PSYCHOLOGICAL DISTRESS AND ITS RELATION TO COPING STRATEGIES AMONG FIREFIGHTERS AND CIVIL DEFENCE FORCE INVOLVED IN THE MASSIVE FLOOD DISASTER IN KELANTAN

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2017

DECLARATION

I hereby declare that the effort of this dissertation is of my personal except for citations and summaries that have been properly acknowledged.

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CERTIFICATION

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LIST OF ABBREVIATIONS

<	:	Less than
≥	:	Equal to and more than
=	:	Equal to
%	:	Percentage
α	:	Alpha
n	:	Sample size
N	:	Population size
Z	:	Z statistic
P	:	Expected proportion
d	:	Precision
DASS 21	:	Depression Anxiety Stress Scale 21
IES-R	:	Impact Event Scale-Revised
Brief COPE	:	Brief coping strategies scale
PTSD	:	Post Traumatic Stress Disorder
SLogR	:	Single Logistic Regression
MLogR	:	Multiple Logistic Regression
DSM-IV-TR	:	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revision
DSM 5	:	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

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ABSTRAK

TEKANAN PSIKOLOGI DAN HUBUNGANNYA DENGAN STRATEGI PENGENDALIAN DIKALANGAN PASUKAN PENYELAMAT BOMBA DAN ANGKATAN PERTAHANAN AWAM MALAYSIA DALAM BENCANA BANJIR BESAR DI KELANTAN

Terdapat banyak kajian melaporkan kesan psikologi bencana banjir kepada mangsa, bagaimanapun data mengenai pekerja penyelamat di Malaysia adalah terhad. Para pekerja penyelamat mempunyai risiko yang tinggi untuk mengalami tekanan psikologi setelah terdedah dengan pengalaman traumatik semasa bencana. Kajian ini bertujuan untuk menentukan prevalens Gangguan Tekanan Pasca Trauma (PTSD), Kemurungan, Kerisauan dan Stres serta faktor-faktor yang berkaitan dengannya dalam kalangan pekerja penyelamat 6 bulan selepas bencana banjir di Kelantan. Satu kajian keratan rentas dalam kalangan 160 pekerja penyelamat telah dijalankan pada bulan Julai 2015, menggunakan borang soal-selidik IES-R versi Melayu yang telah diterjemahkan dan divalidasi untuk mengesan PTSD, DASS 21 versi Melayu untuk mengesan Kemurungan, Kerisauan dan Stres serta Brief-COPE-Versi Melayu untuk menilai teknik strategi penyesuaian yang digunakan. Data dianalisis dengan menggunakan logistik regresi berganda. Didapati bahawa prevalens PTSD dalam kalangan pekerja penyelamat di Kelantan adalah 20.6%. Dalam model akhir, empat pembolehubah kekal ketara iaitu umur [ORadj 0.94 (95% CI 0,89-0,99)], strategi pengendalian secara penafian [ORadj 1.89 (95% CI 1,31-2,71)], strategi pengendalian secara luahan perasaan berfokus [ORadj 1.49 (95% CI 1,01-2,22)] dan strategi

pengendalian secara perancangan [ORadj 3.34 (95% CI 2,03-5,48)]. Prevalens kemurungan adalah sebanyak 19.4%. Model akhir menunjukkan tiga pembolehubah kekal ketara iaitu pengalaman latihan pra bencana banjir [ORadj 0.26 (95% CI 0.07, 0.92)], strategi pengendalian secara perancangan [ORadj 3.72 (95% CI 2.24, 6.17)] dan strategi pengendalian secara menyalahkan diri sendiri [ORadj 1.75 (95% CI 1.21,2.52)]. Prevalens kerisauan adalah sebanyak 29.4%. Model akhir menunjukkan dua pembolehubah yang kekal ketara iaitu strategi pengendalian secara perancangan [ORadj 8.64 (95% CI 4.39,17.00)] dan strategi pengendalian secara menyalahkan diri sendiri [ORadj 1.63 (95% CI 1.10, 2.42)]. Prevalens stres pula adalah sebanyak 13.1%. Model akhir menunjukkan dua pembolehubah yang kekal ketara iaitu strategi pengendalian secara perancangan [ORadj 8.04 (95% CI 3.34,19.32)] dan strategi pengendalian secara membuat jenaka [ORadj 1.78 (95% CI 1.15, 2.76)]. Kesimpulannya, prevalens PTSD, kemurungan, kerisauan dan stres dalam kalangan pekerja penyelamat adalah tinggi dan berhubung kait dengan penggunaan strategi pengendalian yang kurang efektif serta berfokuskan emosi seperti penafian, luahan perasaan berfokus, perancangan, menyalahkan diri sendiri dan membuat jenaka manakala faktor perlindungan terhadap tekanan psikologi dikalangan mereka adalah peningkatan umur serta latihan pra-bencana. Oleh itu, adalah perlu untuk memasukkan komponen psikologi ke dalam latihan pra-bencana untuk pekerja penyelamat di Malaysia.

