255 Tumbon. Moreover, many

tsunami training for public are regularly set up in order to increase people's preparedness and ability to deal with tsunami hazards (DDPM, 2006; Suwanmolee, 2009).

4.4.2 Tsunami warning systems

Thailand had established the department of the National Disaster Warning Centre (NDWC) for improving data collection and acting as the centre for disaster warning in Thailand; along with a key role played by the Thai Meteorological Department (TMD) (Suppasri et al., 2015; Srivichai, Supharatid, & Imamura, 2007). The warning system of Thailand can be issued to the risk area within five minutes of an earthquake occurring. In Krabi province, 20 Early Warning Towers (EWT) were installed, in which two of them are located on Phi Phi island (one in Ton Sai Bay, another one in Loh Dalum Bay) (Calgoro et al., 2009; Thomalla et al., 2009).

From the documents, during the last 10 years many false alarms of EWT occurred on Phi Phi Island (Calgoro et al., 2009; Petty, 2010; Thomalla et al., 2009; Xinhua, 2005). A "false alarm" indicates any warnings caused by technical failures. When the participants were asked what they felt of the false alarms in the past, the survey demonstrated that a majority of the respondents (60%) did not lose trust in tsunami warning systems. They felt safe when they have tsunami warning systems in place. However, three respondents felt that the tsunami warning systems were not trustworthy. Additionally, other five respondents (25%) held what is termed an unrealistic belief that a tsunami was less likely to happen.

Table 4-5 The feeling to the past tsunami false alarms

The feeling of false alarms	Number of participants	Percentage of participants
Earthquake definitely happen but it was not strong enough to generate a tsunami	12	60
A tsunami was less likely to happen	5	25
Tsunami warning systems are not reliable	3	15

Results from the present study indicated that the TEWS presented considerable impact on people's perceptions towards tsunamis and preparedness behaviours. Due to the distrust in TEWS, up to 20 percent of the participants would not evacuate immediately if the tsunami warning is issued. These participants acknowledged that they would check first if they needed to evacuate. Another 10 percent answered "no" that they would not evacuate (Table 4-6).

Table 4-6 Evacuation Intention

Evacuation intention	Number of participants	Percentage of participants
yes, I will immediately evacuate	14	70
yes but I will ensure of evacuation warnings first	4	20
no	2	10

Apart from false alerts, the challenges due to the effectiveness of the two TEWS were evident during the conduct of the questionnaire-based survey. A few participants raised the concern that they did not hear the TEWS sound during the inspection. Such issues are reflected in the following quotes:

“Tsunami warning systems were tested in just a few days before this interview, but I did hear any sound from tsunami towers...”

“I don’t think that I can rely on the TEWS, they always generated false alarms. Last two days, I heard announcements that the authority would test the sound alarm of Tsunami Early Warning Systems here, but honestly I never heard anything until today.”

The problem with the effectiveness of the TEWS was found in 2009. Thomalla et al. (2009) had mentioned this problem in their vulnerability assessment study in Krabi Province. They found that the two EWT in Phi Phi Island were installed and owned by different organisations. The first one was installed by the NDWC, whereas the second was installed by the Krabi Governor. This was because the warning towers installed by NDWC do not cover all of the inhabited area in Krabi. The fragmented ownership resulted in communication and maintenance issues. As a result, this created some serious concerns related to the effectiveness and reliability of TEWS in Krabi province.

Similarly, Calgaro et al. (2009) described the problem regarding the unreliability of the TEWS in Krabi Province explaining:

Many of the warning towers in Krabi Province are considered unreliable. Of the six Krabi communities the Thai Red Cross is working in, only one has a warning tower that is operational. There are also instances of damage through lightning, for example, at Ban Thalane, theft and vandalism. (Thomalla et al., 2009, p. 20)

In the past, at least two tsunami false alarms were evidenced. The result of the false alarms used to frighten people and even resulted in injuries due to panic evacuations (Calgaro et al., 2009; Petty, 2010; Thomalla et al., 2009; Xinhua, 2005). Overall, both the present study and findings from other researchers highlight the insufficient support from government agencies involved in DRM. As a result, the unreliability of such systems seems to reduce the trust of local people in TEWS and likely decreases local residents’ perception and preparedness to tsunami, particularly evacuation.

4.4.3 Tsunami warning signs

Following the 2004 tsunami, tsunami warning signs and maps have been installed in the six provinces that were affected by the event. In some areas, evacuation buildings were built (Suppasri et al., 2015). In Phi Phi Island, the warning signage of tsunami hazards could be seen in most areas. However, there were some problematic issues regarding such tsunami signs. For example, one participant said:

“I do not trust in those preparedness prepared by the government. The tsunami signs and evacuation routes were also insufficient and inadequately maintained by the governments...I raised this issue to the head of the village so many times, however, nothing had been fixed.”

The problems related to tsunami warning signage were noticed during field observation. Firstly, there were tsunami warning signs in most areas, but many of them were in poor condition; for instance, the colour of some signage was gone (Figure 4-3).

Figure 4-3 Insufficient tsunami warning signage



Moreover, many warning signs were hindered by obstacles from local shops, which made them difficult for people to see, as evidenced in Figure 4-4 (p. 46).

Figure 4-4 The obstructed tsunami warning signage



The evacuation routes were also not in good condition. Field observation revealed that the evacuation route signs were poorly maintained. Some evacuation routes were impractical, as they were blocked by either natural (Figure 4-5) or manmade barriers (Figure 4-6, p. 47). In the wake of a tsunami, these obstacles may lead to difficult evacuation.

Figure 4-5 The obstructed tsunami evacuation route No.1 in Phi Phi Island



Figure 4-6 The obstructed tsunami evacuation route no.2



The problem related to tsunami warning signs in Phi Phi Island were also evidenced by Thomalla et al. (2009) who emphasised:

Communities in Krabi Province have voiced concern over the inappropriateness of designated evacuation routes and safe places, and the inadequacy of signage that has been erected following the 2004 tsunami... On Phi Phi Island, we found many examples where tsunami escape signboards are obscured or hidden by buildings making it difficult for people to see them. Also, the escape route painted on the street of Phi Phi Island has either faded or has entirely disappeared. (Thomalla et al. 2009, pp. 21-22)

Overall, results indicate that many preparedness measures and resources seem to be lacking or poorly maintained by government agencies. Therefore, the present findings question if the residents in Phi Phi Island have received adequate and sufficient supports from the government agencies in order to be prepared for a future tsunami. This may be another rooting factor which hinders the residents' preparedness for tsunami.

4.4.4 Tsunami evacuation facilities

The DDPM's strategy plan year 2012-2016 identified that each district had to set up simulation of emergency and evacuation drill at least once a year (DDPM, 2011). The head of each sub-district had to support the population in his/her area to prevent and mitigate risk. The DDPM (2008) described that each district would receive a budget for managing hazards which would cover approximately 45 Bath (just under US\$2) per resident. In Phuket, evacuation drills were proposed to be set up two times a year in

several areas (Sivichai et al., 2007). However, a few of Phi Phi residents identified that the evacuation drills had not been hosted in Phi Phi Island for a while, while other tsunami workshops were always set up in the main land. Moreover, some residents also mentioned that:

“I did not have time to participate in drills in main land because of being busy working”

“It is far to join the drill and I also had to take one day off work...”

The difficulty in accessing tsunami information resources may be one of the great barriers which prevent Phi Phi residents from being prepared for tsunamis.

Since the 2004 tsunami, one evacuation building was built in Ban Nam Kem and Khoa Lak in Phang-nga which was the most affected by the tsunami (see Figure 4-7) (Srivichai et al., 2007; Suppasri et al., 2015). However, no evacuation buildings are found in Phi Phi Island. Again, such findings suggest the lack of support from government agencies in order to reduce the risk of disaster and questions the effects of this on the preparedness and vulnerability of local communities.

Figure 4-7 Evacuation building in Khao Lak, Phang-nga



Source: Srivichai et al. (2007)

4.4.5 Direct communication lines

In Phi Phi community, it was observed that the direct communication lines were installed only in the central areas which has four speakers pointing in four different directions (Figure 4-8). However, there were some concerns raised about the effectiveness of communication if a tsunami would occur. Importantly, it was observed that the Phi Phi

Island community was compacted with a number of hotels, shops, restaurants, and tourists. Some pubs and restaurants opened until late night. Therefore, those noise disturbances from bar and restaurants which generally operated both day and night may interrupt the announcement. As a result, some people may not hear the warning which could potential lead them to harm. This concern related to the communication lines was raised in 2009 (Thomalla et al., 2009).

Figure 4-8 Tsunami early warning towers and sirens



4.4.6 Land use plan

Land use planning is a key aspect of disaster preparedness, including for tsunamis. After the 2004 tsunami, land use guidelines have been introduced to the six tsunami-affected provinces (Paphaasit, Chotiyaputta, & Siriboon, 2006). Many of the local community people were not allowed to return to their original land due to safety reasons. The government encouraged local people to move inland where they are not at high risk of tsunami.

In Phi Phi Island, the government agencies built new houses for local people on the mountain and called it Tsunami village. The government also developed the framework for land use, categorising areas based on activities and the geographical features to control the development in tsunami affected provinces in order to minimise the consequences which may affect lives and construction from a future tsunami. However, the implementation of the plan was not successful due to the protest by the local people (Paphaasit et al., 2006; Srivichai et al., 2007). Srivichai et al. (2007) noted

that some tsunami survivors got smaller houses in smaller lands and, as a result, some of their family members had to live in separate houses. Therefore, the surviving residents protested against the land use guideline. So the guideline was not successfully applied in Phi Phi Island. During field observation, the new commercial buildings under construction were almost completed (Figure 4-9, p. 51). Moreover, there were a number of hotels, small shops, and houses located across the study. Some accommodations were close to the beach (Figure 4-10, p. 51). From the findings, it may be implied that the government support, in terms of resettlement, may not fulfil what people need to live their lives. As a result, there are still a lot of people living within the tsunami risk area. This may also imply that a community based approach in Phi Phi Island needs to be strengthened in order to obtain better understanding of how to integrate people's livelihoods with tsunami risk management. It is noticeable that people in Phi Phi Island rely heavily on the tourism industry in the tsunami risk area.

4.4.7 Tsunami education materials

After the tsunami in 2004, the Thailand NDWC distributed tsunami materials, namely CDs, books, and pamphlets to local people, students, school teachers, and tourists through DDPM (Srivichai et al., 2007). The materials were in both Thai and English languages and distributed in Phuket and Phang-nga (Figure 4-11, p. 52). However, no evidence was found in Phi Phi Island during the field observation. Even though the researcher went to DDPM in Krabi and asked for those materials, the provincial DDPM did not have any available. The DDPM in Krabi only had the tsunami mitigation plan version for government agencies. Moreover, none of the tsunami information materials were found on Phi Phi Island. Such barriers could hinder people from accessing tsunami information source as well as being prepared for tsunamis.

Figure 4-9 New commercial buildings in Phi Phi Island



Figure 4-10 The sample of the accommodation along the beach



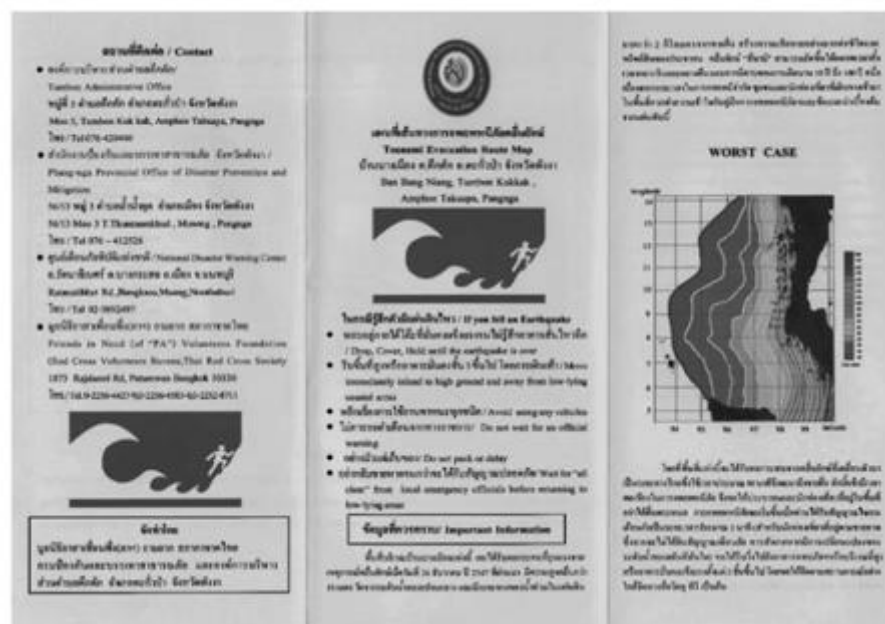
Figure 4-11Tsunami public information in Phuket and Phang-nga



(a) Tsunami book



(b) Tsunami CD



(c)Tsunami pamphlet

Source: Srivichai et al. (2007)

4.5 Chapter Summary

This chapter has described the results of the data which were collected from the 20 participants living on Phi Phi Island, using questionnaire survey complemented by field observation and the study of policy documents and academic publications. The findings indicated that the majority of 20 local residents have high awareness and high perception of tsunami risk. Every participant took preparedness measures (at least three out of seven mentioned activities). It seems that the participants' preparedness behaviours are associated with risk perception, prior tsunami experience, and perception to preparedness measures. People with different prior experience presented with different

perceptions to tsunami resulting in various preparedness behaviours. Not all participants with direct experience performed high levels in adoption of tsunami prepared measures; some of them received negative effects from their 2004 IOT experience, which increased the residents' confidence in their ability to cope with tsunamis resulting in decreasing in preparedness intention.

