



**A Comparative Study of Knowledge and Perceived Skills Regarding Tsunami  
Disaster Nursing During Recovery Phase Between Public Health Nurses  
Working in Tsunami Affected and Non-Affected Areas in  
Aceh Province, Indonesia**

**Maulidar**

**A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of  
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**Thesis Title** A Comparative Study of Knowledge and Perceived Skills Regarding Tsunami Disaster Nursing During Recovery Phase Between Public Health Nurses Working in Tsunami Affected and Non-Affected Areas in Aceh Province, Indonesia

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### **ABSTRACT**

The 2004 tsunami was a huge catastrophe which had a devastating impact on public health in many communities in Indonesia and around the Indian Ocean. Dealing with a massive natural disaster such as this tsunami is a long-term process and places high demands on nursing personnel during the recovery phase, and requires adequate knowledge and skills from all involved, including the public health nurses. This descriptive comparative study aimed to describe and compare the levels of knowledge and perceived skills of public health nurses working in the tsunami affected and non-affected coastal areas in Aceh Province, Indonesia. There were 118 public health nurses from the tsunami affected areas and 107 public health nurses from the tsunami non-affected areas were purposively recruited for the study. The data were obtained using self-reported questionnaires. Mann Whitney U test was used to identify differences in the mean ranks of knowledge and perceived skills between the two groups.

Descriptive statistics showed that the majority of subjects in the affected areas were female (95.8%), 31-40 years old (52.5%), married (91.5%),

educated at the diploma level (73.7%), had 5-10 years working experience (60.2%), and had more than one year experience in providing care for tsunami victims (43.2%). For subjects in the non-affected areas, most were also female (86.9%), were 21-30 years old (55.1%), married (76.6%), educated at the diploma level (88.8%), and had working experience for less than five years (52.3%). Overall, the total mean scores of knowledge regarding tsunami disaster nursing were at a low level for subjects in both the affected ( $M = 65.95\%$ ,  $SD = 7.45$ ) and non-affected areas ( $M = 63.27\%$ ,  $SD = 8.12$ ). Also, the total mean scores of perceived skills regarding tsunami disaster nursing were also at a low level for both the affected ( $M = 66.16\%$ ,  $SD = 10.15$ ) and non-affected areas ( $M = 52.42\%$ ,  $SD = 11.54$ ).

The study found that subjects in the affected areas had a significantly higher mean rank of overall knowledge regarding tsunami disaster nursing than those in the non-affected area (122.35 versus 102.69,  $Z = 2.27$ ,  $p < .05$ ). Furthermore, the findings also showed that subjects in the affected areas had significantly higher overall perceived skills regarding tsunami disaster nursing than those in the non-affected area (146.11 versus 76.48,  $Z = 8.01$ ,  $p < .01$ ). This study revealed that experience and training contributed to knowledge and perceived skills of public health nurses. Also, public health nurses, either in tsunami affected or non-affected areas have to improve their knowledge and skills to prepare for possible future tsunami disasters.

**Keywords:** Community, Knowledge, Perceived skills, Public health nurses, Tsunami

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Maulidar

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# CHAPTER 1

## INTRODUCTION

### *Background and Significance of the Study*

On December 26, 2004, a huge earthquake which was estimated at between 9.0 and 9.3 on the Richter scale occurred in the Indian Ocean. It was the second or third largest earthquake ever recorded and triggered a mega tsunami. The tsunami had an unprecedented effect, killing over 250,000 people in 14 countries around the Indian Ocean (Strand & Masek, 2007; Thorburn, 2007). The most devastating effect of this catastrophe was felt in the Indonesian province of Aceh, where an estimated 126,741 people died (3% of the population of Aceh Province), 93,285 people were missing and more than 500,000 Acehnese were displaced (the Executive Agency of Rehabilitation and Reconstruction for Aceh and Nias, 2009). 7,195 people were categorized as severely injured, and were hospitalized. During the next few weeks after the tsunami, another 300,000 patients would present to seek health care services (Zoraster, 2005).

After the tsunami, a variety of health problems arose, ranging from environmental to acute and chronic physical illness. Because of the large scale of devastation, most essential services were affected. The water reticulations were heavily damaged and contaminated. The waste disposal program was also disrupted (Byleveld, Kent & McCall, 2005). Consequently, the disruption of these services greatly increased the risk of outbreak of any of several, including, according to the World Health Organization (WHO, 2005), water-borne diseases, diseases related to overcrowding, vector-borne diseases and food-borne diseases.

Psychological problems also arose during the tsunami aftermath. As a major disaster, it affected the psychological health and livelihoods of hundreds thousands of people with resulting psychiatric disabilities, many of which were serious and long lasting. A five-day study in the International Committee of the Red Cross (ICRC) hospital, nine weeks after the tsunami, was conducted by Redwood-Campbel and Riddez (2006). This study aimed to screen basic depression and post traumatic stress disorder (PTSD), and found that although less than 2% of the patients were diagnosed with an actual mental health problem, 24% had at least four symptoms of depression/PTSD.

After the 2004 tsunami, there have been eleven more tsunamis reported in Indonesia, the most devastating of which occurred on Java Island on July 17, 2006 which was responsible for 668 deaths (National Geographical Data Center, 2010). As of the writing of this thesis, the most recent occurred on October 26, 2010 in Mentawai Island, on the western part of Sumatra Island, which caused 445 deaths (Sinar Indonesia Online, 2010). There is no coastal area in Indonesia which is safe from tsunami, except the west coast of Borneo and the east coast of Sumatra (Muhari, Diposaptono, & Imamura, 2007). The high intensity of earthquakes and tectonic activities in Indonesia has placed this country in a tsunami prone area. Earthquakes often occur in Indonesia. The Meteorology and Geophysics Agent of Indonesia (2010) reported that over 60 earthquakes with magnitude above 5 on the Rischter scale occurred in Indonesia from only August 17, 2010 to October 24, 2010. Among them, seven occurred in Aceh Province, Indonesia.

In any massive scale disaster event such as a tsunami, there is a wide range of health workers who provide health services. The WHO (2006a) reported that



in most cases, nurses are the largest group. They are frontline workers who provide a wide range of health services, which include promotive, preventive, curative, rehabilitative and supportive care to individuals, families and groups. In other words, nurses have an active role before, during, and after disasters.

Public health nurses provide specific tasks and actions in all phases of a disaster. The response phase is usually short (hours and days), but the recovery phase is usually measured in weeks and months as it attempts to return the people's lives to normal. Thus the recovery phase of a disaster makes the highest demands on the nursing personnel who are working to minimize the impacts on community health. To be effective during such a recovery phase, nurses need to be dispatched for a longer time than in the response phase. Therefore, it is important that public health nurses have sufficient knowledge and skills to work effectively during the recovery phase of a disaster and play their roles in assuring the effectiveness of the recovery process (Mitani, Kuboyama, & Shirakawa, 2003).

Many factors contribute to nurses' knowledge and skills on disaster nursing, including experience and disaster-related training attendance. Previous involvement in disaster response helps nurses to strengthen their professional competency, reinforce their commitment to nursing, and lead them to have positive life goals (Shih, Liao, Chan, Duh & Gau, 2002). Disaster-related training for healthcare workers is also considered as an important factor to enhance their knowledge and skills in dealing with disasters. Disaster training can increase knowledge about disaster plans (Idrose, Adnan, Villa & Abdullah, 2007), disaster topics (Gershon, Gemson, Qureshi & McCollum, 2004), and also increase their

confidence in clinical skills and mental health intervention preparedness in disaster situations (Reid et al., 2005).

In Aceh Province of Indonesia, after the 2004 tsunami, public health nurses in the affected areas provided health services to the tsunami victims. They were in charge of the survivors' camp health centers, identified diseases to prevent outbreaks, found PTSD cases, performed health campaigns, and were active in local communicable diseases surveillance and monitoring programs. Various training programs were also offered for a range of health workers such as nurses, physicians and midwives in tsunami affected-areas. These programs were part of the relief aid offered by local and international agencies. The United States Agency for International Development (USAID, 2007), in their report 3 years after the tsunami, stated that they had trained 97 public health nurses, 33 doctors in mental health nursing, 150 midwives, and 150 psychosocial caregivers. Specifically for nurses, the Medical Emergency Relief International (Merlin, 2005) with assistance from the WHO and the University of Indonesia also provided a 2-month community health training program for 120 public health nurses from four districts in devastated coastline areas. The training topics included immunization, communicable disease surveillance, environmental health, mental trauma, nutrition, hygiene promotion, support for disaster victims and community care.

It can be assumed that in Aceh Province of Indonesia, public health nurses working in the previous tsunami-affected area have experience in caring for tsunami victims in the community. They also have received some training as part of the relief effort from both local and international organizations. Thus it is clear that there are some conditions which affect the knowledge and skills of public health

nurses who work in the tsunami affected areas as compared to those working in areas not directly affected by the tsunami. Therefore, it is important to compare the knowledge and perceived skills of tsunami disaster nursing between public health nurses working in the tsunami affected and non-affected areas in Aceh Province. As public health nurses who work in coastal areas, both in the previous tsunami-affected and non-affected areas need to meet minimum standards of knowledge and skills in providing care to tsunami-affected communities due to the high risk of another tsunami in the future. The comparison of public health nurses' knowledge and perceived skills between both areas can enhance understanding about factors influencing the nurses' knowledge and skills related to tsunami disaster nursing. Factors related to nurses' knowledge and skills such as experience in caring for tsunami victims, training attendance and self-preparedness of nurses are investigated. This knowledge will help to prepare public health nurses to be competent in tsunami disaster nursing for possible future tsunamis.

### *Objectives of the Study*

The objectives of this study were as follows:

1. To identify the level of public health nurses' knowledge regarding tsunami disaster nursing in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia
2. To identify the level of public health nurses' perceived skills regarding tsunami disaster nursing in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia

3. To compare the level of knowledge regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia
4. To compare the level of perceived skills regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected coastal areas in Aceh province, Indonesia

#### *Research Questions of the Study*

This study aimed to answer the following research questions:

1. What are the levels of public health nurses' knowledge regarding tsunami disaster nursing in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia?
2. What are the levels of public health nurses' perceived skills regarding tsunami disaster nursing in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia?
3. Is there a difference in knowledge levels regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia?
4. Is there a difference in perceived skills levels regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected coastal areas in Aceh Province, Indonesia?

### *Conceptual Framework of the Study*

This study aimed to describe and compare the levels of knowledge and perceived skills between public health nurses working in tsunami affected and non-affected areas in Aceh Province, Indonesia. Public health nurses who work in areas previously affected by a tsunami have experience in providing care to tsunami victims' communities. Experience in a previous disaster can influence knowledge and skills of nurses. In their study, Suserud and Haljamae (1997) found that experienced nurses can act better in disaster situations in such things as surveying the situation, performing triage, starting basic life support and having good communication skills during the event.

In this study, the concepts of knowledge and skills regarding tsunami disaster nursing only focused on the recovery phase following a disaster. According to Veenema (2007), the recovery or post impact phase of a disaster is counted 72 hours after the event, and should primarily focus on stabilizing and returning the community to a normal situation. Wisner and Adam (2002), however, mentions that there is no distinct point at which immediate response changes into recovery and then into long-term sustainable development. Progress in some areas will probably be quicker than in others. Moreover, McEntire, Fuller, Johnson and Weber (2002) also mention that often the activities in the disaster phases are complex and overlap. It is also difficult to differentiate an exact time for each phase since the nature of each disaster event is different from others.

Knowledge regarding tsunami disaster nursing consists of knowledge about the public health impacts of a tsunami and tsunami disaster nursing in community. One aspect of public health nurses' competency in the recovery phase of

a disaster, according to Polivka et al. (2008) is assessing the immediate and long-term public impacts of the disaster. Keim (2006) stated that a tsunami has enormous impact on public health including mortality, morbidity, environmental impacts, psychosocial and mental impacts and disease outbreaks. The concepts of tsunami disaster nursing have been developed based on public health nurses' roles in the recovery phase of a tsunami disaster, and are largely derived from Hassmiller (2000), Polivka et al. (2008), and Veenema (2007). The essential knowledge and skills regarding tsunami disaster nursing are mental health care, psychosocial care, spiritual care, surveillance and outbreak investigation; and primary care services after tsunami (Figure 1).

According to Bryant (2006), the initial step of the recovery process is the early identification of people at high risk of developing psychiatric disorders among the disaster victims. Mental health care for tsunami victims comprises psychological triage, mental health referral, psychological first aid, and psychological intervention. Psychosocial care consists of assessment of psychosocial issues, provision of early psychosocial intervention, essential psychosocial support for adults, psychosocial support for children and adolescents, and evaluation of psychosocial interventions. Spiritual care is comprised of spiritual assessment, intervention and evaluation. According to Bloemhard (2008), spiritual care could be described as interventions that can lift up people's spirits, and which are aimed to support spiritual needs and alleviate spiritual distress after a disaster such as tsunami.

The basic principles of post-tsunami surveillance are not different from general surveillance in other settings. Epidemiologic surveillance after a tsunami involves rapid assessment of distribution and determinants of tsunami-related health mortality; and morbidity including injury, illness and disease outbreaks in the

population affected (Glass & Noji, 1992). In the aftermath of a tsunami, primary health care services aim to preserve the health status of tsunami survivors, reduce morbidity and prevent disease outbreaks. The essential primary care services include food provision and nutritional support, vaccinations, water supply and sanitation, health education, shelter management, vector control, and collaboration and referral services (International Committee of the Red Cross, 2006; Veenema, 2007).