Kata kunci: *Gangguan Tekanan Pasca Trauma; Kemurungan, Kerisauan dan Stres; Pekerja Penyelamat; Bencana Banjir*

ABSTRACT

PSYCHOLOGICAL DISTRESS AND ITS RELATION TO COPING STRATEGIES AMONGST FIREFIGHTERS AND CIVIL DEFENCE FORCE INVOLVED IN THE MASSIVE FLOOD DISASTER IN KELANTAN

There were many studies that reported the psychological impact of flood disaster to victims, however data on rescue workers, especially firefighters and civil defence force in Malaysia are scarce. The rescue workers are at an increased risk of developing a psychological distress after being exposed to traumatic events during the disaster. This study aimed at determining the prevalence of Post-Traumatic Stress Disorder (PTSD), Depression, Anxiety and Stress and its associated factors among firefighters and civil defence force rescue workers six months after the flood disaster in Kelantan. A cross sectional study among 160 firefighters and civil defence force rescue workers were conducted in July 2015, using the Malay translated and validated Impact Event Scale -Revised (IES-R) and DASS 21 to detect PTSD, Depression, Anxiety and Stress and Brief-COPE-Malay version to evaluate the types of coping strategies used. Data were analyzed using multiple logistic regressions. The study found that the prevalence of PTSD among firefighters and civil defence force rescue workers in Kelantan was 20.6%. In the final model, four variables remained significant which were age [OR_{adj} 0.94 (95%CI 0.89 - 0.99)], denial coping [OR_{adj} 1.89 (95%CI 1.31 - 2.71)], focus on and venting of emotion coping [OR_{adj} 1.49 (95%CI 1.01 - 2.22)] and planning coping [OR_{adj} 3.34 (95%CI 2.03 - 5.48)]. The prevalence of depression was 19.4%. The final model showed that three variables remained significant

which were pre-disaster training [ORadj 0.26 (95% CI 0.07, 0.92)], planning coping strategies [ORadj 3.72 (95% CI 2.24, 6.17)] and self-blame coping strategies [ORadj 1.75 (95% CI 1.21,2.52)]. The prevalence of anxiety was 29.4%. The final model showed that two variables remained significant which were planning coping strategies [ORadj 8.64 (95% CI 4.39,17.00)] and self-blame coping strategies [ORadj 1.63 (95% CI 1.10, 2:42)]. The prevalence of stress was 13.1%. The final model showed that two variables remained significant which were planning coping strategies [ORadj 8.04 (95% CI 3.34,19.32)] and humour coping strategies [ORadj 1.78 (95% CI 1.15, 2:76)]. In conclusion, the prevalence of PTSD, Depression, Anxiety and Stress among firefighters and civil defence force rescue workers were significantly high and associated with the use of less useful or emotional focused coping strategies including denial, focus on and venting of emotion, planning, self-blame and humour whereby protective effect to psychological distress among them were an increasing of age and pre-disaster training. Therefore, there is a need to incorporate psychological component in the pre-disaster training for rescue workers in Malaysia.

Keywords: *Post Traumatic Stress Disorder; Depression, Anxiety and Stress; Rescue Workers; Flood Disaster*

CHAPTER 1: INTRODUCTION

1.1. General overview of flood disaster

Generally, there are three types of disasters : natural disasters, human-made disaster (airplane crash, collapsed building, haze etc) and technological disasters (war, terrorist attack, bombing etc) (Neria, Nandi and Galea, 2008). Natural disaster is commonly known to be disasters caused by the nature. These natural disasters consist of volcano eruptions, earthquakes, tsunami, avalanches, lahars (volcanic mudslides), landslides, blizzards, heat waves, hurricanes, typhoons, tornadoes, floods and others.

No matter what types of natural disasters it may be, it usually leads to financial, environmental and human loses. It is indeed a great danger for the earth if these types of natural disasters tend to continue. Natural disasters are said to be cataclysmic or in other words a violent natural event that could give either a direct or indirect impact towards the public health and wellbeing (Akasah and Doraisamy, 2015).

One of the most common natural disasters that happen all around the world is flood. The flood takes place when a river bursts its banks and the water spills out onto the floodplain. This scenario is far more likely to happen with the contribution of heavy rains. Therefore, during rainy season, flood warnings are often put in place (Akasah and Doraisamy, 2015).

There are other noticeable risk factors for flooding too, for example steep-sided channels causes a fast surface run-off, while a lack of vegetation or

woodland to both break the flow of water and drink the water means that there is little to slow the floodwater down (Pradhan, 2009). Drainage basins of impermeable rock also cause the water to run faster over the surface (Sinnakaudan, Ghani and Ahmad, 2003).