Many participants demonstrated the barriers to their preparedness such as optimistic bias and fatalism, which arose from their perception to tsunami hazards. Moreover, it was found that up to 30 percent of the participants have negative outcome expectancy to preparedness measures which may decrease in people's intention in taking preparedness.

The demographic background, such as education background, gender, and living conditions (living alone, with family, have child or no children), did not contribute significantly to preparedness behaviours of Phi Phi people. Whereas, the sense of family bondedness and available resources seemed to considerably affect the decision making of the participants as to whether or not to take preparedness actions.

The measures that the government agencies have done for promoting the preparedness of the local community after the 2004 tsunami were explored. After the 2004 tsunami, CBDRM, tsunami warning systems, tsunami warning signage, and land use guidelines, as well as tsunami information material, were introduced to the affected areas aiming to promote the preparedness and reduce the vulnerability of the local community to a future tsunami. However, this study found that many challenges regarding preparedness measures undertaken by the local agencies presents barriers to local people from taking tsunami preparedness. The in-depth interpretation and analysis of these research results, as well as recommendations from this study, will be discussed in next chapter.

5 Discussion

5.1 Introduction

In 2004, Phi Phi Island was hit by one of the most devastating tsunamis in human history. Today, people living on Phi Phi Island are still at tsunami risk due to their geographical location. This is why promoting preparedness for tsunami to local people is an essential, yet challenging task. This study was designed to understand, more than 11 years after the 2004 tsunami, the preparedness of local people to a future tsunami, as well as the elements guiding such preparedness. This research tried to understand how local people's preparedness to tsunamis could be improved. Lastly, it also attempted to identify what preparation measures the government agencies had equipped for the residents in the risk area after the 2004 tsunami. Data were collected through three research tools including a questionnaire survey and field observation undertaken on Phi Phi Island from the April 1 to 18, 2016 as well as an analysis of relevant documents (e.g. policy documents, reports, academic publications). In this chapter, the findings of this study will be compared with the existing literature and discussed thoroughly.

This chapter is divided into four sections. Section 5.2 will discuss how prepared local people in Phi Phi Island are since the 2004 tsunami and what elements are underlying their preparedness behaviours. Section 5.3 will identify what preparedness measures have been undertaken by the government agencies and what measures could be done in order to increase the preparedness of local people regarding tsunamis. In this section, the obstacles from those measures to the residents' preparedness will be discussed in order to make recommendations for improving their preparedness to future tsunamis. The conclusion of this study will be reflected in section 5.4, to highlight the key information from this study and point out the recommendations for actions. Lastly, the limitations of the study and the recommendations for further studies will be discussed in sections 5.5 and section 5.6 respectively.

5.2 Preparedness Behaviours and Related Guiding Elements

About 10 percent of the local residents took part in the questionnaire survey conducted in this study. The results showed that the 2004 tsunami positively shaped their awareness, since all participants were aware of the tsunami hazards. Furthermore, when the local people were asked if they applied any of the following preparedness measures: searching for more information on tsunami, following tsunami updates, knowing how to respond in the wake of a tsunami, participating in drills, preparing emergency supplies, preparing personal getaway kits, and preparing family emergency plan, the study found

that the participants took at least three out of seven measures, while the average was five measures. However, the participants performed a wide range of preparedness behaviours. From this investigation, it was found that many of the following elements influence the local peoples' preparedness behaviours.

5.2.1 Risk perception

Risk perception or the understanding regarding the likelihood and consequence of hazards is one crucial determinant of preparedness behaviour, as it can motivate people to prepare for the event of a hazard (Kapucu & Wilson, 1990; Peacock et al., 2005; Raaijmakers et al., 2008). Solvic (1987) identified that people who have high perception towards tsunami likelihood and consequences are likely to have high intention in adopting preparedness measures. In contrast, people with low perception would present an opposite reaction. The results from the present study indicated that a majority of the participants (up to 90%) expected a tsunami to occur in their community in the future; and 85% perceived that the impact of a future tsunami could be severe. According to past studies, having high risk perception among the residents could have been the reason why many of the residents chose to be prepared for a tsunami. None of the participants with low perception would have ignored taking preparedness measures.

5.2.2 Prior experience

In this study, although up to 95 percent of the participants had prior experience with the 2004 tsunami, it showed that the residents in Phi Phi Island received both positive and negative influences from their experience; one participant with negative influences said that "A tsunami is too devastating to think about.". The adaptation to tsunami preparedness of those participants with prior experience with the tsunami is 68 percent which is lower than the adaptation of a person who did not have any experience with a tsunami (71%). Most participants with prior experience were well prepared for a tsunami. The results are marginally different from many past studies, which indicated prior experience with a tsunami is one of the major influences which can increase risk perception and preparedness intention (Raaijmakers et al., 2008; Tanaka, 2005; Terpstra, 2010), as prior experiences potentially increase the feeling of worry and fear which can be transformed to the adaptation of preparedness measures (Raaijmakers et al., 2008).

The low level in preparation for a tsunami of some participants with prior experience might be because the participants had experienced minor effect from the past tsunami. Kate (1962) and Mileti and O'Brien (1992) described that the experience of past disasters can also limit people's preparedness behaviours; experiencing only minor impacts of the tsunami can lead the victims to become optimistic about the effects from

a future tsunami. Kate (1962) stated that these people would often expect that a future tsunami would be similar or the same as the one which occurred in the past. As a result, they will not prepare for the future because they believe since they survived last time, they will survive again next time.

Both subsection 5.2.1 and 5.2.2 show that people preparedness behaviours are complex. Even though, some participants saw themselves at low risk for a tsunami, but they took many preparedness actions. People without prior experience presented high perception and high preparedness behaviours for tsunamis, while they could have performed in opposite reaction due to the lack of prior experience. These findings pointed that people did not decide their preparedness behaviours based on their risk perception or prior experiences but a combination of factors which are not limited to only these two factors. Additionally, it highlights that people with different experiences to a hazard resulted in different perceptions and preparedness behaviours. Not all participants with tsunami experience would be well prepared. Thus, in promoting preparedness, DRM agencies should assume that the local residents are not homogeneously prepared due to having prior experience from the 2004 IOT. Moreover, their perception of a tsunami which may reduce their preparedness behaviours need to be taken into account.

5.2.3 Optimistic bias

Optimistic bias is identified as a positive judgment that a person makes on himself or herself to be less vulnerable to harm, or less likely to be affected by harm than others (Helweg-Larsen, 1999; Paton et al., 2008). People with optimistic bias believes that a disaster is less likely to happen to them. Having optimistic bias can be a barrier which prevents people from being prepared for hazards (Spittal et al., 2005). In this study, up to 25 percent of the participants believed there is little possibility of a tsunami occurrence. Additionally, optimistic bias among the residents was evident from their overestimation of their preparedness performance. Half of the participants who prepared lower than an average adaptation (five out of seven preparedness measures) overestimated their preparedness and believed that they were well-prepared for a tsunami. This finding is similar to Couling (2009) who found that most of her participants rated themselves as reasonably prepared for hazards as they stored several emergency supplies in their homes; however, only 10 percent were actually fully prepared. Therefore, this finding raised concerns regarding optimistic bias with it's potential to mislead people in reducing their disaster preparedness (Spittal et al., 2005).

Having optimistic bias among the residents of Phi Phi is problematic. To prevent the residents from decreasing their preparedness behaviours, DRM agencies need to get rid of those unrealistic bias by providing residents with correct tsunami information

(Helweg-Larsen, 1999; Paton et al., 2008). Correct information on tsunami hazards and preparedness will prevent people from having unrealistic perceptions, and encourage them on using scientific information to manage tsunami risks. Spittal et al. (2005) explained that when there is no criterion measure, a person often sees their optimistic bias of their preparedness behaviours as a correct judgement. Therefore, the DDPM should identify a tsunami preparedness criterion measure.

5.2.4 Outcome expectancy

Outcome expectancy is identified as the way that an individual assesses the effectiveness, or the benefit of being prepared for hazards (Lion et al., 2002; Paton et al., 2008). When people believe in the effectiveness of preparedness measures, they are likely to follow such measures (optimistic outcome expectancy) (Lion et al., 2002; Paton et al., 2008). On the other hand, when people do not believe that preparing for hazards would benefit them (negative outcome expectancy), they are unlikely to take actions to become prepared (Lion et al., 2002; Paton et al., 2008). This study indicated that 75 percent of the participants had positive outcome expectancy to tsunami preparedness. Outcome expectancy may be the factor which facilitates participants in taking preparedness behaviour measures, as most of them engaged themselves with preparedness measures.

However, up to 20 percent of the participants presented negative outcome expectancy; they were not confident about the necessity and benefits of adopting preparedness measures. Holding a negative outcome expectancy needs to be addressed as it may humble the preparedness intention in these participants, resulting in low prepared for tsunamis (Lion et al., 2002; Paton et al., 2008). This highlights the need for tsunami education in order to reduce negative outcome expectancy among the residents. Becker et al. (2012) and McClure et al. (2007) suggested that tsunami education can develop belief in the benefit of adapting preparedness measures which can reduce negative outcome expectancy and increase in preparedness behaviours.

5.2.5 Availability resources

Studies identified that availability resources, including time and financial resources, are crucial factors for adopting preparedness measures (Terpstra, 2010; Wisner et al., 2004). Terpstra et al. (2009) described that people would likely take preparedness actions depending on two main factors: 1) the efficacy attributes (for their own safety, for their family safety, and for protecting their property) and 2) resources access. However, they

will not take actions if they are constrained by insufficient resources including time, money, and skill to take preparation actions.

The first important resource to prepare for tsunamis is time availability. This study found that most of the participants did not participate in tsunami drills because they were busy working, while the participants who did not have work (e.g. housewife) presented high level in preparedness measures (87%). Therefore, the results in this study agree with the above statement that time availability is an important factor which facilitates the residents to engage in preparedness measure; while having limited free-time diminished people's preparedness intention.

Financial resources were seen as one of the important elements to underlie people's preparedness behaviours. Past studies found that people with sufficient finances commonly take adequate measures and actions for being more prepared, while people with financial constraints frequently have inadequate or insufficient preparation for hazards (FEMA, 2015; Gaillard, 2008; Rachmalia et al., 2011). For this study, it is noticeable that only 65 percent of the participants prepared emergency supplies in place. Additionally, the participants mostly took the preparedness measures in which they did not have to pay for or spend much time on. For example, all participants acquired knowledge on how to respond to a tsunami event, 90 percent followed the tsunami updates and 80 percent prepared their personal getaway items. Findings are consistent with the study of Bandura (1982), who described that income can limit the capacity of people in adoption of preparedness measures. As a result, people with financial constraints are likely to take preparedness measures that are easy for them to afford. Moreover, economic factor prevented the Phi Phi Island residents from participating in tsunami education drills. According to the quotes in Chapter 4, section 4.4.3, a few participants described that they did not participate in any tsunami drills, as they were frequently hosted in the main land, requiring them to take one day off work and pay for the transportation fees. As a result, the participants chose to work instead of taking part in tsunami drills.

According to the above discussion, this surely implies that both time and financial resources present great barriers for people in Phi Phi Island in the adoption of preparedness measures. Therefore, the government should consider these elements as they clearly represent barriers to address goals of preparedness and vulnerability reduction. In contrast, a lack of concern about people's financial resources can result in reducing preparedness behaviours.

5.2.6 Socio-demographic characteristics

Findings indicated that sociodemographic characteristics, including education attainment and gender, played a minor influence to the local people's preparedness behaviours for tsunamis. Based on education background elements, Asfaw and Admassie (2004) and Pothisiri (2013) described that people with higher education are likely to have greater awareness and preparation to hazards due to ability in accessing information, and skills in interpretation of information. In this study, however, people with university degrees prepared for tsunamis less than other participants; those with primary education and secondary education had similar preparedness levels to those with certificates or degrees. The percentage of preparedness adaptation is 50 percent, 71 percent, 72 percent and 70 percent respectively. The result is inconsistent to most studies which identified that people with high education are likely better prepared to hazards due to the high accessibility to information sources and higher skills in understanding hazard information (Asfaw & Admassie, 2004; Muttarak & Pothisiri, 2013). However, this data shows that when people make decisions about becoming prepared, they apply a combination of different factors to influence their decision (McIvar, 2013). As a result, people with low education, which is seen in individuals with difficulties accessing, assessing, and understanding hazard information, are better prepared than many participants with high education levels. This interpretation is supported by the study of McIvar (2013).