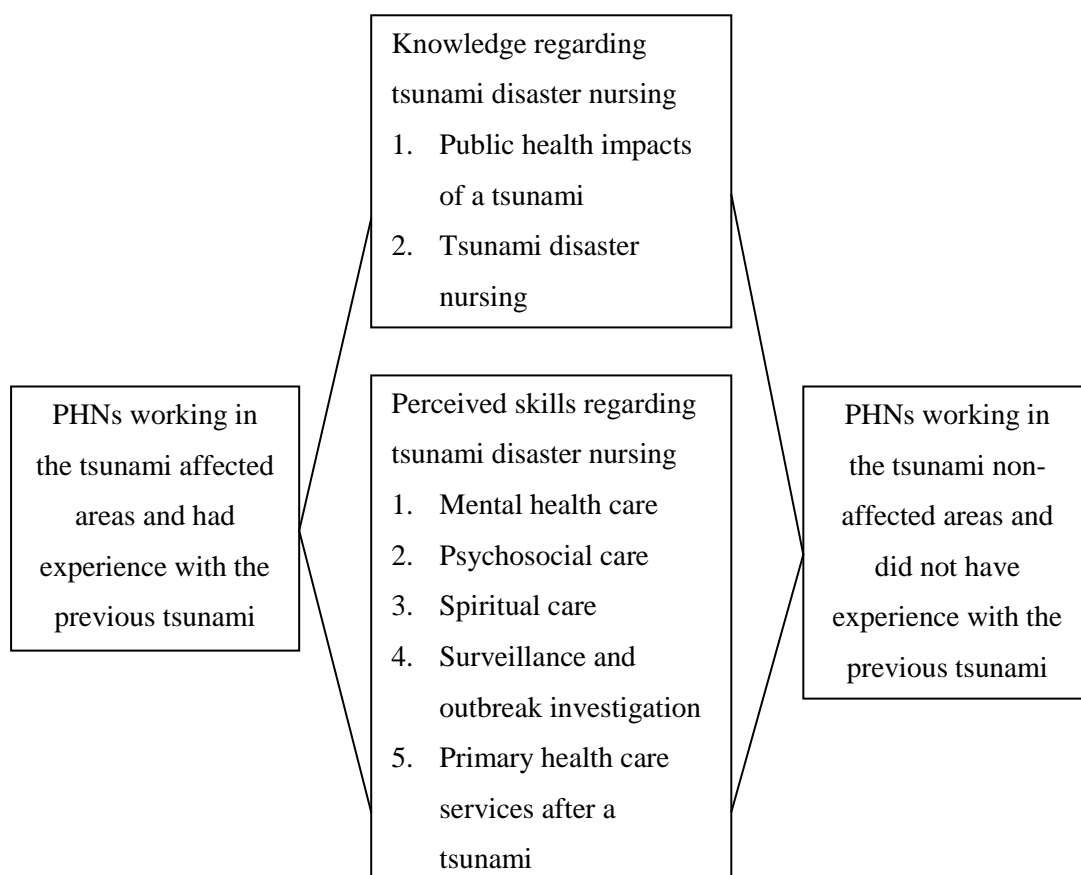


Figure 1: Conceptual framework of the comparative study of knowledge and perceived skills regarding tsunami disaster nursing between PHNs working in tsunami affected and non-affected areas

### *Hypothesis*

Public health nurses working in tsunami affected areas have higher level of knowledge and perceived skills regarding tsunami disaster nursing than those of public health nurses working in non-affected areas in Indonesia.

### *Definition of Terms*

*Knowledge regarding tsunami disaster nursing* was defined as ability of public health nurses to understand concepts or information related to tsunami disaster and the particular nursing practice related to this disaster based on their roles and public health tasks in the recovery phase of a tsunami disaster. This includes knowledge related to the public health impacts of a tsunami and tsunami disaster nursing practices.

*Perceived skills regarding tsunami disaster nursing* was defined as public health nurses' perceived ability to perform specific required tasks based on public health nurses' roles in the recovery phase of a tsunami disaster. These tasks include mental health care, psychosocial care, spiritual care, surveillance and outbreak investigations; and primary health care services after tsunami.

### *Scope of the Study*

This study was conducted in public health centers where public health nurses work in both tsunami affected and non-affected areas in Aceh Province, Indonesia during the 2004 tsunami. The selected affected areas were Banda Aceh Municipality and Aceh Besar District, which were both severely hit by the tsunami on 26 December 2004. The selected non-affected areas were Langsa Municipality and



Aceh Timur District. The study was conducted during May to July 2010 (before the most recent tsunami in October 2010).

### *Significance of the Study*

This study would be benefit in nursing practice, nursing education and public health policy. For nursing practice, the results of this study provide useful information about public health nursing practices, particularly in evaluating the knowledge and skills of public health nurses, and preparing them to deal effectively with future tsunami disasters and their impacts. For nursing education, the findings of this study provide the baseline data which can be used to develop appropriate nursing disaster curricula, specifically for community and public health nurses. While for public health policy, the results of this study provide useful data which can be used to develop appropriate training programs for public health workforce, especially for public health nurses.

## **CHAPTER 2**

### **LITERATURE REVIEW**

The literature review for this study included overview of tsunamis, the Indonesia healthcare system after the 2004 tsunami, public health nurses' knowledge regarding tsunami disaster nursing, public health nurses' skills regarding tsunami disaster nursing and factors related to knowledge and skills of public health nurses regarding tsunami disaster nursing. The literature review is thus divided into the following sections:

1. Overview of Tsunamis
2. The Indonesia Healthcare System after the 2004 Tsunami
3. Disaster Management Phases
4. Public Health Nurses' Knowledge and Skills Regarding Tsunami Disaster Nursing
  - 4.1 Public Health Impacts of a Tsunami
  - 4.2 Tsunami Disaster Nursing in Community
    - 4.2.1 Mental Health Care
    - 4.2.2 Psychosocial Care
    - 4.2.3 Spiritual Care
    - 4.2.4 Surveillance and Outbreak Investigation
    - 4.2.5 Primary Health Care Services After a Tsunami
5. Factors Related to Knowledge and Skills of Public Health Nurses Regarding Tsunami Disaster Nursing
6. Summary of Literature Review

### *Overview of Tsunamis*

The word “tsunami” is Japanese in origin from the root words for harbor (tsu) and wave (nami), which completely means “harbor wave”. A tsunami is an ocean wave or series of waves generated by any large disruption on the ocean floor which displaces a large water mass from its equilibrium. A tsunami can be caused by an earthquake, underwater landslide or volcanic eruption. The most common cause is a submarine earthquake. In general, the earthquake has to be at least at a magnitude of 7 on the Richter scale to produce a tsunami. Following such an earthquake, a tsunami can reach the beach within a few minutes and do enormous damage to the coastline. On the coastline, tsunami waves are between 10 and 20 feet high on average, although mega tsunami waves have been recorded at more than 100 feet high (Boyarsky & Shneiderman, 2002).

A tsunami is a catastrophic event with many devastating aspects. It can cause widespread death, mostly due to drowning (Wattanawaitunechai, Peacock & Jitpratoom, 2005). A tsunami also causes ecological damage and loss of vital community infrastructure (Byleveld et al., 2005). Similar to other disasters, mental and psychosocial problems also arise in the tsunami aftermath. Mental health problems such as depression and post traumatic stress disorder (PTSD) were widely reported following the 2004 tsunami (Redwood-Campbel & Riddez, 2006). Public infrastructures such as health centers and medical facilities were destroyed or damaged by the tsunami which worsens the condition of injured victims when they face delays received treatment (WHO, 2005).

Tsunamis have destroyed communities, creating often large numbers of internally displaced persons. Most such victims have no recourse but to stay in

temporary camps. Following the 2004 tsunami, the public health impacts from such camps included high rates of communicable diseases, an elevated prevalence of acute malnutrition, and high mortality rates (Wilder-Smith, 2005). Overcrowding condition was high risk for diseases transmission such as measles, influenza, meningitis, acute respiratory infection, and TB (WHO, 2005).

#### *Indonesian Health Care System after the 2004 Tsunami*

Indonesian healthcare system is also disrupted by the tsunami disaster due to damage of the health system infrastructure and also loss of health human resources (Carballo, Daita & Hernandez, 2005). Following the 2004 tsunami, many countries reported disruptions to the health infrastructure system. In Indonesia, the International Committee of the Red Cross (ICRC) reported that 80% of the health centers on the west coast and 35% on the east coast of Aceh were destroyed, and the main tertiary hospital in Aceh province was also affected (Redwood-Campbel & Riddez, 2006). The Country Presentation of the Republic Indonesia (2005) reported at the 2005 WHO Conference that 691 health personnel were tsunami victims, of which 250 died and 441 were missing.

In Indonesia, public health nurses work in public health centers or *Puskesmas*. *Puskesmas* are health care services at a sub district level which provide primary health care services for their community. The tsunami relief programs at the sub district level were conducted by *Puskesmas*. During that time, the *Puskesmas* focused on promoting health to the tsunami survivors, especially for vulnerable persons such as pregnant women, the elderly, and children. The health care services offered by the *Puskesmas* included providing basic necessities such as food, water,

drugs, and basic equipment. Public health nurses played an important role in the relief effort following the tsunami. They were in charge of health centers provided in the temporary shelters, which also provided health education, health and hygiene promotion, water sanitation, vaccination, surveillance and monitoring for communicable diseases (Sumargono et al., 2005).

### *Disaster Management Phases*

Tsunami disaster management can be defined as a systematic process of using knowledge, skills and resources to mitigate, respond to and recover from the adverse effects of a tsunami disaster. Much literature is available which describes the public health worker's role in disaster management. One of the main roles of public health workers is to act as first responders following a disaster. Public health nurses as part of public health workers comprise the largest group that work in public health sector. Therefore, competent public health nurses are important in assuring the effectiveness of a public health workforce. (Cross, et al., 2006).

Hassmiller (2000) classified disaster management in to three phases, namely preparedness, response and recovery. Public health nurses have specific roles in each phase, which are as follows:

#### *Preparedness*

Preparedness refers to systematic planning designed to address disaster response prior to its occurrence (Veenema, 2007). In terms of the preparedness stage for a tsunami, nurses actively participate in tsunami disaster planning. Nurses also act to facilitate preparation between community and public health centers. The nurse is also in a unique position to perform community assessment and provide information

related to updated information of populations vulnerable to a tsunami. Related to community advocates, nurse help to maintain a healthy and aware community environment in which people are well-prepared for such things as a tsunami (Hassmiller, 2000).

### *Response*

The response phase is the actual implementation of a disaster plan. For a tsunami, the response phase focuses primarily on emergency relief such as saving lives, and providing first aid, care and basic life requirements to tsunami victims (Veenema, 2007). In the tsunami response stage, nurses have to deal with the immediate effects of a tsunami. In this situation, it is important to prioritize all potential life-threatening problems. When nurses arrive on the scene, triage must be immediately performed. For rapid assessment of the impact, each nursing team member needs to provide accurate information to facilitate rapid rescue and recovery. The types of information in the initial assessment reports include the geographic area of the tsunami, populations at risk or affected injuries and deaths, current level of sanitation, and status of the health care infrastructure. Lack of accurate information regarding the scope of the disaster and its initial effects can contribute to the misuse of resources (Hassmiller, 2000).

### *Recovery*

Recovery actions focus on stabilizing and returning the community to normal life. It involves a number of activities to minimize the long-term effects of the disaster on the community (Veenema, 2007). The role of nurses in the recovery phase is varied, as in the preparedness and response phases. Disasters such as a tsunami have many psychosocial and mental health impacts. Therefore, the nurse is an

important position to provide psychosocial and mental care services to tsunami survivors. Acute and chronic diseases are worse in the aftermath of a tsunami, which is also an important concern of public health nurses. Ongoing assessment and surveillance reports are important to indicate the ongoing status of affected populations and the effectiveness of ongoing relief efforts (Hassmiller, 2000).

As a tsunami results in a large number of displaced people, nurses also need to have specific skills and knowledge related to shelter management. In the shelter, the nurse does assessment and referral, including medical needs (such as medication, immunization), first aid, meal serving, keeping patients' health records, ensuring emergency communication and transportation, and providing a safe environment. Nurse must deliver health promotion, disease prevention, and emotional support. Although initial physical health needs are the first priority, many conditions and problems in the shelter also contribute to psychological distress (Hassmiller, 2000).

According to Veenema (2007) the recovery phase starts sometime following 72 hours after the event. However, Wisner and Adam (2002) mentioned that there is no distinct point at which the immediate response phase changes into recovery and then into long-term sustainable development. Progress in some areas will probably be quicker than in others. Physical rehabilitation and reconstruction can sometimes take place more quickly than social or psychological rehabilitation. McEntire et al. (2002) also note that the activities in the disaster phases often overlap and it is a complex situation not lending itself to definite boundaries. It is also difficult to differentiate the exact time of each phase since the nature of each disaster event may differ from other such events.

The response phase of the aftermath of a disaster is short, measured in hours and days, but the recovery phase, in which nursing personnel are in highest demand, is measured in weeks and months. For an effective recovery phase, nurses need to be dispatched for a longer time than in the response phase (Mitani et al., 2003). Also, the large-scale nature of a disaster such as a tsunami requires a long-term process of recovery because of its tremendous impact which affected the people's lives. Therefore, public health nurses are required to have adequate knowledge and skills in providing care to the tsunami victims, in particular during the long recovery phase following a tsunami.

#### *Public Health Nurses' Knowledge and Skills Regarding Tsunami Disaster Nursing*

Knowledge can be defined as recognition of previous learned material from fact or theory (Sousa, 2006). It involves an understanding of facts and procedures which can be obtained in several ways such as through education, experiences and training (Kak, Burkhalter & Cooper, 2001). Skill refers to actions that an individual performs in a competent way in order to achieve specific goals (Erickson, 1996 as cited in Kak et al., 2001). Public health nurses' knowledge and skills regarding tsunami disaster management consist of knowledge about the public health impacts of a tsunami and knowledge and skills of tsunami disaster nursing practices in a community.



### *Public health impacts of a tsunami*

Public health impacts of a tsunami comprise mortality, morbidity, environmental impact, psychosocial and mental health impacts, and disease outbreaks after a tsunami.

#### *1. Mortality and morbidity*

The 2004 Asian tsunami was considered as a global disaster because it affected many countries, notably Indonesia, India, Sri Lanka, Thailand, Malaysia, Maldives, Myanmar, and Somalia. One month after the event, the WHO (2005) reported more than 200,000 people had died, more than 34,000 injured and more than 100,000 were missing. The largest numbers of victim were in Indonesia, with approximately 126,741 died and 93,285 were missing (The Executive Agency of Rehabilitation and Reconstruction for Aceh and Nias, 2009). The second heaviest impact of tsunami was in Sri Lanka and the WHO (2005) reported that 30,920 died, 15,256 injured and 6,020 were missing in Sri Lanka.

A tsunami is a catastrophic event that has resulted in numerous mortalities. Most deaths caused by a tsunami are due to drowning (Boyarsky & Shneiderman, 2002). A survey by Doocy et al. (2007) with 1653 tsunami-displaced households in nine tsunami-affected districts in Aceh province, Indonesia, found that the overall crude mortality among the displaced population in Aceh was 14.1%. However, they found that the actual rate varied by geographic location, age and sex with the highest mortality rates was in the districts closest to the epicenter. They also found that women had a higher risk of mortality than men, and that the youngest children (aged 0-9 years) and the elderly (aged more than 70 years) had the highest mortality rates.

Similarly, Nishikiori et al. (2006) conducted a study in Sri Lanka 77 to 80 days after the tsunami. The study involved 859 households in 13 evacuation camps. They found that the overall mortality rate among displaced persons was 12.9% with the majority of deaths occurring during and immediately after the tsunami. Mortality rates were higher among females, children and the elderly. They also assessed risk factors for mortality, and found that being indoor at the time of the tsunami, the level of house destruction, and having fishing as an occupation were all linked to higher mortality. Both of these studies noted above acknowledged some limitations. Both were conducted at least two months after the tsunami, giving the possibility of recall bias; and both included only tsunami-displaced households which were staying in the camps, which thus excluded the many tsunami-affected victims who remained in their own or in relatives' houses which could again be a selection bias. However, these studies do give an idea of some factors involving the mortality of the 2004 Asian tsunami which other countries. Their findings give a picture of the vulnerability of different groups of tsunami victims which will be helpful in preparing for future tsunamis. The finding, for instance, that females, children and the elderly were the most vulnerable populations in tsunami disaster suggests a better preparedness for these groups in future tsunamis.