There are activities conducted by human such as the unplanned rapid settlement development, the uncontrolled construction works of buildings in general and major changes in the use of land, that are considered to be the influences of the pattern of hazards. There are several factors contributing to the flooding problem, and they are ranging from topography, geomorphology, drainage, engineering structures and also climate, as explained by (Khan *et al.*, 2014).

1.2. Epidemiology data of flood disaster in Malaysia

Malaysia is one of the tropical countries situated in South East Asia region. Even though Malaysia is a geographically stable area which is free from natural disasters such as earthquakes, volcanic activities, and strong winds such as tropical hurricanes which intermittently affect some of its neighbors such as Indonesia, Philipines, Thailand etc, however, it does not necessarily mean that Malaysia is unequivocally “free” from natural disasters and calamities, as it is regularly hit by floods, landslides, droughts, haze, humanmade disasters and even unexpectedly in 2004, Tsunami (Chan, 2012).

Among all the disasters occured in Malaysia, floods are probably the most common and carry the utmost damage annually. A number of massive floods have occurred in the past (Chan, 2012). The two vital types of flood that is

occurring in Malaysia are the monsoon flood and flash flood (Akasah and Doraisamy, 2015). The monsoon flood occurs mainly from Northeast Monsoon which conquers during the months of November to March with heavy rains to the east coast states of the Peninsula, northern part of Sabah and as well as the Southern part of Sarawak (Akasah and Doraisamy, 2015).

Record shows the occurrence of flood in Malaysia in the past years, such as in 1926, 1931, 1947, 1954, 1957, 1963, 1965, 1967, 1969, 1971, 1973, 1983, 1988, 1993, 1998, 2001, 2006, 2007 and 2010 with about 29000 sq.km or 9% of the total land area and more than 4.82 million people (22%) are affected by flooding per annum. The damages caused by flood are estimated to be RM915 million worth (Akasah and Doraisamy, 2015).

A significant number of casualties, disease epidemics, property and crop damage, as well as other losses have been reported annually due to massive disasters such as flood disasters (Chan, 2012). In fact there are also loss of lives and also have caused obstruction to social activities and slowed down the economy as well (Akasah and Doraisamy, 2015).

Extensive, severe and unpredictable floods such as this have resulted in significant loss of life, damage of crops, livestocks, properties, and public infrastructures (Chan and Parker, 1996). Therefore, according to Malaysian Ministry of Natural Resources and Environment, floods have been identified as the most hazardous natural disaster in Malaysia (Abdul Rahman, 2014).

In a massive flood disaster, most of those who were affected were forced to rely on government and non-government organizations (NGO) rescue and

relief for recovery as their coping mechanisms are totally ineffective. At often times, hundreds of thousands of people were evacuated due to such events (Chan, 2012).

As part of the yearly northeast monsoon season, the recent massive flood which occurred in Kelatan in late December 2014 until early January 2015 became the worst flood to ever occur in the history of the state, as the water level of the flood superseded the floods of 1967, as confirmed by The National Security Council, The Malay Mail Online, 5th Jan 2015 (Malay Mail Online, 2015).

The councils reported that the water level of Sungai Kelantan at Tambatan DiRaja, which has a danger level of 25 metres, reached 34.17 metres compared to 29.70 metres in 2004 and 33.61 metres in 1967. The water level at Tangga Krai, which has a danger level of 5 metres, reached 7.03 metres compared to 6.70 metres in 2004 and 6.22 metres in 1967. The council identified the changing climatic patterns and the result of uncontrolled land management and the swelling number of trees and exploitation of land resources as the two main reasons for the unprecedented magnitude (Malay Mail Online, 2015).

There were several Keretapi Tanah Melayu (KTM), intercity train services along the East Coast route that were interrupted following the occurrence of these floods. Kelantan Social Welfare Department reported that this massive flood disaster forced a total of 329, 441 people to flee their homes, so far, the highest in history, with Kuala Krai, Gua Musang, Tanah Merah, Manik Urai and Kota Bharu being the most affected areas. The evacuees were relocated to 469 relief centers throughout the state because of property damages that were brought

upon them by the flood. Thousands permanently lost their homes and properties, and the aftermath of flood restoration was estimated to cost RM 78 million (Berita Harian, 2014).

1.3. Psychological distress and disaster

Any disasters, including flood frequently resulted in physical illness and psychological distress. Flood not only triggered enormous amount of property damage, but may also expose the victims as well as the rescue workers to a variety of health problems, such as infectious and water-borne diseases, malnutrition due to shortage of supplies and psychological implications, such as post-traumatic stress disorder (PTSD) and depression.

Even though majority of these symptoms could be recovered spontaneously among victims, however, depending on the severity and duration of symptoms, some can be long lasting, and affects daily functions and increase the vulnerability of being diagnosed with a psychiatric disorder, for an example, PTSD (Ishikawa *et al*., 2013).