In terms of a sense of boundedness or strong social ties, Russell et al. (1995) identified that people with home ownership, children, or elder members at home are likely to prepare themselves well for hazards. On the other hand, a lack of social responsibility can lead to ineffective adoption of tsunami preparedness. The findings of the present study indicated that the participants with family members committed with 70 percent adoption to seven preparedness measures, in which the participants whom have children in their house prepared 2 percent higher than the participants living with no children (70% versus 68%) and 20 percent higher than the participants living with friends (70% versus 50%). People with business ownership engaged almost 67 percent of seven preparedness measures which is only 1 percent of adoption higher than the participants who worked full time. The results showed that having a sense of boundedness, especially from family can positively affect preparedness behaviours –regardless of having children, while, the sense of business ownership did not contribute a significant difference in preparedness behaviour. For the participants living without family members, the findings indicated that the participant who was living alone adopted up to 86 percent of the preparedness measures. This may be explained by the fact that living alone, without family members or friends, may increase the feeling of worry resulting in

increasing intention to participate in preparedness measures (Raaijmakers et al., 2008). However, being less prepared for tsunamis (only 50%) of the participants living with friends is needed to be considered in order to help them to be better prepared.

Section 5.2 has identified that both personal factors (e.g. risk perception, belief, bias, personal resources) and social factor, particularly a sense of family boundedness, is crucial and underlies local residents' preparedness behaviours. In next section, the preparedness measures to tsunamis provided by the government agencies will be discussed, with a particular emphasis on how improving such measures, so local people can become better prepared to tsunami.

5.3 Tsunami Mitigation and Preparedness Measures Developed by Government Agencies

As a result of the 2004 tsunami, the government of Thailand has applied many policies and measures to promote preparedness for tsunami among Thai residents living in hazard prone areas. Following the IOT, Thailand became a member of the Indian Ocean Early Warning System and increasingly cooperated with international organisations dealing with disaster risk management such as the JICA, UNDP and ADRC, to name a few (DDPM, 2011, Larsen et al., 2011). However, the findings from this study indicated that, about 11 years after the 2004 tsunami, there are many obstacles which challenge residents in adopting preparedness behaviours.

5.3.1 Community-Based Disaster Risk Management (CBDRM)

The findings identified that CBDRM, or bottom-up approach, has been encouraged in Thailand; yet, was most likely unsuccessfully applied in Phi Phi Island and only appeared in name. CBDRM is the attempt to involve community members in the planning and coordinating in regard to warning, preparing, responding to, and mitigating tsunami hazard (UNISDR, 2014). It is believed to be the most effective approach to increase a community's ability to cope with hazards resulting in minimising potential losses from a future disaster (Thomalla et al., 2009). CBDRM is useful as preparedness measures and related disaster response plan is actively involved the grassroots, allowing residents to share their concerns and plan for their community. However, the findings of this study suggested that CBDRM was unsuccessfully applied in Phi Phi Island. One remarkable example is when one participant told the head of the village about the problem regarding the insufficient warning tsunami signs. If the CBDRM is effective, the problem raised by the resident should have been addressed. The government agencies did not pay attention to the voice from the community, they simply designed an evacuation route

from the topographic instead of a visual on-site inspection or consulting with the local community in their design (Thomalla et al., 2009). Another example is introducing land use guidelines in Phi Phi Island. The agencies moved the residents out of the tsunami affected areas and resettled them in the highland due to safety reasons, without consideration that people in Phi Phi Island rely on the tourist and fishing industry, thus living in the high mountains was not going to support their livelihood. As a result, people moved back and are still living in tsunami high-risk area of Phi Phi Island. This is similar to the case of the volcano eruption of Mt. Pinatubo where Gaillard (2008) found a lack of involvement of the local community people potentially led to ineffective policy which finally resulted in local people moved back to hazard-prone areas, thus being quite vulnerable to disaster.

The unsuccessful adoption of the CBDRM approach in Phi Phi Island may be because this approach was applied very quickly immediately after the tsunami. Due to the urgent need in helping survivors to return to normality after the 2004 IOT, high media attention, and pressure from the international community, the government may have rushed to apply the strategies from best practices and to provide quick and visible responses, as observed in different countries after this event (Regnier et al., 2008). It can be seen that Thailand applied a CBDRM approach in the tsunami affected-areas just a year after the event, in which the top-down approach used to be the traditional approach of DRM in Thailand (DDPM, 2006). As a result, the agencies may not have had a good understanding of the core of the CBDRM approach and how to effectively use this approach with local community (Gaillard, 2008; Kelman, & Mather, 2008; UNISDR, 2014).

This study stressed that ineffectively applying CBDRM, thus limitedly involving local people in disaster-related activities, prevented increasing people's preparedness to disasters. The CBDRM in Phi Phi Island should be improved to be more effective and truly applied in which it can help to provide Phi Phi Island community with a suitable preparedness plan that is adapted to their own context. Moreover, it is suggested here that the agencies involved in DRM should not only focus on increasing people's perception to the hazards, but they also need to help people to overcome their preparedness constraints (Wisner et al., 2004). As emphasised in this research, these constraints strongly relate to resource access and thus, often lies in the root causes of the day-to-day context such as limited economic capacities (Gaillard, 2008; Kelman & Mather, 2008).

5.3.2 The ineffectiveness of TEWS

The effectiveness of tsunami mitigation measures in Phi Phi Island remains challenging; particularly the TEWS. Results identified the challenges due to the ineffectiveness of TEWS in the island. TEWS is an important tsunami mitigation measures allowing people to take protective response before tsunamis arrive on the coasts, resulting in saving many thousands of lives (Couling, 2014). However, ineffective TEWS potentially leads to negative effects such as delay evacuation (Calgaro et al., 2009). In this study, a few participants mentioned that the sound of the TEWS did not work well. Recently the authority tested the sound system of TEWS located in Phi Phi Island, but the residents did not hear anything during the sound test. Moreover, there were many false tsunami alerts due to past technical failures.

The experience of the ineffectiveness of TEWS lead to reducing Phi Phi Island people's perception to risk and preparedness intention (Fraser et al., 2012). Findings showed that apart from the experience of the 2004 tsunami, people frequently applied their knowledge from their life experience, including exposure to an absence of tsunami, in assessing tsunami hazards. After the tsunami in 2004, Thais in tsunami prone areas experienced tsunami false alarms (Calgaro et al., 2009; Petty, 2010; Thomalla et al., 2009; Xinhua, 2005). Because of these experiences, a majority of the participants (60%) still trusted in the TEWS, but 15 percent felt that the tsunami warning systems were not trustworthy, and 25 percent believed that a tsunami is less likely to happen. Indeed, it can be seen that the false alarms affected the trust of the local people in the system and their perceptions to tsunami possibility. Additionally, this study found that the experience of the past false alarms considerably affected their evacuation behaviours. Up to 20 percent of the participants would not evacuate immediately but would look for more information first if the tsunami warning is issued, while another 10 percent would not evacuate, as they did not believe that a tsunami would occur.

The feeling of trust in TEWS is crucial, since people would follow preparedness measures if they have trust in the information. In contrast, they tend to have an opposite reaction which may lead them to harm (Arlikatti et al., 2007; Lion et al., 2002; Slovic, 1993). The example can be seen in Fraser et al. (2012), wherein the prior tsunami false alerts prevented Japanese from taking protective actions resulting in many unnecessary deaths. Consistent to past studies, this highlights that the local residents were negatively affected by their prior experience of the past tsunami false alarms leading to distrust in mitigating system and decrease in their risk perception, which potentially prevents them from taking protective action, especially taking evacuation. Overall, it is important that local authorities deal with the feeling of distrust by the people in order to increase their preparedness, and to prevent decrease in preparedness intention.

5.3.3 Insufficient tsunami information resources

It was obvious in this study that Phi Phi Island residents were experiencing inadequate information supports from the government agencies. Chapter 4, section 4.4.3, identified that the low accessibility to evacuation drills on the main land prevented many residents in participating. As the result, participating in tsunami drills got the least attention from the participants, only 35 percent of them participating in such activities. Moreover, Chapter 4, section 4.4.4, identified a lack of tsunami education material on Phi Phi Island (Srivichai et al., 2007). Tsunami education materials were established and disseminated in six tsunami affected provinces (DDPM, 2006). In Phang-nga and Phuket, the tsunami education material including pamphlets, CDs and books were disseminated to the public (Srivichai et al., 2007). However, none of these materials were found in Phi Phi Island, even at the head of village office and the DDPM in Krabi province. Terpastra et al. (2009) described that tsunami education material is crucial in conveying information regarding tsunami hazard and its proper response to public. The more hazard information resources that can be accessed by the public, the more informed they are about risk and the more frequent they take preparedness actions (Tanaka, 2005). However, a lack of materials may result in having misconceptions of tsunami and preparedness measures. Therefore, this study underscores that limited accessible to tsunami hazards information potentially reduces the residents' preparedness to tsunami.

Additionally, most of the tsunami signage was in insufficient condition. The colour of many tsunami signage had worn off; some signage was hindered by items sold in the local shops. Additionally, many evacuation routes were impractical, since some routes went towards private areas and another route was the way to the forest where access was obstructed by many trees. The effectiveness of tsunami warning signage needs to be improved in order to be able to lead people to proper response in the wake of a tsunami.

In Phi Phi Island, direct communication using a loudspeaker and siren were also installed. These systems were located in the central area of the Island. However, there were concerns regarding the effectiveness of communication through this direct communication line (in Chapter 4, Section 4.4.5). As the noise from the club and bar may disturb conveying hazard information from the authority to the residents which may hamper the residents' from taking preparedness actions. In contrast, Tanaka (2005) argued that in order to motivate people to take preparedness behaviours, the authority need to support public with hazard information, but a lack of this support may lead people to take inappropriate response for a hazard. Therefore, government agencies should address the problem of how to make announcements from direct communication systems heard by the residents. For example, the authority may consider installing more

direct communication lines covering the living area. In order to address this problem, it is important to note that the residents' income is dependent on the tourist industry. To address this issue, Kelman (2005) suggested that CBDRM should be used in order to draw the solution from the root causes on how residents can live safely with risk.

5.4 Conclusion

This dissertation aimed to study preparedness behaviours of the local residents in the 2004 tsunami-affected areas, particularly Phi Phi Island. Moreover, it aimed to identify the tsunami preparedness measures undertaken by government agencies more than 11 years after the 2004 tsunami impacted Thailand population. In this study, a multiple methodological approach design under the pragmatic paradigm was applied. Using this framework, it is believed that positivism and interpretive paradigms should be integrated in order to obtain deep understanding of research data. The questionnaire survey was used as the main tool, while field observation and document analysis were used to complement the information gathered with the survey.

It was found that all participants were aware of tsunamis, this may be the influence from their prior experience, as 95 percent of them were affected by the tsunami in 2004. Participants took at least three preparedness measures out of seven measures, and the average adoption of those measures was five.

However, the preparedness behaviours of the residents on Phi Phi Island appear to be very complex. There are many elements underlying the preparedness behaviours of the local residents in Phi Phi Island including risk perception, prior experience, outcome expectancy, available resources, their sociodemographic characteristics and also the factors from the government. The present study further emphasises the need for government agencies involved in DRM to consider these elements when designing plans and defining policies targeting preparedness and DRM.

These study findings highlighted that many elements including negative outcome expectancy and optimistic bias are problematic as they tended to reduce people's preparedness behaviours for a future tsunami. Moreover, it is noticeable that the participants in Phi Phi Island frequently used their available information including prior experience to tsunami, life experience, resources and personal belief, in assessing risk and deciding whether or not to take preparedness measures. These negative consequences on people preparedness may be the results of lacking in proper tsunami education information. Therefore, the study pointed out that public education related to tsunami hazard needs to be disseminated on the Island. It is believed that supporting

local people with such information will decrease inappropriate perception and inappropriate behaviours due to their personal bias or instinct in managing their vulnerability to tsunamis (Terpstra et al., 2009). The correct information of tsunami hazard and preparedness will prevent people from having unrealistic perceptions (Becker et al., 2012; Helweg-Larsen, 1999; Paton et al., 2008).

The present study also underscored that the limit of personal resources, particularly financial resources and time availability, considerably hampered the residents from adopting preparedness. It is likely that the effects from the past tsunami may still remain in Phi Phi Island community. The result showed that participants chose work over participating in tsunami education programme which is related to their safety. Therefore, these factors are important for DRM policy planners as these constraints prevented the residents from adopting preparedness actions. In order to develop the preparedness level of local people, the government may need to take into account the financial background of the community (Willroth et al., 2012). People with sufficient financial resources will be able to afford taking preparedness measures (Terpstra, 2010; Wisner et al., 2004).