Tsunamis also result in high morbidity. There was also a high number of injured victims in the 2004 Asian tsunami. Tsunami-related injuries can be categorized into two main types: aspiration and trauma. Aspiration results from sudden, violent immersion in water for a period of time, and can lead to pneumonia, asphyxia, and acute respiratory distress syndrome. Trauma can be sub-categorized into soft tissue injuries and orthopedic trauma (fracture or dislocation). Traumas can

be sustained when the massive tsunami waves hit and sweep people away. Fractures can be found in any part of the body, notably the upper and lower extremities, and spinal and lumbar fractures. The most common fracture location in the 2004 tsunami was in the leg, while the most common dislocation site was the shoulder (Prasartritha, Tungsiripat & Warachit, 2008; Wattanawaitunechai et al., 2005).

Related to tsunami trauma, Kaewlai et al. (2007) summarized the radiologic findings of 225 tsunami patients. They found that the most common trauma were musculoskeletal, thoracic, neurological (head and neck), and abdominal. Musculoskeletal traumas involved extremity fractures/dislocations, soft tissue lacerations, retained foreign bodies and spine fractures. The main thoracic trauma was a pneumothorax. Neurological traumas were mainly paranasal sinusitis and facial fractures, and abdominal injuries encompassed abdominal wall, testicular and liver injuries.

Tsunami-related wounds have specific characteristic. They usually involve multiple sites and have organs involvement. They vary in size and depth and can be categorized as major and minor wounds. Major wounds have extensive damage to the skin and underlying soft tissues, and are often severely contaminated with sand, dirt and mud. Another characteristic of tsunami-related wounds is the early development of wound infections. Some bacterial infections are not commonly seen. The factors that contribute to wound infections are underestimation of wound condition, delays in wound care, extensive contamination and skin loss (Prasartritha et al., 2008).

## 2. *Environmental impact*

Tsunamis, along with earthquakes that cause them, result in enormous environmental damage. The high-waves which cause destructive flooding destroy human life. They destroy marine, coastal and inland affected areas. The environmental damage has impact on people's health. From rapid environmental impact assessments (REA) which were conducted after the tsunami in Aceh province of Indonesia and Sri Lanka, found that the tsunami resulted large environmental health impacts, with destroyed public infrastructure, contaminated ground water, poor sanitation, pollution and toxic leakage, and accumulated debris and (Joint UNEP/OCHA Environment Unit, 2005; Ministry of the Environment of Republic of Indonesia, 2005).

Ground water contaminated with seawater, sewage, sludge, and chemicals was a major concern. Water systems were badly affected by the tsunami, with many thousands of wells and boreholes damaged, destroyed and contaminated. Sanitation systems were flooded and destroyed. The tsunami contaminated surface water with the contents of septic tanks and other surface materials. Water samples showed high levels of faecal coliforms bacteria, consistent with sewage contamination (Joint UNEP/OCHA Environment Unit, 2005; Ministry of the Environment of Republic of Indonesia, 2005).

Accumulated waste and debris were also a major problem after tsunami. Many waste materials were scattered over a wide area and also accumulated in canals. The main constituents of the debris were brick, concrete, wood (planks, trees and others organic materials), plastics, metals (iron, aluminum and copper), and vehicles. Overall, an estimated eighty percent of the waste consisted of soil, building

materials or vegetative matter. Delayed clean-up of such debris, including destroyed crops, also prolonged infectious disease problems. The amount of waste varied. In Banda Aceh, a rough calculation of waste volume was at between 7 and 10 million cubic metres, while in some parts of the west coast, most of the debris was swept out to the sea. There was a high volume of mud and sand in Banda Aceh, but less in Meulaboh and nothing at all visible remained in Calang (Ministry of the Environment of Republic of Indonesia, 2005).

The tsunami completely destroyed many communities which displaced many people and forced them to stay in temporary camps. There were reports of poor sanitation in the camps, and no proper disposal system was available at most of the temporary camps. There were inadequate numbers of latrines in the temporary camps. Water shortage was also reported from the camps (Joint UNEP/OCHA Environment Unit, 2005; Ministry of the Environment of Republic of Indonesia, 2005).

### *3. Psychosocial and mental health impacts*

Being exposed to a tsunami, similar to other disaster, can cause psychosocial distress among the victims. Carballo, Heal and Horbati (2006) described some more vulnerable populations and certain conditions that contributed to the vulnerability to psychosocial distress following the 2004 tsunami disaster, most notably loss of place and livelihood, people with special need such as children and the elderly, female sex, those with a disability, problems in temporary camps or permanent housing, host families and health workers. In a study after the tsunami, Raj and Subramony (2008) found that affected females adolescents had higher levels of

perceived stress compare to males adolescents. Affected females adolescents also had higher hyperarousal symptoms than affected males.

Piyasil et al. (2007) conducted a cohort study to follow up post-traumatic stress disorders (PTSD) among surviving tsunami students from two schools in Takuapa District, Southern Thailand found and found that the prevalence of PTSD in children involved in the tsunami disaster was highest at six weeks after the event, and then gradually decreased over the following two years with the help of integrated welfare programs. Related to psychosocial and mental health problems among the elderly, HelpAge International (2005) conducted a study about the impact of tsunami on elderly people, and found that many older people showed signs of trauma and stress such as inability to sleep, body pain, and lack of familiar food. They felt hopeless and talked about their depression. Many had suffered due to family, financial and material losses.

A study conducted by Tang (2007) in 265 adult Thai survivors that assessed their mental status at two weeks and six months following the 2004 earthquake tsunami in 2004, found four trajectories of traumatic stress symptoms: 12% of the survivors presented with chronic stress symptoms, 18% had a delayed onset, 10% showed improvement and the remaining 60% maintained a stable emotional equilibrium. Another study conducted by Griensven et al. (2006) among survivors of the tsunami in southern Thailand, found that elevated rates of symptoms of PTSD, anxiety, and depression were reported 8 weeks after the disaster, with higher rates for anxiety and depression than PTSD symptoms. Nine months after the disaster, the rates of those reporting these symptoms decreased but were still elevated. Another study involving 122 tsunami survivors in two sub-districts of Takua Pa

District, Thailand, found that a majority faced a number of psychosocial stresses resulting from the loss of loved ones and community members, being homeless, fear of more tsunamis, suffering from a loss of sense of safety and security, and lost livelihoods (Thanawood, Yongchalemchai & Densrisereekul, 2006). In conclusion, a stressful event such as a tsunami can result in psychological problems among survivors which can be of a prolonged duration.

#### *4. Disease outbreaks after tsunami*

Following a tsunami, there is a high risk of infectious disease outbreaks. Tsunamis have a rapid onset and broad impact which contribute to factors that increase the threat of infectious disease outbreaks. These factors include community displacement, inadequate sanitation and waste management, contaminated water, nutritional problems and other factors that aggravate the devastation (Waring & Brown, 2005). Related to the 2004 tsunami Asia, the WHO (2005) classified communicable diseases after tsunami as water-borne, food-borne, and vector borne diseases. Other diseases which can immediately occur after tsunami are tetanus, measles, acute respiratory infection and meningitis (Guha-Sapir & VanPanhuis, 2005; Waring & Brown, 2005; Wilder-Smith, 2005).

Water-borne and food-borne diseases are caused by contaminated water supplies and contaminated foods. The other causes are poor sanitation, lack of suitable conditions for sanitary food preparation, and overcrowded conditions. The common water-borne and food-borne diseases include diarrheal diseases, typhoid fever, shigellosis, leptospirosis and hepatitis A and E. Diarrheal diseases such as cholera and dysentery are considered as major cause of mortality and morbidity after

a tsunami, and outbreak of these diseases can occur at any moment. Overcrowded conditions lead to rapid spread of such diseases (Waring & Brown, 2005; WHO, 2005).

The risk of vector-borne disease outbreaks such as malaria and dengue after a tsunami is usually greater than in normal time. The ecological impacts of a tsunami, along with poorer shelter conditions, provides more breeding places for disease vectors such as malaria and dengue, for instance. Puddles of salt water from the tsunami waves increase the amount of brackish water (Krishnamoorthy, Jambulingan, Natarajan, Shriram & Das, 2005). These pools of salt water are not conducive for breeding sites of the malaria vector, *Anopheles sp*, but the monsoons in the country such as Indonesia can turn the brackish areas into fresh water, which are then ideal breeding sites for *Anopheles sp* (Wilder-Smith, 2005). An epidemic of malaria in a disaster setting of a tropical country usually occurs 4 to 8 weeks after initial impact and is characterized by several weeks duration before it peaks (Waring & Brown, 2005).

Related to breeding site, the dengue vector is different from the malaria vector. The dengue vector, *Aedes sp*, is more likely to breed in water containers or other sources of standing water rather than in groundwater pools or swamps. After a tsunami, the number of breeding sites from debris and artificial containers created by the tsunami destruction which fill in with rain water is increased (Guha-Sapir & VanPanhuis, 2005). Also, improvised drinking water storage vessels in temporary shelters can become breeding places for *Aedes* mosquitoes. The overcrowded conditions in temporary shelters also lead to increased bite frequency, and promote the transmission cycle. Moreover, inadequate access to medical services



and treatment delays protract the length of time the parasites remain in the blood and further propagate the disease (Wilder-Smith, 2005).

Tetanus rates also increase after a tsunami, related to the numerous crush-type and other injuries and contaminated wounds with, again, reduced access to medical services. Injury risk are further increased as affected populations clean up after the destruction, and remove debris from their homes and search for belongings. In a country which tetanus coverage is low or nonexistent, tetanus is expected to occur after a disaster such as a tsunami. Measles rates also increase following natural disaster such as tsunami. Although there is no association between tsunami event and measles outbreak, but community displacement and overcrowded conditions in temporary shelters facilitate transmission of the measles virus. Moreover, poor nutritional status contributes to increased mortality if a measles outbreak occurs following a natural disaster (Waring & Brown, 2005).

Acute respiratory infections rise significantly as a direct consequence of a tsunami. Tsunamis cause drowning and aspiration pneumonia. The risk for pneumonia increases with the combination of overcrowding, increased susceptibility, malnutrition, and poor ventilation in temporary shelters (Waring & Brown, 2005). The most common respiratory infections that occurred after the 2004 Asian tsunami were aspiration pneumonia and upper respiratory tract infection. Lower respiratory tract infections were also seen but at a lower incidence. The peak of aspiration pneumonia was about two weeks after the event (Guha-Sapir & VanPanhuis, 2005).

Other common diseases among tsunami survivors which are related to poor sanitation and hygiene are helminthes and skin problems. A survey by the

Cooperative for Assistance and Relief Everywhere, Inc (CARE) and the Centers for Disease Control and Prevention (CDC, 2006), seven months after the tsunami in three tsunami-affected districts of Aceh Province, Indonesia (Aceh Besar, Banda Aceh and Simeulue) with a total 2,650 households, found that in Aceh Besar and Simeulue districts, 75% of school-aged children and 50% of children aged 6 were infected with helminthes such as ascariasis and trichuriasis. A study conducted by Lee, Choi, Eun and Kwon (2006) in out patients of a general hospital in Banda Aceh, Indonesia, between 5 and 25 January 2005, showed that the most prevalent skin problems were infections-infestations (32.5 %), followed by eczemas (29.8%) and traumatic skin disorder (29.4%). Lee et al. (2006) explained that unhygienic conditions, exposure to hazardous environment and contact with various objects during and after the tsunami probably increased the prevalence of those skin problems.

### *Tsunami disaster nursing practice in community*

Tsunami disaster nursing in community during the recovery phase includes mental health care, psychosocial care, spiritual care, surveillance and primary health care services after a tsunami.

#### *1. Mental health care*

The Asian tsunami of December 26, 2004, affected the psychological health and livelihoods of hundreds of thousands of people with resulting psychiatric disabilities that were potentially serious and long lasting. Related to this fact, it is important for public health nurses who work in such communities to have psychological assessment skills (Prasetyawan, Viora, Maramis, & Keliat, 2006). Following a tsunami disaster, even normal-functioning individuals may experience

problems directly related to the disaster. Nurses need to be able to recognize the signs and symptoms of human stress responses (for example acute stress reactions or post-traumatic stress disorder), anxiety, depression, fear, and grief and be able to make referrals to the appropriate resources for care (Rowney & Barton, 2005).

Mental health care for tsunami victims comprises psychological triage, mental health referral, psychological first aid, and psychological intervention. Psychological triage is aimed to distinguish psychological pathology from normal stress reactions after a fearful event such as a tsunami. It is suggested to perform psychological triage in first six weeks after tsunami (Impact, Dutch Knowledge & Advice Centre for Post-Disaster Psychosocial Care, 2007). Mental health referral must be considered if a mental disorder is significantly distressing to the victim and impairs their social functioning. Some of the symptoms which require appropriate referral to a mental health professional are disorientation, depression, anxiety, psychosis, inability to care for self, suicidal thoughts, alcohol and drug abuse, and domestic violence (Plum & Veenema, 2007). Psychological first aid is early psychological response after a stressful event such as a tsunami which is lasting several days or weeks. These activities are not really psychological interventions, but temporary measures designed to improve function and mental health response. Such steps are also aimed to reduce potential psychological harm including prevention of re-traumatization, prevention of incurring new victims, and prevention of severe pathological symptoms (Plum & Veenema, 2007). Nurses need to be aware at least of the more obvious some signs and symptoms of psychological problems such as Post-Traumatic Stress Disorder (PTSD) and other severe mental health problems. Some signs and symptoms which require appropriate referral service for more specialized

treatment are persistent sleep disruption (insomnia, nightmares, fatigue), thought disruption (flashbacks, difficulty in attention and concentration), unusual feelings such as numbness, anger, tearfulness, tantrums, irritability, withdrawal from relationships, severe depression and anxiety, increasing use of drugs and alcohol, indications of suicide, and severe mental illness (Hughes, Grigg, Fritsch & Calder, 2007). Primary symptoms of PTSD are mentally repeated experience (e. g. thoughts and dreams of disaster), avoidance or psychic numbing (e.g., avoidance of disaster related activities, feelings of detachment), and hyperarousal (e.g., difficulty in sleeping or concentrating). These symptoms can be categorized as acute stress disorder if they occur limited to one month following traumatic event (Raj & Subramony, 2008).

Some nursing interventions which can be provided by nurses to help people with PTSD are providing emotional support by encouraging people to talk about their feelings, encouraging friendship and group healing, encouraging them to confront with uncomfortable symptoms such as sleep disturbances, and helping them to solve other problem in their lives such as housing and environmental problems. PTSD can be worsened by other stressors such as inadequate housing conditions. (Patel, 2003 as cited in Hughes et al., 2007).

Depression is another common acute psychiatric problem which occurs after traumatic events. Depression can be signaled by physical symptoms (tiredness, fatigue, aches and pains), emotional symptoms (sadness, miserableness, loss of interest in usual activities, guilt), cognitive symptoms (feeling of hopelessness, difficulty making decisions, low self-esteem, suicidal thoughts), and behavioral symptoms (sleep disturbances, poor appetite). Nursing interventions which can be

applied for disaster victims who have depression include providing information as to why depressions can happen, encouraging the person to share their feelings with family or friends, and to assist them in dealing with their problem by using a problem-solving counseling approach (Hughes et al., 2007).