The prevalence of psychological distress following natural disasters can increase not only PTSD but also depression, anxiety and the use of alcohol (Weisæth, 1995). Nevertheless, their degree of prevalence appears to demonstrate wide variation, most probably due to differences in survey methods, the impact of disasters, countermeasures against disasters, culture backgrounds, religiosity and many more (Ishikawa *et al.*, 2013). Usually, psychological distress amongst victims and rescue workers are higher in human-made and

technological disasters compared to natural disasters (Neria, Nandi and Galea, 2008).

For an example, according to a study among Taiwanese earthquake survivors three years after the 1999 Chi-Chi earthquake, the prevalence of depression following disaster was from 6.4% to 11% (Wu *et al.*, 2006). Furthermore, there were few studies in the past which have shown that the prevalence of PTSD among victims following disaster was high, ranged from 25.8% after Typhon Morakot in Taiwan (Yang *et al.*, 2011), 36% after major Turkish earthquakes (Kiliç & Ulusoy, 2003) to 46% after flood in Mexico (Norris *et al.*, 2004).

1.4. Psychological distress in rescue workers related to disaster

As mentioned earlier in the previous subtopics, disaster can cause both physical and psychological impact. Though physical impact of disaster is usually obvious, psychological impact however may cause a long-lasting suffering or disability. Studies on the psychological impact of disaster usually focuses on victims but studies on the rescue workers that were involved are limited.

Rescue workers contributed their time, energy and even money to help the victims and have played a vital role in mitigating the worst effects of the disaster. Inevitably, rescue workers strived during the disasters to save life of the victims, prevented further damages to properties and in various occasions exposed themselves to dangerous circumstances or traumatic situations. These situations left them vulnerable to psychological distress, including depression, PTSD and anxiety (Connorton *et al*., 2012).

Los Angeles County Fire Department defines a rescue squad as an emergency service organization that uses specialized equipment and knowledge to rescue people. They divided rescue squads into medical (team that rescue trapped victims) and non-medical (team that rescue people who are having medical emergencies) rescue workers (Flintham, 2012).

Medical rescue workers usually provide emergency medical care after trauma to medical patients, such as basic or advanced life support whereas non-medical rescue teams are typically associated with fire departments or civil defenses. They may have been put together with the fire search-and-rescue team, or work autonomously for non-fire rescues, such as from road transport accidents, building accidents, and natural disasters (Flintham, 2012). In their efforts to help the victims, rescue workers in major natural and manmade disasters are placed at high risk of developing psychological symptoms (Shih-Cheng Liao, 2002).

Literatures on psychological distress among disaster rescue worker exists, but little can be found on how organizations can help workers cope with the stresses caused by the exposure to disasters. Furthermore, disaster rescue workers have infrequently been studied empirically (Carol S. Fullerton, Ursano and Wang, 2004). The National Center for Post-Traumatic Stress Disorder conducted an empirical review of the disaster literature spanning from 1981 to 2004 to obtained data pertaining to mental health outcomes of disaster victims. Only 15 percent of the 225 distinct samples were related to rescue or relief workers (Cronin, Ryan and Brier, 2007).

During the recent flood disaster in Kelantan, non-medical rescue workers were involved in the search and rescue works. They played an important and invaluable role to save the victim's life and prioritise on their safety. At the same time, some of their family members, or let alone, they themselves as well as their properties were also affected.

Most of them have worked for more than 24 hours during the acute phase in flood disaster. Amongst the most prominent non-medical rescue workers involved in the floods disaster in Kelantan were the firefighters and civil defences. They came from Fire and Rescue Department of Malaysia (Jabatan Bomba dan Penyelamat Malaysia) as well as Civil Defence Force Department of Malaysia (Angkatan Pertahanan Awam Malaysia).

From literature searching and review, to the best of the reasearcher's knowledge, there was no study on the relationship between psychological distresses and coping strategies among rescue workers especially firefighters and civil defences involved in flood disaster in Kelantan specifically and even in Malaysia generally. Most of the studies were about the victims of the disaster. In response to this notable gap in the previous literature, the present study was intended to investigate the relationship between psychological distress and coping strategies among rescue workers, especially firefighters and civil defense force involved in the flood which occurred in Kelantan in December 2014 so that preventive measure could be issued.

CHAPTER 2: LITERATURE REVIEW

2.1. Prevalence of psychological distress among rescue workers following disaster

Psychological distress among rescue workers may be resulted from direct traumatic effect of the disaster itself as well as from the burden of physical exhaustion and lack of sleep and rest. Employment of certain coping strategies and sociodemographic profiles of the rescue workers may determine the development of psychological distress among them during the disaster.

Most rescue workers experienced mild, normal stress reactions, and such disaster experiences may promote personal growth. However, several studies have found that one third of rescue workers at some point experiences psychological distress (C S Fullerton, Ursano and Wang, 2004).