The sense of family boundedness and the effect of recognising his/her vulnerability from being alone seems to increase people's intention in preparing for tsunami. Therefore, in order to increase the local preparedness to tsunami, the DRM authority should apply the fear appeal along with promoting sense of family boundedness (Raaijmakers et al., 2008).

From the above discussions, the low level in tsunami preparedness among Phi Phi Island residents were partially influenced by the insufficient supports from the government. This study revealed that after the 2004 IOT, the government agencies involved in DRM had applied many useful preparedness measures to tsunamis such as TEWS, tsunami warning signage and tsunami education material in the most tsunami prone areas in Thailand. However, ineffective performances of some of those tsunami measures provided by the government particularly the false alert of TEWS negatively reduced of trust among local people to the measure and further reduced their perception towards tsunami. As a result, many residents decreased in the evacuation intention. This study identified that the problems related to tsunami measures needs to be taken into account. For instance, the authority should ensure the TEWS works effectively. It is also suggested that establishing trust between the DRM agencies and local people is important for potentially increasing people's preparedness behaviours (Slovic, 1993). As people would follow preparedness measures if they trust in the information from DRM. In turn, a lack of trust in authority/agency will lead to the opposite reaction (Calgaro et al., 2009; Slovic, 1993).

CBDRM is a useful and effective tool in get the local people involved with DRM (UNISDR, 2014). Yet, CBDRM was, and is still, ineffectively used in the Phi Phi Island community resulting in many visible evidences such as the impractical evacuation routes and unsuccessful land-use planning. A lack of involvement of the local residents to DRM led to ineffective planning which was not suited with the local context. The rehabilitation for the victims after the 2004 IOT was fit to their local livelihood. Eventually the survivors moved back to live in the tsunami-prone areas, similar to other case studies. In the same vein, similarly, the previous land-use plan would have been successfully applied in Phi Phi Island, if the plan would be established by coordinating between the government and local people. This emphasises that it is important for all DRM policy planners to consider people's context; especially their daily constraints which may hinder local people from associating in preparedness programmes (Gaillard, 2008).

Importantly, in the case of Phi Phi Island, there is a lack of attention and inadequate support from DDPM and local authority. The lack of evacuation shelters and tsunami education material leads to the enquiry of the roles of DDPM and its agencies in proving DRM for people of Phi Phi island. It was also noted that the tsunami drills and programmes were hosted on the main land but not on the island (section 4.4.3). Moreover, problems regarding insufficient tsunami warning signage mentioned by the local resident were likely overlooked by the head of village (section 4.4.2). The findings highlight that the roles of DDPM and its agencies is questionable and further study and investigation of this issue is required. This would help to improve the roles of government authorities in promoting public preparedness behaviours.

The unsuccessful adoption of a CBDRM approach and many other tsunami measures in Phi Phi Island may be because those measures were applied in a rush. As a result, the agencies may still be confused about how to apply this new approach to the community, when the top-down approach used to be the traditional approach in management in Thailand. Thus, a CBDRM in Phi Phi Island should be strengthened in order to increase the local residents' preparedness behaviours. Both the authority personnels and community members should be trained about CBDRM so that they have a good understanding of a core CBDRM approach and how to effectively use this approach with community.

Finally, for sustainable tsunami risk management, a long term plan with regular training, inspecting, and following the effectiveness of DRM in each unit is needed. A few limitations of this study, and the summary of recommendations for action and for future studies are identified in the next sections.

5.5 Limitations of the Study

The study was carefully designed and carried out followed AUTECH guidelines and the norms of Thailand. However, this study has a few limitations which will be described as following:

First, a limitation may arise in the questionnaire survey directed by an interviewer. With a face to face interaction during data administering, the researcher may introduce some bias through explanation, by using different voice and changing wording when the participants asked for clarification about questions (Oppenheim, 1992).

Second, the number of the participants is small. The questionnaire survey was carried out with 20 local participants, which nonetheless represents about 10 percent of local residents. However, due to this small sample, the generalisation of the results from this study may not optimally represent the distribution of the local population. Therefore, it is recommended for a future study to be conducted with larger participants.

5.6 Recommendations for Future Research

The study witnessed the failures of many tsunami mitigation and preparedness measures provided by the government, as well as a lack of attention by the DRM local authority. Therefore, it is suggested that the roles of the government agencies, especially the local personnel, to promote risk preparedness to local community should be studied.

Since the 2004 tsunami, there has been an increase of population dynamics on Phi Phi Island. A number of local people in Phi Phi Island have moved out, while a number of workers from the mainland came to work in Phi Phi Island. Thus, more research is needed to study how to help those transients to better prepare for a tsunami.

Moreover, there are many tourists visiting Phi Phi Island, either travelling each day or staying for short period of time. Further research is required to investigate how well-prepared are those tourists for a tsunami. Such aspects are not only very relevant to Phi Phi Island but also present a major challenge to other parts of Thailand that are highly touristic and considered tsunami exposed areas.

References

- Auckland University of Technology Ethics Committee (AUTEC). (2014). *Guidelines and procedures*. Retrieved from <http://www.aut.ac.nz/researchethics/guidelines-and-procedures>
- Arlikatti, S., Lindell, M. K., & Prater, C. S. (2007). Perceived stakeholder role relationships and adoption of seismic hazard adjustments. *International Journal of Mass Emergencies and Disasters*, 25(3), 218.
- Asfaw, A., & Admassie, A. (2004). The role of education on the adoption of chemical fertiliser under different socioeconomic environments in Ethiopia. *Agricultural Economics*, 30(3), 215-228. doi: 10.1111/j.1574-0862.2004.tb00190.x
- Ballantyne, M. (2000). *Information on volcanic and earthquake hazards: the impact on awareness and preparation*. Lower Hutt, New Zealand: Institute of Geological & Nuclear Sciences.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American psychologist*, 37(2), 122-147. doi: 10.1037/0003-066X.37.2.122
- Basolo, V., Steinberg, L. J., Burby, R. J., Levine, J., Cruz, A. M., & Huang, C. (2008). The effects of confidence in government and information on perceived and actual preparedness for disasters. *Environment and Behavior*. 1(1). 1-25. doi: 10.1177/0013916508317222
- Bazeley, P. (2004). Issues in mixing qualitative and quantitative approaches to research. In R. Buber, J. Gadner, & L. Richards (Eds.), *Applying qualitative methods to marketing management research* (pp.141-156). Hampshire, UK: Palgrave Macmillan.
- Becker, J., Paton, D., & McBride, S. (2012). *Improving community resilience in the Hawke's Bay: A review of resilience research, and current public education, communication and resilience strategies*. Wellington, New Zealand: GNS Science Report
- Bird, D., & Dominey-Howes, D. (2008). Testing the use of a 'questionnaire survey instrument' to investigate public perceptions of tsunami hazard and risk in Sydney, Australia. *Natural Hazards*, 45(1), 99-122. doi:10.1007/s11069-007-9172-8
- Boin, A., & Hart, P. T. (2007). *The crisis approach: Handbook of disaster research*. NY, USA: Springer.

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Bryman, A. (2008). *Social research methods*. Oxford, UK: Oxford University Press.
- Burby, R. J., Deyle, R. E., Godschalk, D. R., & Olshansky, R. B. (2000). Creating hazard resilient communities through land-use planning. *Natural Hazards Review*, 1(2), 99-106. doi: 142.103.92.1
- Calgaro, E. L. (2011). *Building resilient tourism destination futures in a world of uncertainty: Assessing destination vulnerability in Khao Lak, Patong and Phi Phi Don, Thailand to the 2004 Tsunami*. Unpublished Masters or Doctoral thesis, Macquarie University, Sydney, Australia.
- Calgaro, E., Dominey-Howes, D., & Lloyd, K. (2014). Application of the destination sustainability framework to explore the drivers of vulnerability and resilience in Thailand following the 2004 Indian Ocean tsunami. *Journal of Sustainable Tourism*, 22(3), 361-383. doi: 10.1080/09669582.2013.826231
- Calgaro, E., Naruchaikusol, S., & Pongponrat, K. (2009). *Comparative Destination Vulnerability Assessment for Khao Lak, Patong Beach and Phi Phi Don*. Stockholm. Sweden: Stockholm Environment Institute
- Cannon, T. (2008). Vulnerability, "innocent" disasters and the imperative of cultural understanding. *Disaster Prevention and Management*, 17(3), 350-357. doi: 10.1108/09653560810887275
- Charknol, T., & Tanaboriboon, Y. (2006). Tsunami evacuation behavior analysis. *IATSS Research*, 30(2), 83-96. doi: 10.1016/S0386-1112(14)60173-4
- Cocks, J. (1989). *The oppositional imagination: Feminism, critique and political theory*. New York, NY: Routledge.
- Cole, M. (2006). Qualitative research: A challenging paradigm for infection control. *British Journal of Infection Control*, 7(6), 25-29. doi: 10.1177/14690446060070060701
- Couling, M. (2014). Tsunami risk perception and preparedness on the east coast of New Zealand during the 2009 Samoan Tsunami warning. *Natural hazards*, 71(1), 973-986. doi:10.1007/s11069-013-0945-y
- Cresswell, J. W. (2003). *Research design: Qualitative, quantitative and mixed method approaches*. Thousand Oaks, CA: Sage Publications.

- Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. St Leonards, Australia: Allen & Unwin press.
- DDPM. (2006). *The approach in managing disaster risk community-based*. Bangkok, Thailand: Ministry of Interior.
- DDPM. (2008). *Manual of public*. Bangkok, Thailand: Ministry of Interior.
- DDPM. (2011). *DDPM strategy plan 2012-2016*. Bangkok, Thailand: Ministry of Interior.
- DMR. (2011). *Earthquake hazards and Thailand*. Retrieved from http://www.dmr.go.th/download/doc_land/Binder.pdf
- DPWTCP. (2005). *City planning for Phi Phi Island, Krabi Province. Department of Public Works and Town and Country Planning*. Bangkok, Thailand: Ministry of Interior.
- FEMA (2015). *Hurricane Katrina: 10 years later*. Retrieved from <https://www.fema.gov/media-library-data/1438281610980-5c7500a59d9828755c9b3578180e4f73/Katrina-10-National-Fact-Sheet.pdf>
- Fraser, S., Mattsuo, I., Leonard, G. S., & Murakami, H. (2012). *Tsunami evacuation: Lessons from the Great East Japan earthquake and tsunami of March 11th 2011*. Retrieved from <http://crew.org/sites/default/files/SR%202012-017.pdf>
- Gaillard, J. C. (2008). Alternative paradigms of volcanic risk perception: The case of Mt. Pinatubo in the Philippines. *Journal of Volcanology and Geothermal Research*, 172(3), 315-328. doi.org/10.1016/j.jvolgeores.2007.12.036
- Giddings, L. S., & Grant, B. M. (2006). Mixed methods research for the novice researcher. *Contemporary Nurse*, 23(1), 3-11. doi: 10.5172/conu.2006.23.1.3
- Ghobarah, A., Saatcioglu, M., & Nistor, I. (2006). The impact of the 26 December 2004 earthquake and tsunami on structures and infrastructure. *Engineering Structures*, 28(2), 312-326. doi: 10.1016/j.engstruct.2005.09.028
- Godschalk, D. R. (1991). *Disaster mitigation and hazard management. Emergency management: Principles and practice for local government*. Washington DC, USA: International City
- Gorad, G., & Taylor, C. (2004). *Combining methods in educational and social research*. Berkshire, UK: Open University Press.
- Grant, B. M., & Giddings, L. S. (2002). Making sense of methodologies: A paradigm framework for the novice researcher. *Contemporary nurse*, 13(1), 10-28. doi:10.5172/conu.13.1.10