## 2. *Psychosocial care*

Many literatures use the word “psychosocial” to address the combination of psychological and social issues after a disaster rather than using the words separately, because the psychological impact of a disaster is largely the result of social and economical problems (Ehrenreich & McQuaide, 2001). The term “psychosocial” is used by international organizations working in the field of disaster mental health, and is aimed at distinguishing these interventions from a strictly medical perspective which is mainly concerned with a medication approach (WHO, 2006c). Therefore, the word “psychosocial” is commonly used to identify interventions which are aimed at improving the psychosocial wellbeing of the disaster victims.

Public health nurses must be able to competently respond to the psychosocial needs of tsunami victims. They work with vulnerable populations such as children, families, and communities that are at high risk for psychosocial difficulties (Rowney & Barton, 2005). The World Health Organization’s definition of health as physical, mental, and social well-being attests to the need for comprehensive psychosocial care as an integral part of the process of restoring health to survivors of disasters (Becker, 2007).

Assessment of psychosocial issues is aimed at understanding the emergency situation, threat and capacities for psychosocial well-being. In disaster affected communities, assessment includes gathering demographic information, determining the extent of tsunami exposure, and also screening of the population for mental health and psychosocial problems. Demographic assessment includes getting an understanding of the population size, mortality and threats to mortality, access to basic physical needs (e.g. food, shelter, water, sanitation, and health care), and social, religious, and basic ethnographic information (cultural, norms). Assessment of psychosocial problems includes determining signs of psychosocial distress, including behavioral and emotional problems, impaired daily functioning, and disruption of social support patterns (Inter-Agency Standing Committee [IASC], 2007). Some signs and symptoms of psychosocial distress are grief, depression, anxiety, guilt, anger, suspiciousness, irritability and hostility (Ehdenreich & McQuaide, 2001).

Early psychosocial intervention is important to assure the psychosocial well-being of tsunami victims and to prevent psychopathology. Early psychosocial intervention is targeted at promoting natural recovery and using natural sources of help, identifying those who are affected and need rapid psychological help, and referring them appropriately (Impact, Dutch Knowledge & Advice Centre for Post-Disaster Psychosocial Care, 2007). The WHO (2005) recommends providing psychosocial support to members of affected communities with community-based workers who understand the needs of the disaster victims, and also are trained by experts in psychosocial support.

The essentials of psychosocial care for adults that are taught in tsunami-relief training programs are empathy, encouraging ventilation, active

listening, social support, externalization of interests and recreation to distract the victim's thoughts from the disaster, relaxation techniques, and spirituality as part of the overall rebuilding process (Sumargono, et al., 2005). Children and adolescents are vulnerable populations which particularly need psychosocial support after a mass disaster such as a tsunami. Psychosocial support to these populations need to be designed with regard to age and level of development, availability of other social support, the degree of tsunami disruption to their lives and perhaps factors particular to the population such as religious or cultural factors that could influence their resilience (Williams, Alexander, Bolsover & Bakke, 2008). A study by Hestiyanti (2006) to identify factors contributing to children resilience 1-2 months post-tsunami found that internal protective factors of resilient children were strong internal motivation to recover, having a good heart, openness to other people, high motivation to bond to religiosity, self-responsible, sense of humor, and easy going nature. Contributing external factors included support from significant others, cultural perform activities, having opportunity to be involved in psychosocial activities and recreation. The authors suggest working with families is a better approach than working directly with the children.

Evaluation of psychosocial interventions is important for determining the relevance, efficiency, impact, effectiveness and sustainability of the interventions, evaluate the effectiveness of psychosocial intervention (Reference Centre for Psychosocial Support & International Federation of Red Cross and Red Crescent Societies, 2009).

### 3. *Spiritual care*

There are some spiritual impacts that may arise after a traumatic event such as a tsunami, including spiritual disconnection with God, questioning God and theological belief, anger at God, spiritual emptiness, withdrawal from the faith community, and guilt (Ellers, 2006). Spiritual care could be described as interventions that can lift up people's spirits, with an aim to support spiritual needs and alleviate spiritual distress after a tsunami or other disaster situation (Bloemhard, 2008). Spiritual care is important because it can increase physical and psychosocial comfort, and holistic health (Wong & Yau, 2009).

Spiritual assessment consists of assessment of spiritual distress and spiritual needs. Nursing intervention techniques to relieve spiritual distress include communicating with empathy, providing a peaceful environment, helping those who have been through a disaster to accept the situation, identifying the positive aspects of the situation, facilitating religious coping, instilling hope for the future, assisting in finding meaning and purpose in life following the disaster, strengthening patient-family relationships and referring patients to their religious leader. The evaluation of spiritual care consists of assessing the patients' response to the spiritual intervention and evaluating the appropriateness of the spiritual intervention to the right person and at the right time (Baldacchino, 2006). Communication skills are important tools for gathering data related to spiritual issues. Sharing and connection are more useful in gaining spiritual data rather than routine assessment tools and clinical procedures (Bloemhard, 2008).



#### 4. *Surveillance and outbreak investigation*

Surveillance is the process which is used to collect, manage, analyze, interpret, and report on specific diseases for prevention or control programs. It is also used to identify changes in the nature or extent of health problems and also to identify the effectiveness of public health interventions. Surveillance provides information based on basic epidemiology parameters (time, place, and person) and descriptive information regarding when and where health problems are occurring and populations who are affected (Rothman, Greenland & Lash, 2008).

Pryor (2007) classified three main activities in surveillance: data collection, data analysis and interpretation; and data dissemination. Public health centers routinely collect data related to infectious disease surveillance, including information on mortality, morbidity, and health indicators. Following data collection, the data are summarized and analyzed in terms of person, place and time. Analysis is aimed at identifying changes in disease pattern occurrence. The final activity of surveillance is dissemination of the information in order to develop planning for appropriate control and prevention.

Noji (1997) and Teutsch (2000) listed some sequential steps in planning for a surveillance system, primarily establishing objectives, developing case definitions, determining data sources, developing data collection instruments, field-test methodology, developing and testing analysis strategies, developing dissemination mechanisms, and assessing the usefulness of the developed systems. The objective of surveillance must be specific to the event that will be monitored. The case definition should include descriptions of signs and symptoms that can clearly

determine the case. Determining appropriate data sources is important, and shelter is one of the common source of surveillance data in post disaster settings.

The basic principles of surveillance after a tsunami are not different from general surveillance in others settings. Surveillance after a tsunami aims to determine the most immediate problems that must be dealt with, and matching the problems with appropriate response planning. The ultimate goal of epidemiologic surveillance post-tsunami is to prevent or reduce the health consequences resulting from the tsunami destruction. Therefore, surveillance is an integral part of a tsunami relief effort, and has an important related aim of ongoing evaluation of the effectiveness of relief program. Epidemiologic surveillance after tsunami involves rapid assessment of the distribution and determinants of tsunami-related health mortality, morbidity including injury, illness and disease outbreaks in affected populations. It is important to develop case definitions of tsunami-related illnesses and injuries. The case definitions must be simple and understandable (Glass & Noji, 1992).

Traditionally, surveillance systems can be divided into passive and active surveillance. In passive surveillance, the data are routinely obtained from reports of health care providers or health institutions. In active surveillance, public health departments actively search for the cases. Active surveillance needs more resources than passive surveillance. Therefore, it is largely limited to outbreak situations only (Groseclose, Sullivan, Gibbs & Knowles, 2000). Both surveillance systems can be applied in post disaster situations. Each system has its strengths and limitations (Fleischauer, Young, Mott & Ratard, 2007).

Public health nurses are active in the epidemiology and surveillance functions of public health center and participate in disease outbreak investigations after a tsunami or other disaster. Because nurses identify and interview persons potentially exposed to a tsunami, they need to know the signs and symptoms of all possible diseases the victims might have been or be exposed to. They assess, triage, isolate, treat, and provide public health support for victims and responders. (Rowney & Barton, 2005).

An outbreak or epidemic is a number of cases greatly in excess of the number normally expected in a certain time and place. In an emergency situation such as after a tsunami, an outbreak can spread rapidly and cause high mortality and morbidity rates. There are some basic steps in an outbreak investigation including confirming diagnosis, defining outbreak definition, calculating attack rate, collecting and analyzing descriptive data (e.g. time of onset, place and person characteristics), determining at risk population, formulating hypothesis about source, following up the cases, conducting further investigation and writing investigation reports including results and recommendations (Connolly, 2005).

##### *5. Primary health care services after a tsunami*

Primary health care services in a disaster situation such as a tsunami are targeted for immediate impact of health problems. Primary health care services can include food provision and nutritional support, vaccinations, water supply and sanitation, health education, shelter management, vector control and collaboration and referral services (ICRC, 2006, Veenema, 2007).

### *5.1 Food provision and nutritional support*

Food is one of the basic needs of disaster victims who stay in emergency shelters. Providing food and nutritional support are also important to assure nutritional status of vulnerable groups in the community such as infants and children. A survey by Cooperative for Assistance and Relief Everywhere, Inc (CARE) and The Centers for Disease Control and Prevention (CDC, 2006), seven months after the 2004 tsunami in three districts of Aceh Province of Indonesia (Aceh Besar, Banda Aceh and Simeulue) with a total 2,650 households, found that in the three districts, mild or moderate anemia among children aged 6-59 months ranged from 31.8% to 64.5%. Mokdad et al. (2005) further found that roughly three weeks after the tsunami, serious acute malnutrition was quite common among displaced persons in post-tsunami temporary camps. Of 614 children aged 6 months to 5 years and 334 women aged 18 to 45 years in Banda Aceh and Aceh Besar districts, 42.3% of the children had had diarrhea; 69.7%, cough; 56.0% fever; and 34.3% vomiting in the previous two weeks, and of the women, 16.9% had had diarrhea, 44.7% cough; 26.0% fever; and 27.3% vomiting. Acute malnutrition rate were 12.7% among the children and 15.3% among the women. Malnutrition was strongly associated with the health of children but not the women. There is a strong association between inadequate dietary intake and malnutrition both for children and women.

Related to nutrition for infant and children, there are some considerations in order to prevent nutritional problems among those populations. For infants under six months, promoting exclusive breastfeeding during an emergency is important to ensure essential nutrition for the infants and help prevent infectious diseases. For infants above six months, besides promoting the continuation of

breastfeeding, it is also important to introduce energy-dense and soft complementary food such as mashed rice and boiled vegetables. Children above one year can receive the same food as adults, although when feasible breastfeeding should be continued up to two years, supplemented with adult food. For orphans who have lost their mother during disasters, artificial milk should be prepared hygienically. Using a cup and spoon is preferred to using a bottle because they are easier to clean/sterilized and the risk of infection is lower (South-East Asia Disaster Health Information Network, 2009).

Inadequate food, displacement of normal market channels, and overcrowded camps with poor water and sanitation are common problems after major disasters such as earthquakes and tsunamis (Magkos et al., 2003). There are also significant risks of food contamination with dangerous microbiological or chemical substances after such major disasters, with increased risk of food-borne disease outbreaks such as diarrheal diseases, typhoid fever, and hepatitis A. The risks of unsafe or contaminated food are also increased during such periods by unsafe food storage, handling and preparation (International Food Safety Authorities Network [INFOSAN], 2005). Related to safer food issues, the WHO (as cited in Veenema, 2007) has proposed five keys for safer food in natural disaster, namely to keep clean before handling food and during food preparation, separate raw and cooked food, cook food thoroughly, keep food at a safe temperature, and use safe water and raw materials.

## 5.2 *Vaccinations*

According to Connolly (2005), in an emergency situation such as after a tsunami, vaccinations which reduce the incidence of vaccine-

preventable diseases should be considered to prevent outbreaks of such disease. The major vaccines used are for measles, meningococcal meningitis, and yellow fever. Among these, the measles vaccination is the highest priority because it is the most serious health problem encountered in emergency situations among children, as one of the important risk factors for measles transmission is an overcrowded situation. Measles vaccinations are indicated if the vaccine coverage rate of the disaster affected population is below 90%. Mokdad et al. (2005) found that roughly three weeks after the 2004 tsunami, from 614 children aged 6 months to 5 years and 334 women aged 18 to 45 years in Banda Aceh and Aceh Besar, only 33.1% of the children had received a measles vaccination and 12.9% of the women had ever received a tetanus vaccination.

The WHO (2005) proposes some recommendation related to vaccinations in crisis situations such as following a tsunami. In such a situation, every visit to a health care facility should be seen as an opportunity to give a vaccination regardless of the purpose of the visit. In children aged 6 months through 5 years, measles immunization together with vitamin A supplementation is important to decrease mortality and prevent complications. Outside the camps, detection of a single case of measles is adequate reason to begin measles control activities, including a measles vaccination program. Hepatitis A vaccinations are not recommended to prevent outbreaks in a disaster area, although they can be effective in preventing hepatitis A outbreak in small communities, when the vaccinations begin early in an outbreak course. Mass tetanus vaccination programs to prevent tetanus are not normally indicated, but should be reserved for victims with large open wounds or other injuries. Oral cholera and typhoid vaccines are not recommended for mass

campaigns to prevent these diseases. The vaccination should be undertaken together with other control prevention measures.

### *5.3 Water Supply and Sanitation*

Proper and adequate sanitation is an essential concern in a crisis situation such as after an earthquake and tsunami. Lack of sanitation can cause a wide range of problems, from simple inconvenience through water-borne disease outbreak, and social unrest (Hettiarachchi, 2008). There are three important points to ensure proper sanitation facilities: to ensure adequacy of toilets, proper disposal of stools, and cleanliness of the toilets. Proper garbage disposal is also a sanitation issue, and health education and adequate garbage disposal management is needed to ensure the cleanliness of the shelter and surrounding area (South-East Asia Disaster Health Information Network, 2009).

The situation following a tsunami can be worsened if there has been contamination of ground and surface water by the tsunami waves (Hettiarachchi, 2008). For the post-disaster water supply, it is important to ensure safe drinking water by providing health education and supervision of water sanitation safeguards such as chlorination or boiling and storage of drinking water. After a tsunami, wells and other water sources must be chlorinated if they have been contaminated. The storage of water has to be separated for drinking, cooking and washing (South-East Asia Disaster Health Information Network, 2009).

### *5.4 Health education*

Health education is important to increase community awareness and self efficacy behavior. Essential health education for tsunami survivors is important in order to prevent or limit transmission of common infectious diseases

that may occur during the aftermath of a tsunami event, covering such things as promotion of early and proper use of ORS in treatment of diarrheal diseases, good hygiene practices (e.g. hand washing, latrine use), vector control programs such as insecticide-treated mosquito nets (ITNs), safe water and food practices, safe water source and encouraging early treatment seeking behavior. (Connolly, 2005; WHO, 2005).