Highly distressing events usually described by firefighters include disaster or an accident with multiple casualties, a severely injured member of the rescue team, incidents involving the traumatic death or injury of a child, and a victim who is known to the firefighter (Wagner and Martin, 2012).

Rescue workers, such as firefighters and civil defence force is a challenging profession, physically and psychologically. Their tasks are not only to cease the fire, but also to search and rescue in other disasters, such as floods, earthquakes, '*Tsunami*s, airplane crashes and many more.

They are the first liner rescue workers deployed to the affected location as soon as the disasters occurs. Thus, they may inherent many risks, including the development of mental health symptoms, e.g., Posttraumatic stress disorders (Wagner and Martin, 2012). These first responders are exposed to life-threatening situations, work with survivors and families, and often recover the dead and injured victims (Carol S. Fullerton, Ursano and Wang, 2004).

Ample of the epidemiology around rescue worker concerning their mental well-being has gathered from studies following single major traumatic events, such as aircraft disasters (Huizink *et al*., 2006; Pietrzak *et al*., 2014) and bushfires (McFarlane, 1989). However, rescue workers are often exposed to multiple critical events across their professions. As the risk of developing PTSD increases with the number of exposures to traumatic events (Brewin *et al*., 2000), it is vital to consider the impact of cumulative trauma experience among rescue workers.

Generally, the prevalence of psychological distress among rescue workers are 10-20%, less than direct victims (30-40%) but more than the general population (5-10%) (Galea, Nandi and Vlahov, 2005; Neria, Nandi and Galea, 2008). Most studies examining the mental health of rescue workers have focused exclusively on PTSD, with a recent meta analysis of 16 studies suggesting that 7% of current firefighters suffer from PTSD (Berger *et al.*, 2012).

However, small number of studies which have studied this question have produced mixed results. Some of the study found that the number of distressing missions undertaken by fire- fighters predicted PTSD symptoms (Wagner, Heinrichs and Ehlert, 1998). However, there was also a study that reported that

the number of critical incidents attended by fire-fighters did not predict diagnosis of PTSD (Meyer *et al.*, 2012).

While some preliminary study have revealed that fire-fighters who were exposed to a greater number of trauma types had an increased risk of mood and alcohol use disorders (Kaufmann *et al.*, 2013), others have concluded that there was no association between the number of critical incidents attended by fire-fighters and common mental disorders (Meyer *et al.*, 2012). Resolving these inconsistencies is crucial in developing a better understanding of the risks handled by rescue workers and in formulating strategy and intervention responses that can emphasis on those who are at an utmost risk (Harvey *et al.*, 2015)

Rescue workers have high levels of post-traumatic stress disorder (PTSD) symptoms and rates of PTSD that ranged from 11% to 32% (Carol S. Fullerton, Ursano and Wang, 2004). Another study in a group of search and rescue workers two months after 2003 Bingol (Turkey) earthquake found that the frequency of PTSD was 25% (Ozen and Sir, 2004). While this represents a prevalence of PTSD far in excess of that seen in the general population (Creamer, Burgess and McFarlane, 2001; Galea, Nandi and Vlahov, 2005; Neria, Nandi and Galea, 2008).

A study conducted in Taiwan to determine the characteristics of psychological distress and its psychosocial predictors in rescue workers within a 2-month period after an earthquake that struck central Taiwan on September 21,

1999 indicated that prevalence of general psychological distress is high, which was about 20% (Shih-Cheng Liao, 2002).

Another longitudinal study was done at six and eighteen months' post disaster by using the Impact of Event Scale-Revised to examine factors contributing to post-traumatic stress disorder symptoms (PTSD) and subjective health complaints in volunteers working in an earthquake setting. They have found that at six months post-earthquake on May 2006 in Yogjakarta and Central Java, 28% of the volunteers reported a high level (above cut off score of 33) of PTSD symptoms severity and 20.5% at eighteen months (Thormar, Berthold P.R. Gersons, *et al.*, 2014).

2.2. Factors associated with psychological distress among rescue workers

From literature searching and review, few factors were identified to be associated with psychological distress amongst rescue workers that were involved with search and rescue task during or after the disaster.

Firstly, a previous study demonstrates that rescue workers who used emotion-focused coping strategies such as denial, focus and venting on emotion, self-blame and humour were significantly associated with psychological distress among firefighters in Northern Ireland (Brown, Mulhern and Joseph, 2002). Fewer other studies had supported this findings (Beaton *et al.*, 1999; Clohessy and Ehlers, 1999; Corneil *et al.*, 1999; Prati, Pietrantoni and Cicognani, 2011).

Most of the previous literatures reported that, problem-focused coping strategy was usually resilience and work as protective factors among rescue workers during the disaster. However, a study found that problem-focused coping strategy could also be associated with psychological distress (Marmar *et al.*, 1996).