- Gregg, C. E. (2005). *Natural hazards in Hawai'i: Some studies of awareness, risk perceptions, and preparedness*. Unpublished doctoral dissertation, University of Hawaii, Honolulu, Hawaii.
- Gregg, C. E., & Houghton B. F. (Eds.). Natural hazards. In D. Paton, & D. Johnston, (2006). *Disaster resilience an integrated approach*. Chicago, IL: Charles C Thomas Publisher.
- Handmer, J. (2003). We are all vulnerability. *The Australian Journal of Emergency Management*, 3(18), 55-60.
- Helweg-Larsen, M. (1999). (The lack of) optimistic biases in response to the 1994 Northridge earthquake: The role of personal experience. *Basic and Applied Social Psychology*, 21(2), 119-129.
- Howell, S. E., & Bonner, D. E. (2005). *Citizen hurricane evacuation behavior in Southeastern Louisiana: A twelve parish survey*. New Orleans, Louisiana: University of New Orleans.
- Jastone, L. O. (2006). *Federal protection for human research subjects: An analysis of the common rule and its interactions with FDA regulations and the HIPAA privacy rule*. Hauppauge, NY: Nova Publishers.
- Jarusiri, P. (May 1st, 2012). *Likelihood of earthquake in Thailand*. Retrieved from <http://www.cicc.chula.ac.th/en/2012-04-26-04-31-26/203-likelihood-of-earthquakes-in-thailand.html>
- Johnston, D., Paton, D., Crawford, G. L., Ronan, K., Houghton, B., & Borgelt, P. (2005). Measuring tsunami preparedness in coastal Washington, United States. *Natural Hazards*, 35(1), 173-184. doi:10.1007/s11069-004-2419-8
- Jonkman, S. N., & Kelman, I. (2005). An analysis of the causes and circumstances of flood disaster deaths. *Disasters*, 29(1), 75-97. doi: 10.1111/j.0361-3666.2005.00275.x
- Kates, R. W. (1962). *Hazard and choice perception in flood plain management*. Chicago, IL: University of Chicago Press.
- Kelman, I., & Mather, T. A. (2008). Living with volcanoes: The sustainable livelihoods approach for volcano-related opportunities. *Journal of Volcanology and Geothermal Research*, 172(3), 189-198. doi:10.1016/j.jvolgeores.2007.12.007

- Kirschenbaum, A. (2004). Generic sources of disaster communities: A social network approach. *International Journal of Sociology and Social Policy*, 24(10/11), 94-129. doi:10.1108/01443330410791073
- Khan, A., Vasilescu, L., & Khan, H. (2008). *Disaster management cycle—a theoretical approach. Management & marketing-Craiova*. Retrieved from <http://www.mnmk.ro/documents/2008/2008-6.pdf>
- Kuhn, T. S. (1970). *The structure of scientific revolutions*. Chicago, USA: The University of Chicago Press.
- Khunwishit, S., & McEntire, D. A. (2012). Testing social vulnerability theory: A quantitative study of hurricane Katrina's perceived impact on residents living in FEMA designated disaster areas. *Journal of Homeland Security and Emergency Management*, 9(1), 411-663. doi: 10.1515/1547-7355.1950
- Krongkant, P., & Ahmad, M. M. (2010). Typhoon risk perceptions and evacuation decisions of older persons: a case study of a rural community in southern Thailand. *International Journal of Emergency Management*, 7(2), 190-205. doi:10.1504/IJEM.2010.033656
- Kuhn, T. S. (1970). *The structure of scientific revolutions*. Chicago, IL: The University of Chicago Press.
- Larsen, R. K., Calgaro, E., & Thomalla, F. (2011). Governing resilience building in Thailand's tourism-dependent coastal communities: Conceptualising stakeholder agency in social–ecological systems. *Global Environmental Change*, 21(2), 481-491. doi: 10.1016/j.gloenvcha.2010.12.009
- Levac, J., Toal-Sullivan, D., & OSullivan, T. L. (2012). Household emergency preparedness: A literature review. *Journal of Community Health*, 37(3), 725-733. doi:10.1007/s10900-011-9488-x
- Lindell, M. K., & Perry, R. W. (2000). Household adjustment to earthquake hazard. A review of research. *Environment and Behavior*, 32(4), 461-501.
- Lindell, M. K., & Whitney, D. J. (2000). Correlates of household seismic hazard adjustment adoption. *Risk Analysis*, 20(1), 13-25. doi:10.1111/0272-4332.00002
- Lion, R., Meertens, R. M., & Bot, I. (2002). Priorities in information desire about unknown risks. *Risk Analysis*, 22(4), 765-776. doi:10.1111/0272-4332.00067

- Mack, N., Woodsong, C., MacQueen, K. M., Guest, G., & Namey, E. (2005). *Qualitative research methods: a data collectors field guide*. North Carolina, CA: Family Health International.
- Mathers, N., Fox, N. J., & Hunn, A. (1998). *Surveys and questionnaires*. Sheffield, UK: Trent RDSU.
- McClure, J. (2006). *Guidelines for encouraging householders' preparation for earthquakes in New Zealand*. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.547.5535&rep=rep1&type=pdf>
- McClure, J., Sutton, R. M., & Sibley, C. G. (2007). Listening to Reporters or Engineers? How Instance - Based Messages About Building Design Affect Earthquake Fatalism¹. *Journal of Applied Social Psychology*, 37(9), 1956-1973. doi: 10.1111/j.1559-1816.2007.00245.x
- McIvor, D., Paton, D., & Johnston, D. (2009). Modelling community preparation for natural hazards: Understanding hazard cognitions. *Journal of Pacific Rim Psychology*, 3(2), 39-46. doi: <http://dx.doi.org/10.1375/prp.3.2.39>
- McEntire, D. (2012) Understanding and reducing vulnerability: from the approach of liabilities and capabilities. *Disaster Prevention and Management*, 21(2). 206-225. doi: 10.1108/09653561211220007
- Miceli, R., Sotgiu, I., & Settanni, M. (2008). Disaster preparedness and perception of flood risk: A study in an alpine valley in Italy. *Journal of Environmental Psychology*, 28(2), 164-173. doi: 10.1016/j.jenvp.2007.10.006
- Mileti, D. M. (1999), *Disasters by design: A reassessment of natural hazards in the United States*. Washington DC, Washington: Joseph Henry Press.
- Mileti, D. S., & O'Brien, P. W. (1992). Warnings during disaster: *Normalizing communicated risk*. *Social Problems*, 39(1), 40-57. Doi: 10.2307/3096912
- Mulhall, A. (2003). In the field: Notes on observation in qualitative research. *Journal of Advanced Nursing*, 41(3), 306-313. doi: 10.1046/j.1365-2648.2003.02514.x
- Muttarak, R., & Pothisiri, W. (2013). The role of education on disaster preparedness: Case study of 2012 Indian Ocean earthquakes on Thailand's Andaman Coast. *Ecology and Society*, 18(4), 51-65. doi: 10.5751/ES-06101-180451
- Nadim, F., & Glade, T. (2006). *On tsunami risk assessment for the west coast of Thailand*. Retrieved from

- Nirupama, N., & Simonovic, S. P. (2007). Increase of flood risk due to urbanisation: A canadian example. *Natural Hazards*, 40(1), 25-41. doi:10.1007/s11069-006-0003-0
- Nidhiprabha, B. (2007). *Adjustment and recovery in Thailand two years after the tsunami*. Retrieved from <http://www.adbi.org/discussion-aper/discussionpaper/2007/08/02/2344.thailand.tsunami.adjustment.recovery/>
- Norris, F. H. (2006). *Methods for disaster mental health research*. London, UK: Guilford Press.
- Oppenheim, A. N. (1992). *Questionnaire design, interviewing, and attitude measurement*. New York, NY: St. Martin's Press.
- Paton, D. (2003). Disaster preparedness: a social-cognitive perspective. *Disaster Prevention and Management*, 12(3), 210-216. doi: 10.1108/09653560310480686
- Paton, D., Burgelt, P. T., & Prior, T. (2008). Living with bushfire risk: Social and environmental influences on preparedness. *The Australian Journal of Emergency Management*, 23(3), 41-48.
- Paton, D., Gregg, C., Houghton, B., Lachman, R., Lachman, J., Johnston, D., & Wongbusarakum, S. (2008). The impact of the 2004 tsunami on coastal Thai communities: assessing adaptive capacity. *Disasters*, 32(1), 106. doi: 10.1111/j.1467-7717.2007.01029.x
- Paton, D., Smith, L. M., & Johnston, D. (2000). Volcanic hazards: Risk perception and preparedness. *New Zealand Journal of Psychology*, 29(2), 86-91.
- Paton, D., Smith, L., Daly, M., & Johnston, D. (2008). Risk perception and volcanic hazard mitigation: Individual and social perspectives. *Journal of Volcanology and Geothermal Research*, 172(3-4), 179-188. doi: 10.1016/j.jvolgeores.2007.12.026
- Paton, D., & Johnston, D. M. (2006). *Disaster resilience: An integrated approach*. Chicago, IL: Charles C Thomas Publisher.
- Paphavasit, N., Chotiyaputta, C., & Siriboon, S. (n.d.). *Pre-and post-tsunami coastal planning and land-use policies and issues in Thailand*. Retrieved from <http://www.fao.org/forestry/13145-0d2a4be335309affe5edb2179217efbab.pdf>

- Peacock, W. G., Brody, S. D., & Highfield, W. (2005). Hurricane risk perceptions among Florida's single family homeowners. *Landscape and Urban Planning*, 73(2), 120-135. doi: 10.1016/j.landurbplan.2004.11.004
- Petty, M. (September 14th, 2010). *Apology after tsunami false alarm*. Retrieved from <http://www.reuters.com/article/us-thailand-tsunami-idUSTRE68D3RH20100914>
- Pimpa, N. (2012). Amazing Thailand: Organizational culture in the Thai public sector. *International Business Research*, 5(11), 35.
- Pishief, K. S. (2007). *Community understanding and preparedness for tsunami risk in the eastern North Island, New Zealand*. Unpublished doctoral thesis, University of Waikato, Hamilton, New Zealand. Retrieved from [http:// researchcommons.waikato.ac.nz](http://researchcommons.waikato.ac.nz).
- Raaijmakers, R., Krywkow, J., & van der Veen, A. (2008). Flood risk perceptions and spatial multi-criteria analysis: an exploratory research for hazard mitigation. *Natural Hazards*, 46(3), 307-322. doi: 10.1007/s11069-007-9189-z
- Rachamalia, M., Hatthakit, U., & Chaowalit, A. (2011). Tsunami preparedness of people living in affected and non-affected areas: A comparative study in coastal area in Aceh, Indonesia. *Australasian Emergency Nursing Journal*, 14(1), 17-25. doi: 10.1016/j.aenj.2010.10.006
- Régnier, P. (2008). From emergency relief to livelihood recovery. *Disaster Prevention and Management*, 17(3), 410-429. Doi: 10.1108/09653560810887329
- Rigg, J., Grundy - Warr, C., Law & Tan - Mullins, M. (2008). Grounding a natural disaster: Thailand and the 2004 tsunami. *Asia Pacific Viewpoint*, 49(2), 137-154. doi:10.1111/j.1467-8373.2008.00366.x
- Rome, M. A. (May 4th, 2012). *Little to fear in Phuket, says earthquake expert*. Retrieved from <http://www.thephuketnews.com/little-to-fear-in-phuket-says-earthquake-expert-30337.php>
- Russell, L. A., Goltz, J. D., & Bourque, L. B. (1995). Preparedness and hazard mitigation actions before and after two earthquakes. *Environment and Behavior*, 27(6), 744-770. doi: 10.1177/0013916595276002
- Samaddar, S., Misra, B. A., Chatterjee, R., & Tatano, H. (2012). Understanding Community's Evacuation Intention Development Process in a Flood Prone Micro-hotspot, Mumbai. *IDRiM Journal*, 2(2), 89-107.