### *5.5 Shelter Management*

Shelters are managed by volunteers or Red Cross nurses. Public health nurses also have a vital role in shelter management. In the shelter, nurses work based on established nursing processes. Assessment and planning skills are the most important functions of public health nurses. In these settings, interventions include preventing disease and illness, providing emotional support, providing care for vulnerable populations such as pregnant women, children and the elderly, continuing care for those with chronic illness who are dependent on medication and/or medical equipment. In the shelter, public health nurses also provide basic necessities to tsunami survivors such as food, water, and other basic supplies. They also conduct surveillance and communicable diseases monitoring in the shelter. Evaluation in a shelter is an ongoing process, including conferences with shelter families and shelter staffs (Lundy & Butts, 2001).

In Aceh Province of Indonesia, in 2004 tsunami, public health nurses were in charge of the health centers in the tsunami victims' shelters. They provided primary level service for tsunami survivors and performed appropriate referral services for those in need (Sumargono et al, 2005). According to the Ministry of Health of the Republic Indonesia (2006), public health nurses are responsible for



providing nursing care and basic health needs for any community, including displaced communities forced to live in temporary shelters. They are required to provide care for chronic and acute health problems, disabled people and mental health care patients.

### *5.6 Vector Control*

Vector-borne diseases are complex problems which can occur after earthquakes and tsunamis. Vector control methods are used to prevent increased prevalence of vector-borne diseases following a disaster, when people are more vulnerable to such things. According to the Sphere Project, there are three standard measures that public health nurses can use to reduce the spread of vector-borne diseases. The first measure standard is individual and family protection, for example ensuring that all disaster survivors have adequate and appropriate knowledge about the means to protect themselves and their families from common vector-borne diseases in the disaster area such as malaria and dengue fever, which can be prevented by simple measures such as using a mosquito net. The second measure standard is protection of the surrounding physical environment from the risk of nuisance vectors, through such basic environmental vector control methods as establishing adequate shelters, providing a clean water supply and proper garbage management to reduce the number of flies. The third measure standard is the use of chemical control methods such as pesticides (Veenema, 2007).

### *5.7 Collaboration and referral services*

Collaboration commits two or more persons or organizations to achieving a common goal by enhancing the capacity of one or more of the members to promote and protect health (Minnesota Department of Health, as

cited by Mondy, Cardenas & Avila, 2003). One of the most exciting challenges for public health nurses, whether in an emergency management center or in a disaster shelter, is to collaborate with other emergency workers from other disciplines to enhance the emergency response infrastructure at the local, regional, state, national, and global levels (Kuntz, Frable, Qureshi & Strong, 2008). A nurse working in a disaster shelter should be able to recognize the presence of an acute illness or injury and know how to arrange the patient's transfer to a facility that can provide the appropriate level of care. For example, in the case of a patient with crushing chest pain, the nurse should be able to arrange their immediate transfer by ambulance to the nearest ED (Gebbie & Qureshi, 2002).

*Factors Related to Knowledge and Skills of Public Health Nurses Regarding Tsunami Disaster Nursing*

There are some factors related to knowledge and skills of public health nurses regarding tsunami disaster nursing practices, which encompass education, training, experience in providing care during a disaster and self-preparedness. Related to education and training, since nurses are the largest health workers component in the healthcare workforce whom are also involved in disaster situations, continuing education and training become essential concerns. Wang et al. (2008) found that emergency preparedness training resulted in improvement of knowledge and self-assessment of skills for public health leaders. A survey by Duong (2009) with 152 Australian nurses found that the nurses perceived themselves to have a low level of disaster preparedness. This condition may be caused by limited education opportunities and experience dealing with disaster situation. Self study can also

increase knowledge and skills of nurses regarding disaster and emergency situations. Thomas (2005) found that self-study modules can increase nurses' preparedness and knowledge base about bioterrorism event.

Previous experience dealing with a tsunami situation is considered to have a positive influence on the knowledge and skills of public health nurses regarding tsunami disaster nursing practices. Suserud & Haljamae (1997) found that nurses who have more experience in disaster response can play an important role in disaster nursing. They can perform leadership roles at the site of a major disaster. They are also prepared to quickly begin necessary actions such as surveying the situation, getting triage operations underway, starting basic life support, and establishing contact with other disaster officers. On the other hand, of course, nurses without experience can have a poor ability to step in and deal with a new disaster, as a study from Indonesia conducted by Kurniati & Widyalolita (2005) focusing on the 2004 tsunami and its aftermath found that many of the nurses dispatched to deal with that disaster were hindered in their rescue attempts by various factors, including lack of knowledge of health problems commonly seen in a tsunami situation, and lack of the skills required to treat the tsunami victims.

Self-preparedness of nurses toward disaster preparedness will lead to increased knowledge and skills of nurses in a disaster nursing area. Thomas (2005) conducted a survey study with nurses from 20 hospitals across the United States to evaluate the effectiveness of self study methods in enhancing the nurses' knowledge about categories diseases due to terrorism and disaster by providing a self-study module. After the modules were completed and the survey retaken, the author found that the knowledge of the subjects had improved from 20% to 90%. It can be

concluded that the nurses liked the self-study format and it can increase the basic knowledge of terrorism/disaster. O'Sullivan et al. (2008) also found that a low level of preparedness have correlated with a low level of knowledge.

### *Summary of Literature Review*

In summary, tsunami disaster nursing of public health nurses can be defined as actions undertaken by public health nurses in order to manage tsunami related health problems. Tsunamis have a large and prolonged impact on communities and public health, including increases in mortality and morbidity, environmental impacts, psychosocial and mental health impacts, and disease outbreaks following the tsunami. Public health nurses are responsible for dealing with those problems. In order to assure high quality care is provided following a tsunami, public health nurses have to have adequate knowledge and skills regarding tsunami disaster nursing. The knowledge and skills include knowledge about public health impacts of a tsunami and tsunami disaster nursing practice in community. Tsunami disaster nursing practices in the community include mental health care, psychosocial care, spiritual care, surveillance and primary health care services after a tsunami (e.g. food provision and nutritional support, vaccinations, water supply and sanitation, health education, shelter management, vector control, collaboration and referral services).

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### *Research Design*

This descriptive comparative study aimed to: 1) identify the levels of Indonesian public health nurses' knowledge and perceived skills regarding tsunami disaster nursing, and 2) compare the levels of knowledge and perceived skills regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected areas in Indonesia.

#### *Setting and Population*

The target population in this study was public health nurses who work in coastal areas in Aceh Province, Indonesia, a province which received major damage from the 2004 tsunami. Two municipalities and two districts were purposively selected based on the following criteria.

The selected tsunami-affected areas were Banda Aceh Municipality and Aceh Besar District, while the selected non-affected areas were Langsa Municipality and Aceh Timur District. Banda Aceh and Aceh Besar are located in the northern part of Sumatra Island. Banda Aceh is an urban area, the capital city of Aceh Province. It is one of the severely devastated areas of the 2004 tsunami disaster. Fifteen percent of the Banda Aceh population died as a result of the 2004 tsunami (Byleveld et al., 2005). The tsunami destroyed three of Banda Aceh's six public health centers completely and the remaining three were so damaged as to be considered non-functional (Redwood-Campbell & Riddez, 2006). Aceh Besar District

is located nearby Banda Aceh, and was also severely destroyed by the tsunami along its coastal area. Therefore, these two areas can be representative settings for tsunami affected areas.

For the tsunami non-affected areas, Langsa Municipality and Aceh Timur District were selected. They are located close together in the eastern part of Aceh. Langsa Municipality is 400 km far from Banda Aceh, the capital city of Aceh Province. Neither Langsa Municipality nor Aceh Timur District were directly affected by the tsunami. They were selected to be representatives of non-affected area because although there were not struck by the 2004 tsunami, they are at risk of being struck by a future tsunami (Appendix A).

All of the public health nurses working in Banda Aceh Municipality and Langsa Municipality were a target population in this study because all of their areas are considered as coastal areas. However, not all of the public health nurses working in Aceh Besar and Aceh Timur were targeted for the study, as these are quite large districts which have both large coastal areas, and large inland areas not at risk from a tsunami. According to Boyarsky and Shneiderman (2002), areas at greatest risk from a tsunami are less than 25 feet above sea level and within 1 mile of the shoreline. The Executive Agency of Rehabilitation and Reconstruction for Aceh and Nias (2009), however, found that in the 2004 tsunami, up to 6 kilometers from the shorelines were affected. Therefore, only public health nurses working in public health centers within approximately 6 kilometers of the shoreline were included in this study.

### *Sample and Sampling*

#### *Sample Size*

In this study, the estimated numbers of public health nurses in each group were determined using a proportion sampling technique. According to the Ministry of Health of Republic of Indonesia (2008), at the time of that report there were 2,291 public health nurses working in 309 public health centers in Aceh Province Indonesia. Based on the tsunami 2004 affected and non-affected districts in Aceh Province, there were 1,224 public health nurses working in tsunami affected areas and 1,067 public health nurses working in tsunami non-affected areas. These numbers were computed regardless of the educational background of nurses. There are three types of nursing education in Indonesia, namely a bachelor degree in nursing, a nursing diploma and secondary high school level of nursing. Since 1997, the Indonesian government has established the regulation for the minimum education of nurses entering practice to be a nursing diploma. According to Puskdiknakes (as cited in Saha, 2006), as many as 50% of nurses in Indonesia have only a secondary high school level of education. However, this number was counted based on the total number of nurses for the whole part of Indonesia.

The proportion technique was used to estimate the sample size of this study. According to Singchangchai, Khampalikit and Na-Sae (1996), from a total population of 1,000-9,999, the proportion used should be 10% of the total population. Approximately 10% of the 1,224 public health nurses in the affected areas and 1,067 public health nurses in the non-affected areas were counted for the subjects in this study, giving 122 and 106 from affected and non-affected areas, respectively. Initially, 350 questionnaires altogether were distributed in two tsunami affected areas

and two non-affected areas yielding 319 returned questionnaires (91.1% response rate). Fifteen questionnaires which were incomplete and 79 questionnaires whose subjects did not meet the inclusion criteria were excluded for analysis. Finally, the number of subjects meeting the criteria from non-affected areas was 107, while from affected areas was 118, which was close to the estimation of required subjects. The number of subjects was reasonable because there were a limited number of subjects who met all of the inclusion criteria.

#### *Sampling Technique*

Subjects in this study were recruited purposively from nurses who work in Banda Aceh Municipality, Aceh Besar District, Langsa Municipality and Aceh Timur District. The inclusion criteria for subjects in the affected areas were as follows:

- 1) Had at least a nursing diploma level of education
- 2) Had experience in caring for tsunami victims, and
- 3) Currently work as a nurse in a public health center located in a tsunami-affected area

While the inclusion criteria for subjects in the non-affected areas were as follows:

- 1) Had at least a nursing diploma level of education
- 2) Did not have any experience in caring for tsunami victims, and
- 3) Currently work as a nurse in a public health center located in a coastal area which had not been struck by the tsunami (a non-affected area)



## *Instrumentation*

### *Instruments*

The instruments used in this study were developed by the researcher. It consists of three parts. The details of each part are as follows.

#### *1. The Demographic Data Questionnaire (DDQ).*

The demographic data questionnaire consisted of 10 items: gender, age, marital status, level of education, duration of work, training and education related to the special requirement of disaster nursing, experience in working with tsunami victims, duration of involvement with the tsunami recovery activity, perceived threat of a future tsunami, self preparedness of knowledge and skills (Appendix C).

#### *2. The Public Health Nurses' Knowledge Regarding Tsunami Disaster Nursing Questionnaire (PHNK-TDNQ).*

The Public Health Nurses' Knowledge Regarding Tsunami Disaster Nursing Questionnaire was developed based on the work of Polivka et al. (2008), and Veenema (2007). It was used to determine the level of public health nurses' knowledge toward tsunami disaster nursing. The concepts of knowledge included public health impacts of a tsunami and tsunami disaster nursing in an affected community. The questionnaire consisted of 40 yes-no type questions. Subjects were asked to answer "Yes" or "No" to each question. One point was given for each correct answer and zero point for each incorrect answer, giving a maximum possible score of 40, and a range from 0 – 40 (Appendix D). Later, these scores were converted into percentages. The level of knowledge was then categorized into three levels as follows based on McDonald (2002):

Low	< 69.99%
Moderate	70.00 - 79.99%
High	> 80 %

### *3. The Public Health Nurses' Perceived Skills regarding Tsunami Disaster Nursing Questionnaire (PHNS-TDNQ).*

This questionnaire was used to assess the skills level of the subjects regarding tsunami disaster nursing and was also developed based on Polivka et al. (2008) and Veenema (2007). These skills include mental health care, psychosocial care, spiritual care, surveillance and outbreak investigation, and primary health care services after a tsunami. This questionnaire also included 40 items, but each item was rated using a 5-point Likert scale, with 1 = very poor, 2 = poor, 3 = fair, 4 = good, 5 = very good (Appendix E). The possible scores of the PHNS-TDNQ thus range from 40-200. These scores were also converted into percentages and divided into three levels of perceived skills similar to the levels of knowledge.

#### *Translation of the Instruments*

The original instruments of this study were developed in English and translated by three Indonesian bilingual translators. The first translator translated the instrument into Indonesian language. Then, the second translator translated the instrument back into English. Last, the third translator clarified and looked for discrepancies between the two versions. There were no discrepancies found during the translation process.

### *Validity and Reliability of the Instruments*

#### *1. Validity*

Three experts in disaster nursing and public health nursing from Faculty of Nursing, Prince of Songkla University were asked to validate the instruments. They were asked to determine the relevancy among the items. The instrument was then revised and modified based on the suggestions from the experts.

#### *2. Reliability*

The Public Health Nurses' Knowledge Regarding Tsunami Disaster Nursing Questionnaire (PHNK-TDNQ) and the Public Health Nurses' Perceived Skills Regarding Tsunami Disaster Nursing Questionnaire (PHNS-TDNQ) were tested for reliability with 20 public health nurses who work in the coastal area of Pidie District, Aceh Province, Indonesia. Pidie District is one of the areas devastated by the 2004 tsunami. Kuder Richardson-20 (KR-20) for the PHNK-TDNQ and Cronbach's alpha for the PHNS-TDNQ were performed in this study yielding values of .72 and .96, respectively. The acceptable value of new instrument according to Polit and Hungler (1999) is at least .70, and thus both of the instruments was accepted in this study.

## *Data Collection*

### *Preparation Phase*

1. The researcher asked for and obtained a letter from the Dean of the Faculty of Nursing, Prince of Songkla University which was used for Indonesian government bureaucratic procedures to obtain the necessary permissions to undertake the data collection processes required for the study.
2. The researcher requested permission from the head of the Health Department who superintends the Public Health Centers in each proposed district by submitting a letter and explaining the purpose of the study.
3. The researcher trained six research assistants (RAs) about the study purposes and procedures, the criteria for subject selection, instrument completion, and discussed some bstacles that they might face during the data collection process.
4. The researcher/RAs explained to the heads of the involved Public Health Centers about the study objectives, benefits, and confidentiality, and the method of data collection.
5. The researcher/RAs asked for and received the name lists of nurses who work in the involved Public Health Centers and approached them to be subjects for this study

### *Implementation Phase*

1. The researcher/RAs asked the nurses who met the inclusion criteria for the study to participate in this study.

2. The researcher/RAs explained to the subjects about the benefit, purpose and ethical consideration in this study.
3. The researcher/RAs collected the questionnaires from the subjects and checked them for completeness.