Another factors that were associated with psychological distress in workers who worked during the disaster were younger age group (Green *et al.*, 1997; C S Fullerton, Ursano and Wang, 2004; Sakuma *et al.*, 2015), female, lower education background, predisaster psychopathology disaster injury and traumatic events (North, Oliver and Pandya, 2012; Cheng *et al.*, 2014) whereas according to previous studies, good organizational, social support and proper pre-disaster training were considered as protective factors from psychological distress, cross sectionally (Alvarez and Hunt, 2005; Perrin *et al.*, 2007; Thoresen *et al.*, 2009) and longitudinally (Brooks *et al.*, 2016).

2.3. Conceptual Framework

In this conceptual framework of the study, the association between PTSD, Depression, Anxiety and Stress with coping strategies and sociodemographic factors among Firefighters and Civil Defence Force rescue workers involved in the 2014 massive flood disaster in Kelantan had been tested. IES-R instrument was used to measure the PTSD, while malay validated DASS 21 instrument was used to measure the Depression, Anxiety and Stress. Brief COPE scale was used to measure types of coping strategies.

Sociodemographic profiles such as age, gender, marital status, education level, total household income, job characteristic such as rank, experience as rescue worker, pre-disaster training, psychological first aid training, and flood related events were included to see their association with PTSD, depression, anxiety and stress among the rescue workers. This was summarised in Figure 3.1.

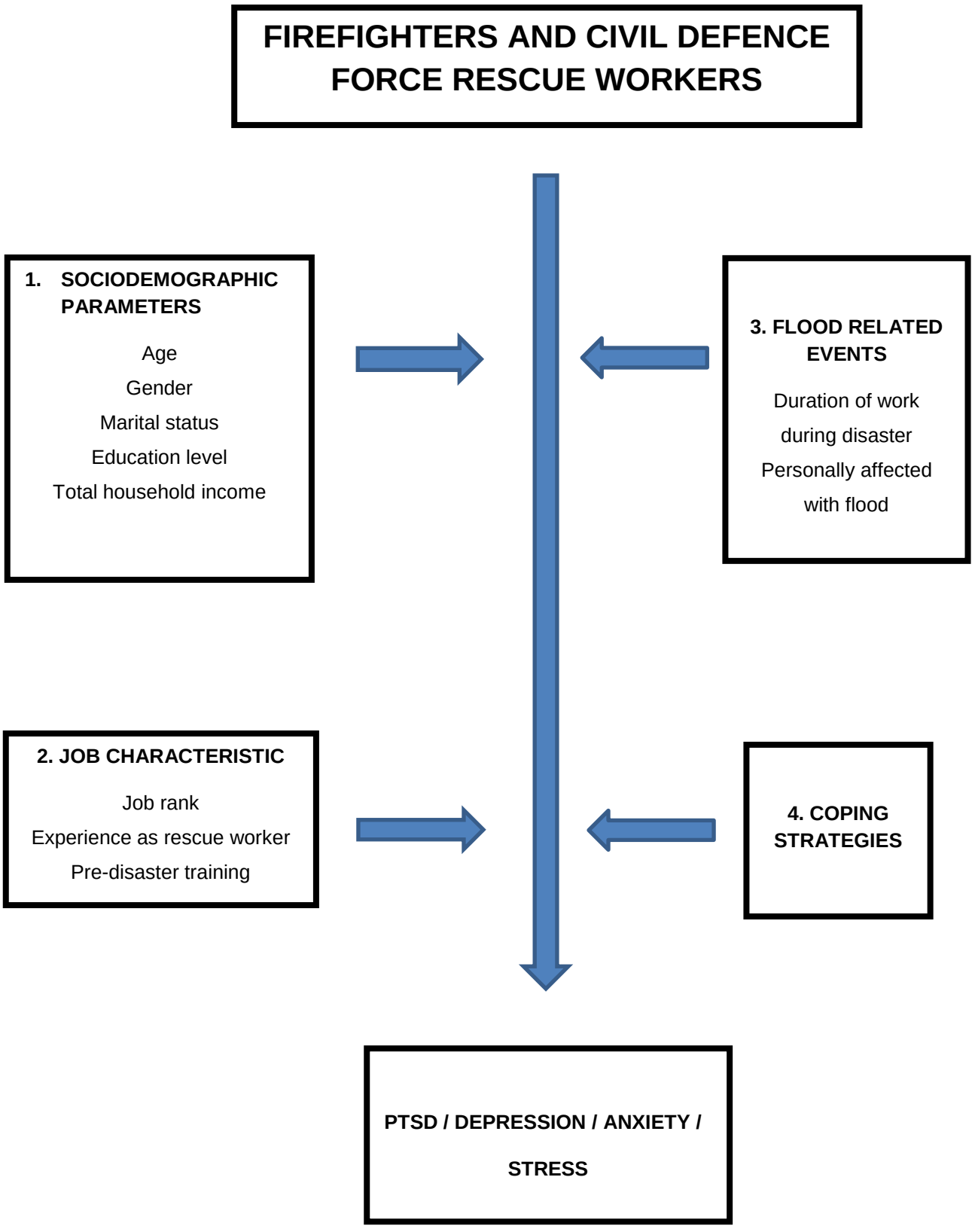

Figure 3.1 : Research Conceptual framework

CHAPTER 3: OBJECTIVE AND RESEARCH QUESTIONS

This section will represent the general objective, specific objective, research questions, hypotheses, and the conceptual framework of the study.