- Simpson, D. M. (2008). Disaster preparedness measures: A test case development and application. *Disaster Prevention and Management: An International Journal*, 17(5), 645-661. doi:10.1108/09653560810918658
- Siniscalco, M. T., & Auriat, N. (2005). *Questionnaire design*. Paris, France: UNESCO International Institute for Educational Planning.
- Sinsakul, S. (2004). Coastal erosion in southern part of Thailand. p. 7-26. In C. Tanavud (ed.). *Proceedings of the International Conference on Environmental Hazards and Geomorphology in Monsoon Asia: Progress in Process Study and GIS Mapping*. Hat Yai, Thailand
- Sirirat, S. (May 19th, 2014). *Keep an eye on local fault line, disaster expert warns Phuket*. Retrieved from <http://www.thephuketnews.com/keep-an-eye-on-local-quake-fault-line-disaster-expert-warns-phuket-46326.php>
- Shaw, R., & Goda, K. (2004). From disaster to sustainable civil society: The Kobe experience. *Disasters*, 28(1), 16-40. doi: 10.1111/j.0361-3666.2004.00241.x
- Slovic, P. (1987). Perception of risk. *Science*, 236(4799), 280-285.
- Solberg, C., Rossetto, T., & Joffe, H. (2010). The social psychology of seismic hazard adjustment: Re-evaluating the international literature. *Natural Hazards and Earth System Sciences*, 10(8), 1663-1677. doi: 10.5194/nhess-10-1663-2010
- Spittal, M. J., McClure, J., Siegert, R. J., & Walkey, F. H. (2005). *Optimistic bias in relation to preparedness for earthquakes*. Retrieved from <http://www.massey.ac.nz/~trauma/issues/2005-1/spittal.htm>
- Spittal, M. J., McClure, J., Siegert, R. J., & Walkey, F. H. (2008). Predictors of two types of earthquake preparation: Survival activities and mitigation activities. *Environment and Behavior*, 40(6), 798-817. doi: 10.1177/0013916507309864
- Srivichai, M., Supharatid, S., & Imamura, F. (2007). Recovery process in Thailand after the 2004 Indian ocean tsunami. *Journal of Natural Disaster Science*, 29(1), 3-12. doi:10.2328/jnds.29.3
- Steckley, M., & Doberstein, B. (2011). Tsunami survivors' perspectives on vulnerability and vulnerability reduction: Evidence from Koh Phi Phi Don and Khao Lak, Thailand. *Disasters*, 35(3), 465-487. doi: 10.1111/j.1467-7717.2010.01221.x
- Suppasri, A., Goto, K., Muhari, A., Ranasinghe, P., Riyaz, M., Affan, M., ... & Imamura, F. (2015). A decade after the 2004 Indian ocean tsunami: the progress in disaster preparedness and future challenges in Indonesia, Sri Lanka, Thailand

and the Maldives. *Pure and Applied Geophysics*, 172(12), 3313-3341.
doi:10.1007/s00024-015-1134-6

- Tanaka, K. (2005). The impact of disaster education on public preparation and mitigation for earthquakes: A cross-country comparison between Fukui, Japan and the San Francisco Bay Area, California, USA. *Applied Geography*, 25(3), 201-225. doi:10.1016/j.apgeog.2005.07.001
- Taylor, N. (1999). Anglo-American town planning theory since 1945: three significant developments but no paradigm shifts. *Planning Perspectives*, 14(4), 327-345. doi: 10.1080/026654399364166
- Tekeli-Yeşil, S., Dedeoğlu, N., Tanner, M., Braun-Fahrlaender, C., & Obrist, B. (2010). Individual preparedness and mitigation actions for a predicted earthquake in Istanbul. *Disasters*, 34(4), 910-930. doi: 10.1111/j.1467-7717.2010.01175.x
- Terpstra, T. (2010). *Flood preparedness: Thoughts, feelings and intentions of the Dutch public*. Enschede, Netherlands: University of Twente.
- Terpstra, T., Lindell, M. K., & Gutteling, J. M. (2009). Does communicating (flood) risk affect (flood) risk perceptions? Results of a quasi-experimental study. *Risk Analysis*, 29(8), 1141-1155. doi:10.1111/j.1539-6924.2009.01252.x
- Thanawood, C., Yongchalermchai, C., & Densrisereekul, O. (2006). Effects of the December 2004 tsunami and disaster management in southern Thailand. *Science of Tsunami Hazards*, 24(3), 206-217.
- Thomalla, F., Metusela, C., Naruchaikusol, S., Larsen, R. K., & Tapa, C. (2009). *Disaster risk reduction and tsunami early warning systems in Thailand: A case study on Krabi province, project report-2009*. Stockholm, Sweden: Stockholm Environment Institute.
- Turner, B. L., Kasperson, R. E., Matson, P. A., McCarthy, J. J., Corell, R. W., Christensen, L., ... Schiller, A. (2003). A framework for vulnerability analysis in sustainability science. *Proceedings of the National Academy of Sciences of the United States of America*, 100(14), 8074-8079. doi: 10.1073/pnas.1231335100.
- UN. (2006). *Tsunami Thailand. One year later*. Retrieved from <http://reliefweb.int/sites/reliefweb.int/files/resources/89408849FEC99045492570E3001EB6CC-uncttha-tha-22dec.pdf>
- UNISDR. (2014). *Training on community based disaster risk management*. Retrieved from <http://www.unisdr.org/we/inform/events/37623>

UNISDR. (2015). *The human cost of natural disasters 2015, a global perspective*.

Retrieved from

http://reliefweb.int/sites/reliefweb.int/files/resources/PAND_report.pdf

Witvorapong, N., Muttarak, R., & Pothisiri, W. (2015). Social participation and disaster risk reduction behaviours in tsunami prone areas. *PLoS one*, 10(7), 1-20.

doi:10.1371/journal.pone.0130862

Willroth, P., Massmann, F., Wehrhahn, R., & Revilla Diez, J. (2012). Socio-economic vulnerability of coastal communities in southern Thailand: The development of adaptation strategies. *Natural Hazards and Earth System Sciences*, 12(8), 2647-2658. doi:10.5194/nhess-12-2647-2012

White, G. F. (1945). *Human Adjustment to Floods: A geographical approach to the flood problem in the United States*. Chicago, IL: University of Chicago

Xinhua. (December 15th, 2005). *False tsunami alarm creates chaos in southern Thailand*. Retrieved from http://www.chinadaily.com.cn/english/doc/2005-12/15/content_503660.htm

Appendices

Appendix A: AUTECH Approval



AUTECH Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9099 ext. 8336
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

11 March 2016

Eve Coles
Faculty of Health and Environmental Sciences

Dear Eve

Re Ethics Application: **16/50 How do communities in Krabi understand and prepare for tsunami risk?**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTECH).

Your ethics application has been approved for three years until 11 March 2019.

As part of the ethics approval process, you are required to submit the following to AUTECH:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 11 March 2019;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 11 March 2019 or on completion of the project.

It is a condition of approval that AUTECH is notified of any adverse events or if the research does not commence. AUTECH approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTECH grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this. If your research is undertaken within a jurisdiction outside New Zealand, you will need to make the arrangements necessary to meet the legal and ethical requirements that apply there.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,



Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: Arisara.Poompoe.bowariss@gmail.com, Chris Webb; Rhoda Scherman

Appendix B: Survey Questionnaire

Project title: ***“How do communities in Phi Phi Island understand and prepare for tsunami risk?”***

Project Supervisor: ***Rhoda Scherman***

Researcher: ***Arissara Poompoe***

Questionnaire

Demographic

1. Are you ☐ male ☐ female
2. Which best describes the situation you are living in now?
 - ☐ Family with children
 - ☐ Family without children
 - ☐ Living alone
 - ☐ Other, please specify _____
3. How old are you? _____ years
4. Are you a person with disability?
 - ☐ Yes ☐ No
5. What is your current employment status?
 - ☐ Employed full-time
 - ☐ Employed part-time
 - ☐ Not in paid employment
 - ☐ Self-employed

6. What is your highest education qualification?

- ☐ No school qualifications
- ☐ Primary or secondary school qualifications
- ☐ Trade certificate or professional certificate or diploma
- ☐ University undergraduate degree (Bachelor degree)
- ☐ University postgraduate degree (such as Master degree or Doctorate)

7. Have you ever experienced a tsunami?

- ☐ Yes ☐ No

8. If yes, please specify

- ☐ Directly affected
- ☐ Indirectly affected

Understanding tsunami hazards

9. What natural hazards do you think are the most likely to affect to your community? (tick all may apply)

- ☐ Earthquakes
- ☐ Typical Storms, Typhoons with high winds
- ☐ Flooding
- ☐ Tsunamis
- ☐ Forest fires
- ☐ Mudslides

10. What do you feel best represents the consequences of each hazards?

	The level of the impact				
	Don't know	Low	Moderate	high	severe
Earthquakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Typhoons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tsunamis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Forest fires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mudslides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. When do you think that a tsunami could occur?

- ☐ Within the year
- ☐ In the next 1- years
- ☐ In the next 10-100 years
- ☐ Not within 100 years
- ☐ Never

Preparedness

12. Have you searched for more information abouttsunami hazards?

☐ Yes ☐ No

Comment (reasons):_____

13. Do you closely follow the news about the tsunamis?

☐ Yes ☐ No

Comment (reasons):_____

14. Have you participated in tsunami public education programs which the emergency management agencies have provided for your community?

☐ Yes ☐ No

Comment (reasons): _____

15. Do you know how to respond if a tsunami hit your community?

☐ Yes ☐ No ☐ Not sure

Comment (how?): _____

16. Have you prepared emergency supplies of food, water, clothing or a first aid kit in your place to be used in the case of a tsunami?

☐ Yes ☐ No

Comment (reasons): _____

17. Have you prepared personal getaway kits?

☐ Yes ☐ No

Comment (reasons): _____

18. Does your household have an emergency plan that includes instructions for every family member about where to go and what to do in the event of a tsunami?

☐ Yes ☐ No

Comment (reasons): _____

19. Do you think that preparation to a tsunami hazard is useful?

☐ Yes ☐ No ☐ Not sure

Comment (reasons): _____

- ☐ Earthquakes happened but were not strong enough to generate tsunamis
- ☐ Tsunami is less likely
- ☐ Tsunami warning system in Thailand is not trustworthy and reliable
- ☐ Other, please specify _____

- ☐ Yes, I will evacuate immediately.
- ☐ Yes, I will evacuate but I will check for more information with the source first.
- ☐ No

22. What would be best describe the level of your readiness to tsunami hazards?
(please tick one)

←—————→

Not prepared low moderate well-prepared

☐ ☐ ☐ ☐

84

Researcher Contact Details:

Arissara Poompoe

Email: bowariss@gmail.com

Project Supervisor Contact Details:

RhadaScherman

Email: rscherma@aut.ac.nz

Project title: “ชุมชนในจังหวัดกระบี่มีความเข้าใจและเตรียมพร้อมในการเผชิญเหตุต่อสึนามิอย่างไร?”

Project Supervisor: Rhoda Scherman

Researcher: อริสรา พุ่มโพธิ์

Questionnaire

Demographic

1. เพศ ☐ ชาย ☐ หญิง
2. ข้อใดต่อไปนี้บรรยายลักษณะการพักอาศัยของคุณได้ดีที่สุด?
 - ☐ อาศัยอยู่กับครอบครัว และลูกๆ
 - ☐ อาศัยอยู่กับครอบครัว ไม่มีลูก
 - ☐ อยู่คนเดียว
 - ☐ อื่นๆ โปรดระบุ
3. ปัจจุบันคุณมีอายุปี
4. คุณมีความพิการทางร่างกายหรือไม่?
 - ☐ ใช่ ☐ ไม่ใช่
5. ปัจจุบันคุณประกอบอาชีพในลักษณะไหน?
 - ☐ ลูกจ้างประจำ ☐ ลูกจ้างชั่วคราว
 - ☐ ประกอบกิจการส่วนตัว ☐ ไม่ได้ประกอบอาชีพ/แม่บ้าน
 - ☐ อื่นๆ โปรดระบุ.....
6. ระดับการศึกษาสูงสุดของคุณ?
 - ☐ ไม่ได้เรียนหนังสือ ☐ จบการศึกษาระดับประถมศึกษา-มัธยมต้น
 - ☐ จบการศึกษาระดับมัธยมปลาย หรือ ปวช. ☐ จบการศึกษาระดับ ปวส หรือปริญญา
 - ☐ สูงกว่าปริญญาตรี

7. คุณเคยเผชิญเหตุสึนามิหรือไม่?

☐

ใช่

☐

ไม่ใช่

8. ถ้า “ใช่” โปรดระบุว่า คุณได้รับผลกระทบจากสึนามิในลักษณะใด

☐

ได้รับผลกระทบจากสึนามิโดยตรง (บาดเจ็บ, สูญเสียสมาชิกในครอบครัว หรือ ทรัพย์สินเสียหาย)

☐

ได้รับผลกระทบจากสึนามิโดยอ้อม

มุมมองต่อมหันตภัยสึนามิ

9. คุณคิดว่าภัยพิบัติใดต่อไปนี้ ที่อาจจะกระทบชุมชนของคุณ? (ตอบได้มากกว่า 1 ข้อ)

☐

แผ่นดินไหว

☐

พายุ

☐

น้ำท่วม

☐

สึนามิ

☐

ไฟฟ้า

☐

พายุโคลนถล่ม

10. คุณคิดว่าข้อใดต่อไปนี้สามารถบรรยายผลกระทบจากแต่ละภัยพิบัติได้ดีที่สุด?

	ระดับความรุนแรงของผลกระทบ				
	ไม่รู้	ต่ำ	ปานกลาง	สูง	รุนแรง
แผ่นดินไหว	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
พายุ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
น้ำท่วม	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
สึนามิ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ไฟฟ้า	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
พายุโคลนถล่ม	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. คุณคิดว่าเมื่อไหร่สึนามิจะเกิดขึ้นอีก?

- ☐ ในปีนี้
- ☐ ใน 1-10 ปี
- ☐ ใน 10 – 100 ปีข้างหน้า
- ☐ ไม่เกิดอีกแล้ว

การเตรียมความพร้อมเพื่อรับมือกับสึนามิ

12. คุณได้หาข้อมูลเกี่ยวกับสึนามิเพิ่มเติม หลังจากเหตุการณ์สึนามิในปี 2004 หรือไม่?

- ☐ ใช่ ☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

13. คุณได้ติดตามข่าวสาร อัปเดต เรื่องสึนามิอย่างใกล้ชิด?

- ☐ ใช่ ☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

14. คุณได้เข้าร่วมการอบรมเรื่องสึนามิที่จัดโดยหน่วยงานรัฐ เช่น การซ้อมหนีภัย?