### *Ethical Considerations*

Data were collected after the Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University, Thailand, approved the study. Permissions were also obtained from the heads of the District Health Departments and heads of the Public Health Centers. In explaining this study to these various people, the researcher/RAs explained about the purposes and potential benefits of the study, discussed ethical considerations such as confidentiality and awareness of potential harms which could occur due to traumatic feelings of the subjects who had experienced the 2004 tsunami, such as re-awakening feelings of sadness and anxiety while completing the questionnaires. While performing this study, there were no subjects who experienced emotional or psychological problems related to completing the questionnaires. The researcher maintained confidentiality of the subjects by ensuring that all of the information collected would be used only for the research purposes of this study, and that confidentiality would be maintained by the use of codes rather than identifying the subjects by name.

### *Data Analysis*

In this study, the data were analyzed by the following statistical techniques:

1. Demographic data were analyzed by using descriptive statistic: frequencies, percentages, means, standard deviation and chi-square.
2. Public health nurses' knowledge regarding tsunami disaster nursing were analyzed by using descriptive statistics: means and standard deviation to determine the level of knowledge of public health nurses toward tsunami disaster nursing.
3. Public health nurses' skills regarding tsunami disaster nursing practice were analyzed by using descriptive statistics: means, and standard deviation to determine the skills of knowledge of public health nurses toward tsunami disaster nursing.
4. The assumptions of parametric statistics were tested. It was found that the knowledge and perceived skills regarding tsunami disaster nursing were not normally distributed. Therefore, Mann-Whitney U test was used to test mean differences of knowledge and perceived skills between public health nurses working in tsunami affected and non-affected areas.

## CHAPTER 4

### RESULTS AND DISCUSSION

Initially, 350 questionnaires were distributed in two tsunami affected areas and two non-affected areas yielding 319 returned questionnaires (91.1% response rate). Fifteen questionnaires which were incomplete and 79 questionnaires whose subjects did not meet the inclusion criteria were excluded from analysis, leaving finally, 118 subjects from the tsunami affected areas and 107 subjects from non-affected areas for data analysis. During data collection, it was a public health center in a tsunami affected area which refused to allow the public health nurses to participate in this study due to the high workload of the staff.

#### *Results*

The findings of this study are presented as follows: 1) the demographic data of the subjects, 2) level of knowledge and perceived skills regarding tsunami disaster nursing, and 3) comparison of knowledge and perceived skills regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected areas.

#### *Demographic Data of the Subjects*

There were 225 subjects in this study, divided into two groups, 118 subjects working in two tsunami affected areas and 107 subjects working in two tsunami non-affected areas. For the subjects in the tsunami affected areas, most were female (95.8%) and married (91.5%) and more than 30 years old (62.7%). More than three-fourths of the subjects were educated at the diploma level (73.7%) and more

than half of them had been working for 5-10 years. All of them (100%) had experience in caring for tsunami victims with a duration of more than one year involvement in tsunami recovery activity (43.2%) (Table 1).

In the non-affected areas, the majority of the subjects were also female (86.9%) and married (76.6%). Differently from the subjects in the affected areas, more than half of the subjects from the non-affected areas were less than 30 years old (55.1%), while similarly to the subjects from the affected areas, most had a diploma level of education. None of the subjects in the non-affected areas had experience in caring for tsunami victims. There were differences of all subjects' characteristics between the subjects in the affected and non-affected areas (Table 1).

Table 1

*Frequency and Percentage of Demographic Data of the Subjects (N = 225)*

Characteristic	Affected areas (N = 118)		Non-affected areas (N = 107)		$\chi^2$	p
	n	%	n	%		
1 Gender					5.68 <sup>a</sup>	.01
Male	5	4.2	14	13.1		
Female	113	95.8	93	86.9		
2 Age					7.26 <sup>a</sup>	.02
21-30	44	37.3	59	55.1		
31-40	62	52.5	41	38.3		
>40	12	10.2	7	6.5		
Min	26		21			
Max	54		47			
Mean	33.62		31.02			
SD	5.06		6.31			



Table 1 (Continued)

Characteristics	Affected areas (N = 118)		Non-affected areas (N = 107)		$\chi^2$	p
	n	%	n	%		
3 Marital status					9.85 <sup>b</sup>	.00
Single	8	6.8	22	20.6		
Married	108	91.5	82	76.6		
Divorced and widowed	2	1.7	3	2.8		
4 Education					8.22 <sup>a</sup>	.00
Diploma	87	73.7	95	88.8		
Bachelor	31	26.3	12	11.2		
5 Duration of working (years)					83.26 <sup>b</sup>	.00
<5	0	0	56	52.3		
5-10	71	60.2	26	24.3		
>10	47	39.8	25	23.4		
Min	5.83		0.41			
Max	28		23			
Mean	10.39		6.98			
SD	4.84		5.53			
6 Duration of involvement with the tsunami recovery activity (years)						
None	0	0	107	100		
< 0.5	34	28.8				
0.5 - 1	33	28.0				
> 1	51	43.2				
Min	1 month					
Max	4					
Mean	1.29					
SD	0.90					

Note. a = Chi Square, b = Fisher's exact test

*Perceived Threat of Tsunami and Self-preparedness of the Subjects*

Table 2 shows the data how the subjects perceived the threat of another tsunami and the self-preparedness of public health nurses toward disasters in general. A majority of the subjects in both the affected (74.6%) and non-affected (62.6%) areas believed that another tsunami would not likely occur in the near future. Also more than half of the subjects in the affected (68.6%) and non-affected (83.2%) areas believed that a tsunami would not likely occur in their working area. With regard to their self-preparedness methods, a majority of the subjects in the affected (73.7%) and non-affected (72.9%) areas rated “sometimes” for reading books and materials related to disaster. Almost half of subjects in affected areas (48.3%) and more than half of subjects in non-affected areas (63.6%) indicated that “sometimes” they searched and read disaster related material from the internet. Almost half of the subjects (48.3%) in the affected areas and most of the subjects (79.4%) in the non-affected areas had never attended a seminar or conference related to disaster.

Table 2

*Perceived Threat of Tsunami and Self-preparedness of the Subjects (N = 225)*

Characteristic	Affected areas (N = 118)		Non-affected areas (N = 107)		$\chi^2$	p
	n	%	n	%		
	Perceived threat of future tsunami					
Tsunami is likely to occur in near future time					3.74 <sup>a</sup>	.05
yes	30	25.4	40	37.4		
no	88	74.6	67	62.6		

Table 2 (Continued)

Characteristic	Affected areas (N = 118)		Non-affected areas (N = 107)		$\chi^2$	p
	n	%	n	%		
	Tsunami is likely to occur in working area					
yes	37	31.4	18	16.8		
no	81	68.6	89	83.2		
Self preparedness of PHNs						
Reading books and materials related to disaster					9.39 <sup>b</sup>	.01
Never	14	11.9	24	22.4		
Sometimes	87	73.7	78	72.9		
Often	14	11.9	5	4.7		
Always	3	2.5	0	0		
Searching for and reading disaster related material from internet					10.02 <sup>b</sup>	.01
Never	48	40.7	37	34.6		
Sometimes	57	48.3	68	63.6		
Often	12	10.2	2	1.9		
Always	1	0.8	0	0		
Attending seminars or conferences related to disaster					23.71 <sup>b</sup>	.00
Never	57	48.3	85	79.4		
Sometimes	58	47.4	21	19.6		
Often	3	2.5	1	0.9		

Note. a = Chi Square, b = Fisher's exact test

*The Levels of Knowledge Regarding Tsunami Disaster Nursing*

Overall, the total mean scores of knowledge regarding tsunami disaster nursing were at a low level for both the tsunami affected and non-affected groups. Also the levels of knowledge for all sub variables for both groups were at a low level. The total mean score of knowledge regarding tsunami disaster nursing for subjects in affected areas was 65.95% (SD = 7.46) with a mean score for knowledge about tsunami disaster nursing practices was 66.67% (SD = 8.59) and for knowledge about the public health impacts of a tsunami was 64.74% (SD = 10.64) (Table 3).

Table 3

*Means, Standard Deviations and the Levels of Knowledge Regarding Tsunami Disaster Nursing of Public Health Nurses Working in the Tsunami Affected Areas (N = 118)*

Knowledge	M (% score)	SD	Level
Tsunami disaster nursing practices	66.67	8.59	Low
Public health impacts of a tsunami	64.74	10.64	Low
Total	65.95	7.46	Low

For knowledge regarding tsunami disaster nursing of subjects in the tsunami non-affected areas, the total mean score was 63.27% (SD = 8.12). The mean score for knowledge about public health impacts of a tsunami was 62.39% (SD = 8.59) and for the knowledge about tsunami disaster nursing practice was 63.27% (SD = 8.12) (Table 4).

Table 4

*Means, Standard Deviations and the Levels of Knowledge Regarding Tsunami Disaster Nursing of Public Health Nurses Working in the Tsunami Non-Affected Areas (N = 107)*

Knowledge	M (% score)	SD	Level
Public health impacts of a tsunami	64.73	11.61	Low
Tsunami disaster nursing practices	62.39	8.59	Low
Total	63.27	8.12	Low

*The Levels of Perceived Skills Regarding Tsunami Disaster Nursing*

Overall, the total mean score of perceived skills regarding tsunami disaster nursing was at a moderate level, for both the tsunami affected and non-affected groups, as well as for every sub variable in both groups. For the affected areas, the total mean score was 66.16% (SD = 10.15). In the sub-variables, the mean score of perceived skills for primary health care services after a tsunami was the highest (M = 67.20%, SD = 11.55), followed by mental health care (M = 66.29%, SD = 13.48), spiritual care (M = 65.69%, SD = 12.79), surveillance and outbreak investigation (M = 65.25%, SD = 13.31), and psychosocial care (M = 64.64%, SD = 13.50) (Table 5).

Table 5

*Means, Standard Deviations and the Levels of Perceived Skills Regarding Tsunami Disaster Nursing in Public Health Nurses Working in the Tsunami Affected Areas (N = 118)*

Skill	M (% score)	SD	Level
Primary health care services after a tsunami	67.20	11.55	Low
Mental health care	66.29	13.48	Low
Spiritual care	65.69	12.79	Low
Surveillance and outbreak investigation	65.25	13.31	Low
Psychosocial care	64.64	13.50	Low
Total	66.16	10.15	Low

The total mean score of perceived skills regarding tsunami disaster nursing for subjects in non-affected area was 52.42% (SD = 11.54). Similar to the affected areas, the highest mean score was for primary care services after a tsunami (M = 53.64%, SD = 12.82), followed by spiritual care (M = 53.57%, SD = 14.04), psychosocial care (M = 51.92%, SD = 13.79), surveillance and outbreak investigation (M = 51.07%, SD = 12.78), and mental health care (M = 50.46%, SD = 13.66) (Table 6).

Table 6

*Means, Standard Deviations and Levels of Perceived Skills Regarding Tsunami Disaster Nursing in Public Health Nurses Working in the Tsunami Non-Affected Areas (N = 107)*

Skill	M (% score)	SD	Level
Primary health care services after a tsunami	53.64	12.82	Low
Spiritual care	53.57	14.04	Low
Psychosocial care	51.92	13.79	Low
Surveillance and outbreak investigation	51.07	12.78	Low
Mental health care	50.46	13.66	Low
Total	52.42	11.54	Low

*Comparison of Knowledge Regarding Tsunami Disaster Nursing Between Public Health Nurses Working in Tsunami Affected and Non-Affected Areas*

Non parametric testing (Mann-Whitney U Test) was used to compare the mean ranks of knowledge regarding tsunami disaster nursing between public health nurses working in tsunami affected and non-affected areas. The subjects in the affected areas had a higher mean rank of overall knowledge than subjects in the non-affected areas (122.35 versus 102.69) and there was a significant difference in overall knowledge regarding tsunami disaster nursing between subjects in the affected and non-affected areas ( $Z = 2.27, p < .05$ ). For knowledge about tsunami disaster nursing practices, the subjects in the affected areas also had a significantly higher mean rank than those in the non-affected areas (127.75 versus 96.74,  $Z = 3.60, p < .01$ ). For knowledge about public health impacts of a tsunami, the subjects in the affected areas had lower mean rank than those in the non-affected areas, but the difference was not significant (Table 7).

Table 7

*Comparison of Knowledge Regarding Tsunami Disaster Nursing between Public Health Nurses Working in the Affected and Non-Affected Areas using Mann-Whitney U Test (N = 225)*

Knowledge	Affected areas (N = 118)			Non-affected areas (N = 107)			Z
	Mean Rank	Min	Max	Mean Rank	Min	Max	
Public health impacts of a tsunami	111.63	33.33	86.67	114.51	33.33	86.67	0.34
Tsunami disaster nursing practices	127.75	32	84	96.74	32	84	3.60**
Total score	122.35	42.5	77.5	102.69	42.5	77.5	2.27*

\*  $p < .05$ , \*\*  $p < .01$

*Comparison of Perceived Skills Regarding Tsunami Disaster Nursing Between Public Health Nurses Working in Tsunami Affected and Non-Affected Areas*

The Mann-Whitney U test was also used to compare the mean ranks of perceived skills regarding tsunami disaster nursing between the two groups. Table 8 shows the results of statistical testing which revealed that the subjects in the affected areas had a significantly higher mean rank of overall perceived skills than those in the non-affected areas (146.11 versus 76.48,  $Z = 8.01$ ,  $p < .01$ ). It was also found that the subjects in the affected areas had higher mean ranks of perceived skills in all sub-variables regarding tsunami disaster nursing, differences which were significant for primary health care services after a tsunami (143.83 versus 79,  $Z = 7.46$ ,  $p < .01$ ), mental health care (145.14 versus 77.56,  $Z = 7.80$ ,  $p < .01$ ), spiritual care (137.84



versus 85.61,  $Z = 6.05$ ,  $p < 0.1$ ), surveillance and outbreak investigation (142.50 versus 80.46,  $Z = 7.15$ ,  $p < .01$ ), and psychosocial care (146.11 versus 76.48,  $Z = 6.31$ ,  $p < .01$ ).

Table 8

*Comparison of Perceived Skills Regarding Tsunami Disaster Nursing between Public Health Nurses Working in the Affected and Non-Affected Areas Using Mann-Whitney U Test (N = 225)*

Skill	Affected areas (N = 118)			Non-affected areas (N = 107)			Z
	Mean Rank	Min	Max	Mean Rank	Min	Max	
Primary health care services after a tsunami	143.83	35	87.5	79	25	92.50	7.46**
Mental health care	145.14	23.33	96.67	77.56	23.33	86.67	7.80**
Spiritual care	137.84	36	96	85.61	24	88	6.05**
Surveillance and outbreak investigation	142.50	32.5	92.5	80.46	22.5	87.5	7.15**
Psychosocial care	138.97	24	92	84.36	24	84	6.31**
Total score	146.11	42	85.5	76.48	30	84.5	8.01**

\*\* $p < .001$

### *Discussions*

There were 225 public health nurses recruited in this study, 118 from tsunami affected areas and 107 from non-affected areas. The findings of this study will be discussed in two parts: 1) the levels of knowledge and perceived skills regarding tsunami disaster nursing, 2) comparison of the knowledge and perceived

skills regarding tsunami disaster nursing between public health nurses working in the tsunami affected and non-affected area.