3.1 General objective

The aim of this study is to determine the prevalence of psychological distress and associated factors among firefighters and civil defence force rescue workers involved in the 2014 massive floods disaster in Kelantan.

3.2 Specific objectives

1. To determine the prevalence of psychological distress (PTSD, Depression, Anxiety and Stress) among firefighters and civil defence force.

2. To determine the associations between psychological distress and identified factors among firefighters and civil defence force. The identified factors include :

    a. socio-demographic characteristic,

    b. coping strategies,

    c. job characteristic and flood related events.

3.3 Research questions

1. What is the prevalence of psychological distress (PTSD, Depression, Anxiety and Stress) among firefighters and civil defence force?

2. Are there any associations between psychological distress and socio-demographic characteristic, coping strategies, job characteristic and flood related events?

3.4. Hypotheses

1. The prevalence of psychological distress (PTSD, Depression, Anxiety and Stress) among firefighters and civil defence force are high.

2. There are significant associations between psychological distress and socio-demographic characteristic, coping strategies, job characteristic and flood related events.

CHAPTER 4: METHODOLOGY

In this chapter, the methodology of this study will discuss and further be divided into study setting, type of study, population and sample, selection criteria, determination of sample size, method of data collection, instruments, ethical issues, data entry, statistical analysis and flow chart of the study.

4.1 Study Setting

This study was conducted at three Malaysian Fire Brigade and Malaysian Civil Defence Force Department involved during 2014 massive flood disaster in Kelantan, Malaysia which were Kuala Krai, Tanah Merah and Kota Bharu. These locations were chosen because it was amongst the area that were badly affected with flood disaster with high number of victims (Berita Harian, 2014). The rescue center in these areas were involved directly and closely with the rescue and search tasks.

4.2 Study Design

This was an observational cross-sectional study to determine the prevalence of psychological distress in relation to the coping strategies and the socio-demographic characteristics.

4.3 Study Period

The data collection was conducted from the 3rd of July 2015 until the 17th of July 2015 (2-weeks duration). The reason for the data collection to be conducted

within this two-weeks period was to measure the psychological distress among rescue workers exactly six months after the flood disaster (floods occurred starting 15th dec 2014 until 3rd Jan 2015) as well as so that there were no significant differences in the assessment days between each participant in order to reduce the possibility of biasness.

4.4. Reference Population

The reference population for this study was all firefighters and civil defence force rescue workers in Kelantan. According to Kelantan Fire Brigade and Kelantan Civil Defence Force Department, the total of firefighters and civil defence force rescue workers that were involved with the massive 2014 flood disaster in Kelantan were 850 and 725 personnels, respectively.

4.5. Source Population

Malaysian firefighters and civil defence force rescue workers that had been involved during the massive floods disaster in Kelantan (between 15th December 2014 and 03rd Jan 2015)

4.6 Study sample

Subject that has been selected from the sampling frame through non-probability convenience sampling and screened to fulfill inclusion and exclusion criteria.

Malaysian firefighters and civil defenses that had been involved during the floods disaster in Kelantan (between 15th Dec 2014 and 03rd Jan 2015) were selected via non-probability convenient sampling and fulfilled inclusion and exclusion criteria as listed below:

4.6.1. Inclusion criteria

1. Firefighters and Civil defenses on duty and involved during the 2014 flood disaster in Kelantan (between 15th Dec 2014 and 03rd Jan 2015).
2. Age between 18 to 60 years' old
3. Able to read and write in Bahasa Melayu. Thus, understands the questionnaire (i.e., no language barrier between data collectors and subjects).

4.6.2. Exclusion criteria

1. Has been diagnosed or receiving treatment for major psychiatric illnesses.
2. Subject with organic CNS disease, cognitive impairment or mentally retarded.
3. Staff that was onleave.
4. Staff with office duty only.

4.7. Sampling method

Non-probability convenience sampling method was applied in this study. All participants who fulfilled the inclusion criteria within the study period were recruited. This method was preferred due to the limitation of time and resources. Out of 1575 of the rescue workers involved in the massive flood disaster in Kelantan, a total of 180 of the rescue workers fulfilled the inclusion criteria as listed by Fire and Rescue Department as well as Civil Defence Force of Kelantan.