- ☐ ใช่ ☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

15. คุณรู้ว่าจะปฏิบัติตนอย่างไรเพื่อที่จะเอาตัวรอด หากสึนามิโจมตีชุมชนของคุณหรือไม่?

- ☐ ใช่ ☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

16. คุณได้เตรียมของใช้ยามฉุกเฉินเช่น อาหาร น้ำ เสื้อผ้า ยา ไว้ที่บ้าน เพื่อไว้ใช้ในยามฉุกเฉินจากสึนามิ?

- ☐ ใช่ ☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

17. คุณได้เตรียมของสำคัญส่วนตัวไว้ในกระเป๋าเผื่อที่คุณจะสามารถเอาไปด้วย หากมีเหตุฉุกเฉินเกิดขึ้นหรือไม่?

☐ ใช่

☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

18. คุณได้เตรียมแผนเผชิญเหตุฉุกเฉินสำหรับบุคคลในครอบครัวไว้ด้วยหรือไม่?

☐ ใช่

☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

19. คุณคิดว่า หากคุณเตรียมความพร้อมไว้รับมือกับสึนามิตามมาตรการข้อ 12-18 มีประโยชน์หรือไม่?

☐ ใช่

☐ ไม่ใช่

คำแนะนำ (เหตุผลประกอบ): _____

20. คุณมีความคิดอย่างไร ที่ใน 10 ปีที่ผ่านมา มีการแจ้งเตือนภัยจากสึนามิหลายครั้ง แต่ยังไม่มีการไหนที่จะเกิดสึนามิจริงๆ อย่างในปี 2004? (เลือก 1 ข้อ)

☐

อาจจะมีแผ่นดินไหว แต่ไม่รุนแรงพอที่จะก่อให้เกิดสึนามิ

☐

สึนามิไม่น่าจะเกิดเร็วๆ นี้

☐

ระบบการแจ้งเตือนภัยจากสึนามิของไทยไม่น่าเชื่อถือ

☐

อื่นๆ โปรดระบุ

☐

21. หากคุณได้รับแจ้งเตือนภัยจากสึนามิ จากหอเตือนภัย คุณจะอพยพไปยังที่ที่ปลอดภัยหรือไม่?

☐

ใช่ ฉันจะอพยพทันทีที่ได้รับการแจ้งเตือน

☐

ใช่ ฉันจะอพยพ ภายหลังจากที่ฉันได้ตรวจสอบข้อมูลแล้ว

☐

ไม่

คำแนะนำ (เหตุผลประกอบ): _____

22. คุณคิดว่าปัจจุบันนี้คุณได้เตรียมความพร้อมดีในระดับใด เพื่อที่จะรับมือจากสึนามิ? (เลือก 1 ข้อ)



ไม่ได้เตรียม

ต่ำ

ปานกลาง

ดี

☐
☐
☐
☐

23. คุณมีข้อคำแนะนำ หรือสิ่งที่ภาครัฐควรแก้ไข เพื่อที่จะทำให้สมาชิกในชุมชนเตรียมความพร้อมเพื่อรับมือกับสึนามิมากขึ้น?

ขอบคุณเป็นอย่างสูงที่ท่านได้ให้ความร่วมมือในการตอบคำถามเหล่านี้

หากท่านมีปัญหาสงสัยหรือต้องการทราบข้อมูลเพิ่มเติมเกี่ยวกับงานวิจัยสามารถติดต่อสอบถามได้ที่

นักวิจัย:

นางสาว อริสรา พุ่มโพธิ์

อีเมลล์: bowariss@gmail.com

อาจารย์ที่ปรึกษาโครงการ:

Rhada Scherman

Email: rscherma@aut.ac.nz

Appendix C: Participant Information Sheet

Date Information Sheet

Produced: 25/03/2016

Title of Research Study:

“How do communities in Krabi understand and prepare for tsunami risk?”

Dear Sir/Madam,

My name is Arissara Poompoe. I am conducting research titled *“How do communities in Krabi understand and prepare for tsunami risk?”* as part of my dissertation of my Masters in Emergency Management at Auckland University of Technology (AUT). This study aims to understand how the residents in Phi Phi Island interpret and prepare for the tsunami risk. The information gained from this research will be used to make recommendations for best practice assisting risk analysis and policy-makers improve the risk communication among public in order to foster better preparedness to tsunami.

Before you decide whether to take part in the study, it is important that you understand what the research is for and what you will be asked to do. Please take time to read the following information and this Participant Information Sheet will help you decide if you’d like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. Before you decide, you may discuss it with other people such as family or friends, please feel free to do this.

Participation is voluntary, you can decide whether or not to take part. If you decide to take part, you will be given this information sheet to keep. You will also be asked to sign a consent form. You can change your mind at any time and withdraw from the study without giving a reason. Whether or not you decide to participate in this study will not lead any disadvantages to you. You are welcome to phone me if you would like any further information.

What is the purpose of this research?

The purpose of the research study is to discover the understanding of communities towards tsunami risk and how they prepare to deal with it. You will act as a representative of your community, I will ask you questions about what it is like for you, your thoughts, your feelings, and your concerns of tsunamis as well as your preparedness to its hazards. This study will definitely benefit your community as you will be allowed to share your opinions and concerns. Your contribution will help the policy-makers and risk analysers gain better insight on how to foster better preparedness of the local community particularly in tsunami prone areas

in Krabi province especially for on Phi Phi Island. This higher preparedness will contribute to the wider community being able to protect themselves and their properties resulting in reducing losses and impacts from future tsunamis.

Moreover, it is crucial to note that the design of this study was approved by Ethic committee from Auckland university of Technology on March 11st, 2016.

How was I identified and why am I being invited to participate in this research?

A simple random sampling technique will be used to recruit participants for this study. This will allow every resident to have an equal chance to be selected. The researcher will request the list of potential participants from the provincial governmental office in order to build the sample. Twenty residents who meet the criteria's to be a participant; being permanent residents living within 20 km from coastal areas and age 20 years or over, will be chosen at random from the list of residents so that the researcher bias can be minimised.

However, potential participants who work in emergency management fields or who have some knowledge background of the subject need to be excluded from this study because they may hold bias point of views towards the subject matter.

Additionally, if there are finally more than 20 potential participants wanted to participate in this study, the selection will be on the first come first served.

What will happen in this research?

If you want to take part in this study, you need to give your consent by signing the consent form which is attached to the study information sheet, then return it to the primary researcher. Your response will be treated with full confidentiality and anyone who takes part in the research will be identified only by code numbers or false names. The participants in this study will be asked to answer the structured-questionnaire which will be researcher administered. The researcher will assist you if you have any difficulty with the instructions or questions. If you cannot read and/or write, this is not problematic. The researcher will read the questions for you and help you to complete the questionnaire form, then at the end of session the researcher will read all the questions and answers to confirm with you if they are all correct. In the questionnaires, the participants will be given the choice to leave further comments at the end of the questionnaire.

What are the discomforts and risks?

The participants in this study may experience negative flashbacks during the questionnaire filling process.

How will these discomforts be alleviated?

During collection of the data, if you experience discomfort, embarrassment, incapacity or psychological disturbance, the researcher will offer you a break, or skip the question. You do not have to answer all questions, and you can skip some questions that they wish to do so. Ultimately, if you still feel uncomfortable, you have the choice to freely leave the study.

What are the benefits?

Within this study, you are allowed to share your perspectives and concerns about the tsunami risk that you are facing. Thus, you will benefit by having their voice heard. Moreover, it is hoped that this study can establish useful knowledge to foster better preparedness of local community especially in your community.

How will my privacy be protected?

The researcher will ensure the identity of all participants and confidential information obtained incidentally during research is protected throughout the study period. Your name will not be recorded on the questionnaires and the information will not be disclosed to other parties. Your responses to the questions will be used for the purpose of this project only. The research data and consent forms will be separately stored using code numbers instead of personal names, and kept on AUT premises which only supervisors and the primary researcher can access.

Although, at the end of the research I will write a report and the results may be published in my dissertation. However, no individuals' name and any personal information will not be included in the final report. Moreover, the researcher will not describe the person in the way that people can identify who he/she was or discuss on "who said what". The confidentiality and anonymity of the participants is underlined important.

What are the costs of participating in this research?

There are no financial costs to participating in this research, apart from your time. The study will be a single interview with myself which we expect that it will take approximately 30 minutes, the further time around 10 minutes may be required to verify the answer. We will arrange a time to meet, which is convenient for you and in your own home if that is appropriate.

What opportunity do I have to consider this invitation?

You will be given seven days to decide about participating in the study.

How do I agree to participate in this research?

If you agree to take part, please contact me by call or text so we can arrange to meet at a time that is convenient for you. Moreover, you are asked to complete the attached response slip and return it to me when we meet.

Will I receive feedback on the results of this research?

When I have completed the study, I will produce a summary of the findings which I will be more than happy to send you if you are interested.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Rhoda Scherman, rscherma@aut.ac.nz, 921 9999 ext 7499.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH, Kate O'Connor, *ethics@aut.ac.nz* , 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Arissara Poompoe

Email: bowariss@gmail.com

Project Supervisor Contact Details:

Rhoda Scherman

Email: rscherma@aut.ac.nz

Please do not hesitate to contact me if you need further information,

Thanking you in anticipation,

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'A. Poompoe', with a long horizontal stroke extending to the right.

Arissara Poompoe

(Primary Researcher)

เอกสารชี้แจงผู้เข้าร่วมการวิจัย**(Participant Information Sheet)**เอกสารฉบับวันที่
25/03/2016**ชื่องานวิจัย****"ชุมชนในจังหวัดกระบี่มีความเข้าใจและเตรียมพร้อมในการเผชิญเหตุต่อสึนามิอย่างไร"****คำกล่าวเบื้องต้น**

ข้าพเจ้านางสาว อริสรา พุ่มโพธิ์ กำลังดำเนินการวิจัย ภายใต้หัวข้อ "ชุมชนในจังหวัดกระบี่มีความเข้าใจและเตรียมพร้อมในการเผชิญเหตุต่อสึนามิอย่างไร" ซึ่งเป็นส่วนหนึ่งของการศึกษาระดับปริญญาโท ในด้านการบริหารจัดการความเสี่ยงและภัยพิบัติ ของข้าพเจ้า ณ มหาวิทยาลัย โอ๊คแลนด์ ออฟ เทคโนโลยี (Auckland University Of Technology) ประเทศนิวซีแลนด์ งานวิจัยนี้มีวัตถุประสงค์ที่ศึกษาเกี่ยวกับมุมมองของชาวชุมชนในจังหวัดกระบี่ เกี่ยวกับภัยร้ายจากสึนามิ อยางไรและมีเตรียมพร้อมในการเผชิญเหตุหรือไม่ อยางไรบ้าง สำหรับประโยชน์ที่คาดว่าจะได้รับจากงานวิจัยนี้คาดว่าจะช่วยให้บุคลากรและหน่วยงานที่เกี่ยวข้องกับการจัดการด้านนโยบายเพื่อส่งเสริมการเตรียมความพร้อมในการเผชิญเหตุสึนามิ เข้าใจมุมมองและความคิดเห็นของคนในชุมชนมากขึ้น และส่งผลการเตรียมความพร้อมที่ดีขึ้นของคนในชุมชน

โดยก่อนที่ท่านจะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้เตรียมข้อมูลเกี่ยวกับวัตถุประสงค์ของการวิจัย วิธีการวิจัย ประโยชน์และผลกระทบที่อาจเกิดขึ้นจากการวิจัยอย่างละเอียด การเก็บรักษาข้อมูล ตลอดจนข้อมูลที่สำคัญอื่นๆ การเข้าร่วมโครงการวิจัยนี้เป็นแบบอาสาสมัคร ข้าพเจ้าสามารถถอนตัวจากการเป็นอาสาสมัครโครงการวิจัยนี้เมื่อใด ก็ได้ถ้าข้าพเจ้าปรารถนา หรือหากท่านไม่เข้าร่วมในการวิจัยนี้ ก็จะไม่มีผลกระทบต่อไปๆ ต่อท่าน ทั้งสิ้น หากมีข้อมูลซักถามในข้อมูลขอให้ท่านได้ซักถามได้ทันที

วัตถุประสงค์ของโครงการวิจัย

งานวิจัยนี้เป็นส่วนหนึ่งของรายวิชา งานวิจัย คณะการบริหารจัดการความเสี่ยงและภัยพิบัติ (Emergency management) มหาวิทยาลัย Auckland University Of Technology ประเทศนิวซีแลนด์ ซึ่งการวิจัยนี้ หวังว่าจะช่วยบุคลากรและหน่วยงานที่เกี่ยวข้องกับการจัดการด้านนโยบายเพื่อส่งเสริมผลการเตรียมความพร้อมที่ดีขึ้นของคนในชุมชน โดยเฉพาะพื้นที่ที่มีความเสี่ยงจากสึนามิ ในจังหวัดกระบี่ ซึ่งการเตรียมความพร้อมที่สูงขึ้นของชุมชนจะทำให้ชาวบ้านมีความสามารถที่จะปกครองชีวิตและทรัพย์สินของตนเองและครอบครัว และจะลดผลกระทบและความสูญเสียที่อาจเกิดขึ้นได้จากสึนามิที่อาจเกิดในอนาคต