*The Levels of Knowledge and Perceived Skills Regarding Tsunami Disaster Nursing*

Overall, the levels of knowledge and perceived skills regarding tsunami disaster nursing of subjects in the affected and non-affected areas were at a low level, which was in line with several other studies which have reported that nurses have low levels of knowledge and skills in disaster nursing area. In their study, for example, Hammad, Arbon and Gebbie (2010) found that South Australian emergency nurses have a low level of disaster knowledge. Mitani et al. (2003) also found in their study, that 31% of the nurses did not know the principles of disaster triage, and 40% did not know about debriefing and defusing techniques which are commonly used in disaster mental health care. In a study focused particularly on tsunami disaster nursing, Lukthitikul and Hatthakit (2007) found that Thai nurses had insufficient knowledge to perform wound care to tsunami victims.

In this study, there are several identified factors that might have contributed to low level of knowledge and perceived skills regarding tsunami disaster nursing, including educational background, self-preparedness of nurses toward disaster management and perceived threat of future tsunamis. Firstly, educational background of the subjects might contribute to low level of knowledge and perceived skills regarding tsunami disaster nursing. In this study, the results showed that majority of the subjects in both the affected areas (73.7%) and in the non-affected areas (88.8%) had been educated at a diploma level (Table 1). The diploma level of

nursing education in Indonesia is a three year nursing course offered in nursing schools into which students come from senior high school. An earlier study (Saha, 2006) found that 78% of diploma nursing students had a low or below average ability to self-direct their learning which then also influenced on their level of knowledge and skills. This may happen because the Indonesian diploma nursing schools still use a teacher-centered approach with little emphasis on a student-centered approach. With regard to this study, in which a majority of subjects are educated at a diploma level, this factor may have contributed to the overall low level of knowledge and perceived skills of the subjects.

The second factor that might have contributed to the low level of knowledge and perceived skills regarding tsunami disaster nursing found in this study was the self-preparedness of nurses toward disaster management. The study indicated that in both tsunami affected and non-affected areas, the subjects lacked self-preparedness in terms of disaster-related knowledge. A majority of the subjects in both affected and non-affected areas were less likely to have prepared themselves by reading books and materials related to disaster, searching for and reading disaster related material from the internet, or attending seminars or conferences related to the role of public health nurses in disaster response (Table 2). This finding was again congruent with the finding of the previously referenced paper that nursing students educated at the diploma level, as were most in this study, tend to lack self-directed learning. Also consistent with the findings of these studies, O'Sullivan et al. (2008) found that low levels of self-preparedness of nurses correlated with low levels of knowledge and skills.

Self-preparedness of nurses toward disaster management, such as through reading books and materials related to disaster would improve nurses' knowledge about disaster nursing. Thomas (2005) conducted a study which aimed to evaluate the self-preparedness study approach towards bioterrorism and disaster preparedness in regard to six categories of diseases which might follow a terrorist attack or disaster, and provide a self-study module to the nurses. After this study module was complete, the knowledge of subjects had improved from 20% to 80%, revealing that the self-study format can increase the basic knowledge of nurses toward bioterrorism and disaster events. Slepisi (2007) also recommended that improvement of personal preparedness can increase nurses' knowledge, skills and abilities to face disaster events.

In this study, the findings showed that a low level of knowledge regarding tsunami disaster nursing might also correlate with low levels of perceived skills regarding tsunami disaster nursing itself. Knowledge and skills are highly considered to influence each other and it can be assumed that adequate knowledge will lead to better nursing performance and vice versa. A previous study had highlighted that insufficient of nurses' knowledge regarding disaster management would impact to less skillful of nurses in response to disaster. Husna (2010) conducted a study with nurses working in hospital in a tsunami affected area. She found that knowledge about tsunami care was significantly and positively correlated with perceived skills for tsunami care. With regard to tsunami care, many studies have found that nurses had insufficient knowledge to provide adequate care for tsunami victims. Caring for tsunami victims is a new challenge for public health nurses who have not experienced nursing following a tsunami because the nature of tsunami-

related diseases is different from more commonly encountered diseases. Previous studies have found that nurses had insufficient knowledge to deal with the particular wounds resulting from a tsunami (Lukthitikul & Hatthakit, 2007; Wacharong, Chukpaiwong & Mahaisavariya, 2005). Kurniawati and Widyalolita (2005) found in their study that during the response phase of the 2004 tsunami in Aceh Province Indonesia, some nurses reported that they lacked knowledge about tsunami-related health problems. As an example of one problem, many of the nurses reported that they had performed wound suturing after cleaning tsunami wounds using normal saline, which would increase the possibility of wound infection.

The third factor that might contribute to the low level of knowledge and perceived skills is the perceived threat of a future tsunami. Regarding this issue, most of the subjects in both the affected areas (74.6%) and the non affected areas (62.6%) perceived that a second tsunami would be unlikely to occur in the near future, and even if one did occur, most of them believed it would not be likely to occur in their working area (Table 2). A low perception of a tsunami threat can lead to low awareness of nurses in preparing themselves to face a future disaster. Although earthquakes often happen in Indonesia, and undersea earthquake caused the 2004 tsunami, many people believe that a mega tsunami such as in 2004 is a very rare event, happening perhaps once in a hundred years. This perception might be influenced from local newspapers which mentioned that a mega-tsunami such as the 2004 tsunami is predicted by scientists to happen in next 200 years (Serambinews, 2009). Further in regards to this context, Stein and Okal (2005) argued that the huge earthquakes on 26 December 2004 indicated a slow released of energy by slippage along a 1,200 km fault, which later generated a long rupture that contributed to the

subsequent tsunami. After that the entire rupture zone slipped and the strain accumulated from the subduction of the Indian plate beneath the Burma microplate has been released. Therefore, there is no immediate danger of a similar tsunami being generated on this part of the plate boundary, although large earthquakes still present a threat.

The results also showed that both the tsunami affected and non-affected groups had the highest mean scores on perceived skill of primary health care services after a tsunami. For subjects in the affected areas, the four highest mean scores of perceived skills regarding tsunami disaster nursing, were (1) promote breastfeeding practice among mothers in the shelter, (2) provide educational information to promote good hygiene practice, safe water and food consumption and early seeking treatment behavior, (3) provide educational information to prevent and limit infectious disease transmission (water-borne, food-borne and vector-borne diseases), and (4) give vaccine appropriately (e.g. measles, polio) (Table 13). For subjects in the non-affected areas, the three highest mean scores of perceived skills regarding tsunami disaster nursing were (1) perform basic physical assessment for common health problems in the shelter (e.g. diarrhea, common cold, skin infection), (2) give vaccine appropriately (e.g. measles, polio), and (3) in charge health service center in the tsunami shelter (Table 14). With this dimension, most subjects perceived themselves to have better abilities for performing basic primary health care services such as promoting appropriate nutritional support and health education, providing vaccinations, performing basic physical assessment and assuming charge of temporary health service centers. The reason that might explain this finding that among the sub variables of perceived skills regarding tsunami disaster nursing,

primary health care services are routine services and common activities performed by public health nurses, either in affected or non-affected areas, therefore they are confident in these skills. According to Ministry of Health of Republic Indonesia (2006), public health nurses in Indonesia are accounted as first primary health care providers in providing services to communities according to public health center tasks such as health promotion, maternal and child health, family planning, nutritional support, prevention of communicable diseases, environmental health and primary care level services.

*Comparison of Knowledge and Perceived Skills Regarding Tsunami Disaster Nursing Between the Subjects in the Affected and Non-Affected Areas*

The study found that subjects in the affected areas had higher overall mean ranks of knowledge and perceived skills than those in the non-affected areas, including a significantly higher total mean rank of knowledge and perceived skills. The results also showed that subjects in the affected areas had higher mean rank for all sub variables in perceived skills regarding tsunami disaster nursing, all significantly different as well. For knowledge about tsunami disaster nursing practices, subjects in the affected areas also had significantly higher mean ranks than those in the non-affected areas. However, for knowledge about the public health impacts of a tsunami, subjects in the affected areas had lower mean ranks than those in the non-affected areas, although the differences were not significant.

There are some factors that might contribute to the higher mean ranks of nurses in the affected areas, and the significant differences in knowledge and perceived skills regarding tsunami disaster nursing between the two groups. Those

factors are working experience as public health nurses, direct experience in caring for tsunami victims in a community, training attendance and age of the subjects.

Firstly, working experience might contribute to the higher mean rank of knowledge and skills regarding tsunami disaster nursing of subjects in the tsunami-affected areas. The findings showed that a majority of subjects in the affected areas had been working for 5-10 years (60.2%), and the remaining subjects had been working for more than ten years (39.8). In contrast, the subjects in the non-affected areas were mostly novice nurses (52.3%) who had been working for less than five years. Length of working experience had influenced the knowledge and perceived skills of nurses as described in Benner's conceptualization in her 'novice to expert' framework (as cited in Fero, Witsberger, Wesmiller, Zullo & Hoffman, 2009). Many studies have also found that duration of nursing experience contributes to knowledge and skills of nurses. Bigbee, Otterness and Gehrke (2010), for example, studied about competencies in public health nursing including basic public health science skills, and found that there was a strong positive relationship between self-reported competency levels and years of professional experience in nursing, providing that experience in nursing does make a difference in the development of clinical nursing expertise. Similarly, Saeki, Izumi, Uza and Murashima (2007) also found that length of experience as public health nurses had a strong correlation with improvement of professional competencies among public health nurses in Japan. In this study, professional competencies referred to knowledge, skills, behavior and performance required in the field of public health nursing. Fero, et al. (2009) conducted a study to compare critical thinking abilities between new graduates and experienced nurses using the Performance Based Development System (PBDS), and found that nurses



with more years of experience were more likely to meet the expectations of the PBDS assessment.

The second factor is related to direct experience in caring for tsunami victims in a community. All of the subjects from the affected areas had direct experience in providing care to tsunami victims. They had all been involved in the tsunami recovery process and had contributed to the resilience of tsunami victims. The results of this study showed that more than three-fourths of the subjects in the affected areas had experience in taking charge of health centers in tsunami survivors' shelters (Appendix F). In a visit to tsunami affected area of Aceh Province in January 2005, Sumargono et al. (2005) reported that after the tsunami, public health nurses who worked in tsunami-affected areas provided health services to the tsunami victims. They were in charge of the survivors' camps health centers, identified diseases to prevent outbreaks, found case of PTSD, performed health campaigns, and were active in local surveillance and monitoring for communicable diseases.

In relation to this, Ihlenfeld (2003) concluded that experience does make a difference in the development of clinical nursing expertise. Moreover, Yang, Xiao, Cheng, Zhu, and Arbon (2010) who conducted a qualitative study to explore the experience of Chinese nurses following the Wenchuan earthquake, found that involvement in a disaster activity can help nurses rediscover their helping and caring role. In the aftermath of the 2004 tsunami, it can be assumed that those public health nurses who worked in affected areas gained a picture of the health problems and health needs of tsunami victims and the larger impacts of a tsunami attack. They also gained confidence in their ability to competently perform the required skills in providing care to tsunami victims and the affected communities. This finding is

further supported by a qualitative study conducted by Shih et al. (2002) who found that most of the Taiwanese nurses who were rescuers in the 9-21 earthquake in Taiwan underwent got positive impacts from their experience involved in that event, most notably a clearer concept of disaster care overall and enhanced knowledge of the survivors needs. Suserud and Haljamae (1997) found that nurses who have more experience in disaster response can play an important role in disaster nursing and perform leadership roles at the site of a major disaster, performing important actions such as surveying the situation, performing triage, starting basic life support, and keeping contact with other disaster officers. Greater experience may lead to increased confidence and mastery (O'Sullivan et al., 2008).

The third factor that contributes to higher knowledge and perceived skills of public health nurses working in a tsunami affected area is attending disaster-related trainings courses. Most of the subjects in the affected areas had attended the training that provided as integral part of tsunami recovery activities. Training is accepted as one of the factors that can enhance nurses' competencies including knowledge and skills. Enhancing capacities and capabilities of public health nurses in affected areas also became the target of the health component recovery of the Executive Agency of Rehabilitation and Reconstruction for Aceh and Nias (2009).

A study conducted to evaluate the effectiveness of mental health training in public health workers found that a large majority of respondents reported that the training had given them greater knowledge of disaster mental health and provided many disaster mental health skills. They also said that the training had given them confidence in their ability to respond to respond effectively due to enhanced knowledge and skills in disaster mental health care (Reid et al., 2005). Another study

also found that nurses who had received training in particular areas of disaster nursing were very confident in their ability to contribute to a disaster situation compared those who had never received such training (James & Duarte, 2006). Many studies related to knowledge, skills and preparedness of healthcare providers who may someday have to face disaster situation have recommended that providing training programs for healthcare providers is an important factor to foster the knowledge, skills and preparedness required to face a disaster (Kurniawati & Widyalolita, 2005; Reid, et al., 2005; Slepasi, 2007; Yang et al., 2010).

In this study, a majority of subjects in the affected areas (62.7%) had attended one of the mental health training programs which were conducted after the 2004 tsunami (Appendix F). This training program, which was developed by the School of Nursing, University of Jakarta, was based on a 10-day curriculum for community mental health nurses (CMHN). The curriculum consisted of 11 core issues, two on children, seven on adults, and two on the elderly. The training was provided to nurses working in all affected districts and 226 public health nurses have been specially trained as community mental health nurses (WHO, 2006b). This training would likely be the reason that the nurses in the affected areas had mental health care as their second highest mean score for perceived skills for subjects in tsunami affected areas. Among other trainings programs, the training for mental health care courses have been well designed and managed.

The forth factor that might have contributed to higher levels of knowledge and perceived skills of subjects in the affected areas than those in the non-affected areas is the age of the subjects. In this study, a majority of subjects in the affected areas (52.5%) were 31-40 years old, while a majority of the subjects in the

non-affected areas (55.1%) were 21-30 years old. It can be assumed that most of the subjects in the non-affected areas were young adults who had not yet gained mastery in their professional work (Chan, 2009). A related factor is that the age of any subject would have a close relationship with their duration of working experience and disaster-related experience. Age is an absolute factor related to achieve both nursing and disaster-related experience. Nurses who are older have had more opportunities to gain experience and mastery throughout their professional careers.

Regarding the finding which showed no significant difference of knowledge about the public health impacts of a tsunami between subjects in affected and non-affected areas, the likely reason for this finding is that the 2004 tsunami was the largest tsunami in recent history and the large area in Aceh Province which was impacted by the tsunami became a national and international health concern. Therefore, the knowledge about its impacts on public health became well-known to public health nurses working in both tsunami affected and non-affected areas. Although the subjects working in non-affected areas did not have the direct experience in providing care for tsunami victims, they did witness the impacts of the tsunami and had ample opportunity to read and hear about its impact in terms of the professional concern with public health in general.