All participants who fulfilled the inclusion criteria within the study period were offered for recruitment.

4.8. Study subjects

The principle researcher with the helped of trained research assistants approached all eligible rescue workers who fulfilled the study criteria. They were approached directly and not through their rank officer. The involvement in this research was on voluntary basis. Detailed explanation of the study was given and written consent was obtained using the approved concent form endorsed by the Ethics Committee of USM.

Once participants have given their written consent, research tools which consisted of the sociodemographic data sheet, Impact Event Scale Revised (IES-R) Malay version, Depression Anxiety Stress Scale 21 (DASS 21) Malay Version and the Brief COPE Malay Version were given to them. They were asked to complete it. Researcher and research assistants were readily available to help the participants. Once participants had completed, the data sheets were collected and coded for data analysis.

4.9. Sample size determination

All objectives were considered for the sample size determination.

4.9.1. Calculation for objective 1:

To determine the prevalence of psychological distress among firefighters and civil defence force rescue workers:

Calculation was made using **single proportion formula**.

a) (PTSD):

Sample size was calculated with the following formula (Daniel, 1999; Naing, Winn and Rusli, 2006)

$$n = \frac{Z^2 P (1-P)}{d^2}$$

n = sample size,
Z = Z statistic for a level of confidence (1.96),
d = precision (0.06),
P = prevalence or proportion. For **objective one (a) (PTSD)**, P is set to **0.17** based on the prevalence from previous study of 16.7% Posttraumatic Distress (PTSD) and Coping Strategies among Rescue Workers five months after an Earthquake in Taiwan (Chang *et al.*, 2003) using the same Impact Event Scale Revised (IES-R). As such P is 0.17.

PTSD (Chia, 2003): $n = \frac{1.96^2 \times 0.17 (1-0.17)}{0.06^2}$

= 151 number of samples

[Investigator used a larger d (0.06) instead of 0.05 due to limitation of resources, as most of the rescue workers were unable to participate with this study despite them being a fulfilled inclusion criteria, as they need to be onstandby for emergency cases during the data collection period] (Naing, Winn and Rusli, 2006)

b) (Depression):

Sample size was calculated with the following formula (Daniel, 1999; Naing, Winn and Rusli, 2006)

$$n = \frac{Z^2 P (1-P)}{d^2}$$

n = sample size,

Z = Z statistic for a level of confidence (95% = 1.96),

d = precision (0.05),

P = prevalence or proportion. For **objective one (b) (Depression)**, P is set to **0.04**, based on the prevalence from previous study of 3.8% Depression in Rescue Workers after the Gigantic tsunami following The Great East Japan Earthquake in 2011(Sakuma *et al.*, 2015).

Depression (Sakuma *et al.*, 2015) : $n = \frac{1.96^2 \times 0.04 (1-0.04)}{0.05^2}$

= 60 number of samples

c) Anxiety:

Sample size was calculated with the following formula (Daniel, 1999; Naing, Winn and Rusli, 2006) :-

$$n = \frac{Z^2 P (1-P)}{d^2}$$

n = sample size,

Z = Z statistic for a level of confidence (1.96),

d = precision (0.05)

P = prevalence or proportion. For **objective one (c) (Anxiety)**, P is set to **0.11** based on the prevalence from previous study of 10.8% anxiety among Rescue Workers after an Earthquake in Taiwan (Shih-Cheng Liao, 2002).

Anxiety (Shih-Cheng Liao, 2002): $n = \frac{1.96^2 \times 0.11 (1-0.11)}{0.05^2}$

= 151 number of samples

d) Stress:

Sample size was calculated with the following formula (Daniel, 1999; Naing, Winn and Rusli, 2006):-

$$n = \frac{Z^2 P (1-P)}{d^2}$$

n = sample size,
Z = Z statistic for a level of confidence (95% = 1.96),
d = precision (0.06).
P = prevalence or proportion. For **objective one (d) (Stress)**, P is set to **0.16**, based on the prevalence from previous study of 16.4% Stress among rescue workers after a major earthquake in Taiwan (Shih-Cheng Liao, 2002).

Depression (Shih-Cheng Liao, 2002): $n = \frac{1.96^2 \times 0.16 (1-0.16)}{0.06^2}$

= 144 number of samples

[Investigator used a larger d (0.06) instead of 0.05 due to limitation of resources, as most of the rescue workers were unable to participate with this study despite them being a fulfilled inclusion criteria because they need to be on standby for emergency cases during the data collection period] (Naing, Winn and Rusli, 2006)

4.9.2. Calculation for objective 2 (Multiple Logistic Regression):

Sample size was calculated with the following Cohen formula (Cohen, 1992) :-

In the above table, the researcher has decided to use a set of six independent variables, base on previous study by using Multiple Logistic Regression, where they found six independent variables to be positively associated with