โดยงานวิจัยนี้ได้ผ่านการอนุมัติจากคณะกรรมการพิจารณาจริยธรรมการวิจัย จากมหาวิทยาลัย เมื่อวันที่ 11 เดือนมีนาคม 2559 หมายเลขอ้างอิง 16/50

การเลือกผู้เข้าร่วมโครงการวิจัยในครั้งนี้

งานวิจัยนี้จะใช้วิธีสุ่มเลือก 20 ท่าน จากรายชื่อผู้ที่ตรงตามหลักเกณฑ์ของการวิจัย ซึ่งต้องเป็นคนในชุมชนอาศัยอยู่ในเกาะพีพีโดยถาวร และมีอายุ 20 ปี เป็นต้นไป โดยรายชื่อที่ผู้วิจัยใช้นี้จะมาจากศาลากลางจังหวัดกระบี่ ซึ่งการใช้วิธีสุ่มเลือกนี้มีข้อดีที่ว่า ผู้ที่มีคุณสมบัติตรงตามหลักเกณฑ์ของการวิจัยจะมีโอกาสถูกเลือกโดยเท่าเทียมกัน แต่ผู้ที่ทำงานในหน่วยงานที่เกี่ยวข้องกับการบริหารเหตุฉุกเฉินหรือมีความรู้ที่เกี่ยวข้องกับงานวิจัยนี้มาก่อนจะไม่สามารถร่วมงานวิจัยนี้ได้ เนื่องจากข้อมูลที่ให้มาอาจจะเบี่ยงเบนไปจากชาวบ้านโดยทั่วไป ท่านมีเวลา 7 วันในการตัดสินใจว่าจะเข้าร่วมงานวิจัยหรือไม่ หากท่านสนใจเข้าร่วมโครงการวิจัยนี้ ท่านสามารถติดต่อผู้วิจัยได้ทางโทรศัพท์มือถือ ซึ่งทางนักวิจัยจะนัดวันเวลาและสถานที่ที่ท่านสะดวกเพื่อทำการเก็บข้อมูล หากท่านไม่ติดต่อกลับภายในระยะเวลาที่กำหนด ผู้วิจัยจะติดต่อท่านที่ตรงตามหลักเกณฑ์ของการวิจัยเป็นลำดับต่อไป

จะมีขั้นตอนอะไรบ้างหากเข้าร่วมในโครงการวิจัยในครั้งนี้

หากท่านต้องการเข้าร่วมงานวิจัยนี้ ท่านจะต้องลงนามในเอกสารยินยอมเข้าร่วมโครงการวิจัย ซึ่งได้แนบในท้ายของเอกสารฉบับนี้

แล้วส่งสำเนาหลังจากที่ท่านได้ลงนามแล้วคืนให้กับผู้วิจัย

การเข้าร่วมงานวิจัยนี้ท่านไม่ต้องเสียค่าใช้จ่ายใดๆทั้งสิ้น นอกจากในเรื่องของเวลา การเก็บข้อมูลจะเป็นการถามตอบโดยใช้คำถามสั้นๆ ซึ่งทางนักวิจัยจะทำหน้าที่อ่านและช่วยกรอกข้อมูลให้ท่าน ซึ่งจะเป็นประโยชน์แก่ผู้ที่อยากเข้าร่วมโครงการแต่ไม่สามารถอ่านหรือเขียนได้ การเก็บข้อมูลจะใช้เวลาประมาณ 30 นาที และอีก 10 นาทีที่นักวิจัยจะอ่านคำถามและคำตอบให้ท่านฟังเพื่อตรวจสอบความถูกต้อง

หากท่านเข้าร่วมในโครงการในครั้งนี้ จะมีภาวะเสี่ยงหรือ อันตรายหรือไม่

ระหว่างการตอบแบบสอบถาม บางคำถามอาจทำให้ท่านนึกถึงเหตุการณ์สึนามิในปี 2004 ท่านอาจรู้สึกอึดอัด ไม่สบายใจ เครียด ท่านมีสิทธิที่จะไม่ตอบคำถามเหล่านั้นได้ และถ้าท่านยังรู้สึกไม่ดีขึ้น ทางเราจะเสนอให้ท่านพัก แล้วค่อยเริ่มการเก็บข้อมูลต่อหลังจากที่ท่านรู้สึกดีขึ้น แต่สุดท้ายถ้าท่านรู้สึกไม่สบายใจที่จะตอบคำถามที่เหลือ ท่านสามารถถอนตัวจากโครงการได้

ประโยชน์ที่จะก่อเกิดในการให้ข้อมูลในโครงการวิจัยในครั้งนี้

งานวิจัยนี้มีประโยชน์ที่ว่าท่านจะได้แสดงความคิดของท่านและเป็นเสมือนตัวแทนของคนในชุมชนในการแสดงความเข้าใจ ข้อคิดเห็น หรือสิ่งที่ท่านคิดว่าควรตระหนักเกี่ยวกับภัยสึนามิ ตลอดจนการเตรียมความพร้อมเพื่อรับมือจากสึนามิ ซึ่งประสบการณ์จากท่านที่ท่านแบ่งปันจะนำข้อมูลที่ได้มาเป็นองค์ความรู้เพื่อช่วยส่งเสริมชุมชนให้มีการเตรียมตัวที่ดีขึ้นในการรับมือสึนามิ

ท่านจะได้รับการปกป้องความลับของข้อมูลที่ให้สัมภาษณ์อย่างไร

ข้อมูลที่ทางผู้วิจัยได้จากท่าน หากท่านเข้าร่วมงานวิจัยนี้ ข้อมูลส่วนตัวของผู้เข้าร่วมการวิจัยจะถูกเก็บรักษาไว้ ไม่เปิดเผยต่อสาธารณะเป็นรายบุคคล ผู้วิจัยจะใช้รหัสแทนชื่อและนามสกุลจริงของท่านลงในแบบบันทึกข้อมูล และข้อมูลจะถูกทำลายเมื่อการศึกษาครั้งนี้สิ้นสุด ผู้วิจัยขอรับรองว่าข้อมูลที่ได้รับการเก็บเป็นความลับและจะนำเสนอผลการวิจัยในภาพรวมเท่านั้น โดยจะไม่มีการระบุชื่อ/ข้อมูลส่วนตัวของท่าน และจะไม่มีการอ้างถึงว่า “ใครพูดอะไร” ในรายงาน ดังนั้นท่านสามารถมั่นใจได้ว่างานวิจัยนี้จะไม่ก่อให้เกิดความเสียหายแก่ท่านแต่ประการใด

ท่านจะได้รับผลงานวิจัยในครั้งนี้หรือไม่

หลังจากงานวิจัยนี้เสร็จสิ้น ทางผู้วิจัยจะทำสรุปรายงานวิจัย ซึ่งหากท่านมีความประสงค์ต้องการข้อมูล ผู้วิจัยมีความยินดีอย่างยิ่งที่จะส่งสรุปรายงานวิจัย ตามความร้องขอ ผ่านทางอีเมลหรือช่องทางที่ท่านสะดวก

หากท่านมีข้อแนะนำเกี่ยวกับงานวิจัยนี้ ท่านสามารถแจ้งไปที่

อาจารย์ที่ปรึกษาโครงการ Rhoda Scherman อีเมลล์ rscherma@aut.ac.nz โทร (+64)921 9999 ext 7499.

หรือ คณะกรรมการพิจารณาจริยธรรมการวิจัย Kate O'Connor อีเมลล์ ethics@aut.ac.nz โทร (+64)921 9999 ext 6038

หากท่านมีปัญหาสงสัยหรือต้องการทราบข้อมูลเกี่ยวกับงานวิจัยสามารถติดต่อสอบถามผู้วิจัย นางสาว อริสรา พุมโพธิ์ ได้ที่ bowariss@gmail.com หรือโทร 0891619109

Appendix D: Consent Form

Project title: ***“How do communities in Krabi understand and prepare for tsunami risk?”***

Project Supervisor: ***Eve Coles***

Researcher: ***Arissara Poompoe***

Please tick to indicate you consent to the following

I have read and understood the information provided about this research project in the Information Sheet dated 25/03/2016.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I do not work in emergency management fields or have any knowledge background of the subject	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I have had an opportunity to ask questions and to have them answered.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I agree to take part in this particular study.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I understand that this study is using questionnaire with interview administered as a method in collecting research data.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I understand that my participation is voluntary and I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
If I withdraw, I understand that all relevant information contributed by me will be destroyed.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I wish to receive a copy of the brief report from the research (If yes, please provide your email: _____)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Declaration by participant:

I hereby consent to take part in this study.

Participant's name: _____

Signature: _____

Date: _____

Approved by the Auckland University of Technology Ethics Committee on March 11st, 2016

AUTEC Reference number 16/50

Note: The Participant should retain a copy of this form.

เอกสารแสดงความยินยอมเข้าร่วมโครงการวิจัย

(Consent form in Thai language)

ชื่องานวิจัย ชุมชนในจังหวัดกระบี่มีความเข้าใจและเตรียมพร้อมในการเผชิญเหตุต่อสึนามิอย่างไร

ชื่ออาจารย์ที่ปรึกษา Rhoda Scherman

ชื่อนักวิจัย อริสรา พุ่มโพธิ์

โปรดตอบคำถามต่อไปนี้ โดยเติมเครื่องหมาย x ลงใน □

ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้อ่านรายละเอียดของงานวิจัยนี้ ข้าพเจ้าทราบถึงวัตถุประสงค์ของการวิจัย วิธีการวิจัย รวมทั้งประโยชน์และผลกระทบที่อาจเกิดขึ้นจากการวิจัยอย่างละเอียด จากเอกสารงานวิจัยสำหรับผู้เข้าร่วมโครงการ ฉบับวันที่ 25/03/2016	ใช่ □ ไม่ใช่ □
ข้าพเจ้าไม่ได้ทำงานในหน่วยงานที่เกี่ยวข้องกับการบริหารเหตุการณ์หรือมีความรู้ที่เกี่ยวข้องกับงานวิจัยนี้มาก่อน	ใช่ □ ไม่ใช่ □
นักวิจัยได้ให้โอกาสข้าพเจ้าซักถามข้อสงสัยต่างๆ จนเข้าใจการเข้าร่วมงานวิจัยในครั้งนี้เป็นอย่างดี	ใช่ □ ไม่ใช่ □
ข้าพเจ้าประสงค์เข้าร่วมโครงการวิจัยนี้	ใช่ □ ไม่ใช่ □
ข้าพเจ้าเข้าใจวิธีการเก็บข้อมูลงานวิจัยนี้ ว่าเป็นการตอบคำถามสำรวจ โดยนักวิจัยจะช่วยอำนวยความสะดวกโดยจะอ่านและกรอกข้อมูลลงแบบฟอร์มให้	ใช่ □ ไม่ใช่ □
ข้าพเจ้าเข้าใจว่าการเข้าร่วมโครงการวิจัยนี้เป็นแบบอาสาสมัคร ข้าพเจ้าสามารถถอนตัวจากการเป็นอาสาสมัครโครงการวิจัยนี้เมื่อใดก็ได้ถ้าข้าพเจ้าปรารถนา โดยไม่มีผลกระทบใดๆ ทั้งสิ้นต่อข้าพเจ้า	ใช่ □ ไม่ใช่ □
หากข้าพเจ้าถอนตัวจากงานวิจัยนี้ ข้อมูลต่างที่นักวิจัยได้รับจากข้าพเจ้าจะถูกทำลายทิ้ง	ใช่ □ ไม่ใช่ □
ข้าพเจ้ามีความประสงค์ที่จะรับสำเนารายงานฉบับสรุปของงานวิจัยนี้ (หากต้องการโปรดระบุชื่ออีเมลล์: _____)	ใช่ □ ไม่ใช่ □

ข้าพเจ้าได้อ่านข้อความข้างต้นแล้วและได้ลงนามในใบยินยอมนี้ด้วยความเต็มใจ

ลงนามอาสาสมัครเข้าร่วมงานวิจัย:

ลายเซ็น:

วันที่:

แบบฟอร์มนี้ได้ผ่านการอนุมัติจากคณะกรรมการพิจารณาจริยธรรมการวิจัย จากมหาวิทยาลัยโอ๊คแลนด์ ออฟเทคโนโลยี

ณ วันที่ 11 เดือนมีนาคม 2559 หมายเลขอ้างอิง 16/50

หมายเหตุ โปรดส่งสำเนาเอกสารฉบับนี้กลับมาที่นักวิจัย