In this study, the discussion of the knowledge and skills of tsunami disaster nursing has focused mainly on the personal skills of nurses, but it should not be forgotten that collaboration and team work in disaster nursing are also important. According to Veenema (2007), public health nurses need to develop the necessary skills to participate in and to be able to effectively lead a disaster team if called upon to do so. Interdisciplinary and inter-agency collaboration is also important in

mobilizing resources affectively during a disaster. Rebmann, Carrico and English (2008) noted one of the important lessons learned from studying previous disasters is the need for effective communication between agencies working in disaster shelters. When public health nurses work in a disaster team, effective disaster teamwork requires that each team member knows what to do and how to do it. It is necessary to have high coordination among all the people involved in the disaster situation. Coordination is also important when a large scale disaster requires teams from many countries to work together (Gebbie & Qureshi, 2002).

In summary, the levels of knowledge and perceived skills regarding tsunami disaster nursing in both the tsunami affected and non-affected areas were at a low level. There are some factors that might contribute to this finding, include educational background, self-preparedness and perceived threat of future tsunamis. The finding also showed that the subjects in tsunami affected areas had significant higher of knowledge and perceived skills that those in the non-affected areas. The factors that might influenced to this finding are duration of working experience as public health nurses, direct experience in caring the tsunami victims and training-related disaster attendance.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### *Conclusions*

This descriptive comparative study aimed to describe the level of knowledge and perceived skills regarding tsunami disaster nursing and to analyze the differences in such knowledge and skills between public health nurses working in the tsunami affected and non-affected areas in Aceh Province, Indonesia. A hundred and eighteen subjects from the affected areas and 107 subjects from the non-affected areas were purposively recruited for the study. The subjects were asked to complete the questionnaires which had been validated by three experts from the Faculty of Nursing, Prince of Songkla University, Thailand. The instruments were the Demographic Data Questionnaire (DDQ), the Public Health Nurses' Knowledge Regarding Tsunami Disaster Nursing Questionnaire (PHNK-TDNQ) and the Public Health Nurses' Perceived Skills Regarding Tsunami Disaster Nursing Questionnaires (PHNS-TDNQ). A pilot study with 20 public health nurses was conducted, which yield a KR-20 coefficient of .72 for the PHNK-TDNQ and a Cronbach's alpha coefficient of .96 for the PHNS-TDNQ.

The descriptive demographic data of the subjects were as follows. A majority of the subjects in both the affected areas (95.8%) and the non-affected areas (86.9%) were females. More than half of the subjects in the affected areas (52.5%) were 31-40 years old, while more than half of the subjects in the non-affected (55.1%) areas were 21-30 years old. Most of the subjects were married (91.5% for the affected aresa, 76.6% for the non-affected aresa) and educated at the diploma level (73.7% for

the affected areas and 88.8% for the non-affected areas). For subjects in the affected areas, most had 5-10 years of working experience (60.2%), while most subjects in the non-affected areas had less than 5 years working experience (52.3%). All of the subjects in the affected areas had experience in providing care to tsunami victims' community and more than half of them had more than one year experience involved in tsunami recovery process (43.2%).

The findings showed that subjects in the affected areas had a low level of a total mean score of knowledge ( $M = 65.95\%$ ,  $SD = 7.46$ ) and a mean score of knowledge about the public health impacts of a tsunami ( $M = 64.74\%$ ,  $SD = 10.64$ ) and a mean score of knowledge about tsunami disaster nursing practice ( $M = 66.74\%$ ,  $SD = 8.59$ ). Similarly, subjects from the non-affected areas also had a moderate level of a total mean score of knowledge ( $M = 63.27\%$ ,  $SD = 8.12$ ) and a mean score of knowledge about public health impacts of a tsunami ( $M = 64.73\%$ ,  $SD = 11.61$ ) and a mean score of knowledge about tsunami disaster nursing practicea ( $M = 62.39\%$ ,  $SD = 8.59$ ). Overall, the level of perceived skills regarding tsunami disaster nursing for subjects in the affected areas was at a low level ( $M = 66.16\%$ ,  $SD = 10.15$ ). The highest mean score was in primary health care services after a tsunami ( $M = 67.20\%$ ,  $SD = 11.55$ ), followed by mental health care ( $M = 66.29\%$ ,  $SD = 13.48$ ), spiritual care ( $M = 65.69\%$ ,  $SD = 12.79$ ), surveillance and outbreak investigation ( $M = 65.25\%$ ,  $SD = 13.31$ ), and psychosocial care ( $M = 64.64\%$ ,  $SD = 13.50$ ). Similarly, the overall level of perceived skills regarding tsunami disaster nursing in the non-affected areas was at a low level ( $M = 52.42\%$ ,  $SD = 11.54$ ). The highest mean score was also for primary health care services after a tsunami ( $M = 53.64\%$ ,  $SD = 12.82$ ), followed by spiritual care ( $M = 53.57\%$ ,  $SD = 14.04$ ), psychosocial care ( $M = 51.92\%$ ,  $SD =$

13.79), surveillance and outbreak investigation ( $M = 51.07\%$ ,  $SD = 12.78$ ), and mental health care ( $M = 50.46\%$ ,  $SD = 11.54$ ).

For the comparison of knowledge and perceived skills between public health nurses working in the tsunami affected and non-affected areas, the finding showed that subjects in the affected areas had higher mean ranks of overall knowledge (122.35 versus 102.69) and knowledge about tsunami disaster nursing practice (127.35 versus 96.74) than those in the non-affected areas and there were significant differences of mean ranks for overall knowledge ( $Z = 2.27$ ,  $p < .05$ ) and knowledge about tsunami disaster nursing practice ( $Z = 3.60$ ,  $p < .01$ ). However, for knowledge about the public health impacts of a tsunami, the results showed that there was no significant difference of mean rank between those two groups, although the mean rank score of subjects in the affected areas was lower than those in the non-affected areas (111.63 versus 114.51).

Similarly, the findings also showed that subjects in the affected areas had a statistically significant higher mean rank of overall perceived skills of tsunami disaster nursing than those in the non-affected areas (146.11 versus 76.48), as well as all of the included sub variables of primary health care services after a tsunami (143.83 versus 79), mental health care (145.14 versus 77.56), spiritual care (137.84 versus 85.61), surveillance and outbreak investigation (142.50 versus 80.46), and psychosocial care (138.97 versus 76.48). There was also found any significant difference of perceived skills regarding overall tsunami disaster nursing ( $Z = 8.01$ ,  $p < .01$ ) and for primary health care services after a tsunami ( $Z = 3.36$ ,  $p < .01$ ), mental health care ( $Z = 7.80$ ,  $p < .01$ ), spiritual care ( $Z = 6.05$ ,  $p < .01$ ), surveillance and



outbreak investigation ( $Z = 7.15, p < .01$ ), and psychosocial care ( $Z = 6.31, p < .01$ ) respectively.

#### *Limitations of the Study*

This study may have many internal confounding factors as factor which may influence higher knowledge and perceived skills of subjects in the affected areas than those in the non-affected areas due to the nature of the study and limitation to control those confounding factors.

#### *Recommendations*

##### *Nursing Practice*

At the completion of this study, it is recommended that public health nurses should increase their knowledge and skills regarding tsunami disaster nursing in order to be ready to face a future tsunami that might occur at any time. Self-preparedness of nurses and an environment that highly encourages such self-study should lead to better knowledge and skills in this area.

##### *Nursing Education*

This study provides baseline data which can be used to help develop specific nursing curricula for nursing students as an integral part of public health nursing courses which can prepare and equip future nurses with appropriate knowledge and skills they can use if faced with disaster, particularly such as another tsunami.

### *Public Health Policy*

The findings of this study can be used for further development of appropriate training programs or courses for public health nurses and other public health workers, and also to evaluate the effectiveness of such programs. This study can also benefit for public health center to develop an institution disaster plan which mainly involve the nurses.

### *Nursing Research*

Based on the findings of this study, further studies on developing the guidelines on the competency requirements of public health nurses in regard to responding to future disasters such as another tsunami care are recommended. Also, it is recommended such studies include examining the knowledge and skills of public health nurses in other phases of a disaster, not only the recovery phase.

## References

- Baldacchino, D. R. (2006). Nursing competencies for spiritual care. *Journal of Clinical Nursing, 15*, 885-896.
- Becker, S. M. (2007). Psychosocial care for adult and child survivors of the tsunami disaster in India. *Journal of Child and Adolescent Psychiatric Nursing, 20*(3), 148-155.
- Bigbee, J. L., Otterness, N., & Gehrke, P. (2010). Public health nursing competency in a rural/frontier state. *Public Health Nursing, 27*, 270-276.
- Bloemhard, A. (2008). *Spiritual care for self and others*. Retrieved March 2, 2010 from <http://www.mncdgp.org.au>.
- Boyarsky, I. & Shneiderman, A. (2002). Natural and hybrid disasters: Causes, effects, and management. *Topics in Emergency Medicine, 24*, 1-25.
- Bryant, R. A. (2006). Recovery after the tsunami: Timeline for rehabilitation. *Journal Clinical Psychiatry, 67*, 50-55.
- Byleveld, P. M., Kent, M. I., & McCall, B. J. (2005). Operation Sumatra assist: Post-tsunami environmental and public health response in Banda Aceh. *Australian Defence Forces Health Journal, 6*, 48-53.
- Carballo, M., Daita, S., & Hernandez, M. (2005). Impact of the tsunami on healthcare systems. *Journal of Royal Society of Medicine, 98*, 390-395.
- Carballo, M., Heal, B., & Horbaty, G. (2006). Impact of the tsunami on psychosocial health and well-being. *International Review of Psychiatry, 18*(3), 217-223.
- Centers for Disease Control and Prevention. (2006). Assessment of health-related needs after tsunami and earthquake. Three districts, Aceh Province,

- Indonesia, July-August 2005. *Morbidity and Mortality Weekly Report*, 55, 93-97.
- Chan, M. F. (2009). Factors affecting knowledge, attitudes, and skills levels for nursing staff toward the clinical management system in Hong Kong. *Computers Informatics Nursing*, 27(1), 57-65.
- Connolly, M. A. (2005). *Communicable disease control in emergencies: A field manual*. Retrieved April 22, 2010 from [http://whqlibdoc.who.int/publications/2005/9241546166\\_eng.pdf](http://whqlibdoc.who.int/publications/2005/9241546166_eng.pdf).
- Country Presentation, Republic of Indonesia. (2005). *The health aspect of tsunami disaster in Indonesia*. Presented at the Conference on Health Consequences of the Tsunami, Phuket, Thailand, 4-6 May 2005. Retrieved February 16, 2010 from [http://www.who.int/hac/events/tsunamiconf/presentations/1\\_2\\_national\\_perspectives\\_indonesia\\_idrus\\_ppt.pdf](http://www.who.int/hac/events/tsunamiconf/presentations/1_2_national_perspectives_indonesia_idrus_ppt.pdf).
- Cross, S., Block, D., Josten, L., Reckinger, D., Keller, L. O., Strohschein, S., et al. (2006). Development of the public health nursing competency instrument. *Public Health Nursing*, 23(2), 108-114.
- Doocy, S., Rofi, A., Moodie, C., Spring, E., Bradley, S., Burnham, G., et al. (2007). Tsunami mortality in Aceh Province, Indonesia. *Bulletin of the World Health Organization*, 85, 273-278.
- Duong, K. (2009). Disaster education and training of emergency nurses in South Australia. *Australian Emergency Nursing Journal*, 12, 86-92.
- Ehdenreich, J. H., & McQuaide, S. (2001). Coping with disasters: A guidebook to psychosocial intervention. Retrieved March 2, 2010 from <http://www.mhwwb.org>.

- Ellers, K. (2006). *Emotional and spiritual care in disaster relief operations: An on-site orientation guide for emotional and spiritual teams*. Retrieved March 2, 2010, from <http://www.usc.salvationarmy.org/usc/>.
- Fero, L. J., Witsberger, C. M., Wesmiller, S. W., Zullo, T. G., & Hoffman, L. A. (2009). Critical thinking ability of new graduate and experienced nurses. *Journal of Advanced Nursing*, 65(1), 139-148.
- Fleischauer, A. T., Young, S., Mott, J., & Ratard, R. (2007). Disaster surveillance revisited: Passive, active and electronic syndromic surveillance during hurricane katrina, New Orleans, LA-2005. *Advances in Disease Surveillance*, 2, 153.
- Gebbie, K. M., & Qureshi, K. (2002). Emergency and disaster preparedness, core competency for nurses: What every nurse should but may not know. *American Journal of Nursing*, 102(1), 46-51.
- Gershon, R., Gemson, D., Qureshi, K., & McCollum. (2004). Terrorism preparedness training for occupational health professionals. *Journal of Occupational and Environmental Medicine*, 46(12), 1204-1209.
- Glass, R. I., & Noji, E. K. (1992). *Public health surveillance*. New York: Van Nostrand Reinhold.
- Grienvan, F. V., Chakkraband, M. L. S., Thienkrua, W., Pengjuntr, W., Cardozo, B. L., Tantipiwatanaskul, P., et al. (2006). Mental health problems among adults in tsunami-affected areas in Southern Thailand. *The Journal of American Medical Association*, 296(5), 537-548.
- Groseclose, S. L., Sullivan, K. M., Gibbs, N. P., & Knowles, C. M. (2000). Management of the surveillance information system and quality control of

- data. In S. M. Teutsch, & R. E. Churchill (Eds.), *Principles and practice of public health surveillance* (2nd ed). New York: Oxford University Press.
- Guha-Sapir, D., & VanPanhuis, W. (2005). *The Andaman Nicobar earthquake and tsunami 2004. Impact on disease in Indonesia*. Retrieved February 18, 2010 from <http://www.recoveryplatform.org/assets/publication/Tsunami%20Recovery/disease%20after%20tsunami.pdf>.
- Hammad, K. S., Arbon, P., & Gebbie, K. M. (2010). Emergency nurses and disaster response: An exploration of South Australian emergency nurses' knowledge and perceptions of their roles in disaster response. *Australian Emergency Nursing Journal*, xxx, xxx-xxx.
- Hassmiller, S. (2000). Disaster management. In M. Stanhope, & J. Lancaster (Eds). *Community & public health nursing* (6th ed, pp. 470-489). St. Louis, MO: Mosby.
- HelpAge International. (2005). *The impact of the Indian Ocean tsunami on older people*. Retrieved February 19, 2010 from <http://helpage.org>.
- Hettiarachchi, M. (2008). *Sanitation during disaster relief and reconstruction: The experiences of Asian Tsunami 2004*. Paper presented at the International Conference on Building Education and Research (BEAR 2008), Kandalama, Sri Lanka.
- Hughes, F., Grigg, M., Fritsch, K., & Calder, S. (2007). Psychosocial response in emergency situation: The nurse's role. *International Nursing Review*, 54, 19-27.

- Husna, C. (2010). *Perceived clinical skills for tsunami care and its related factors among nurses in Banda Aceh, Indonesia*. Unpublished master's thesis, Prince of Songkla University, Hatyai, Thailand.
- Idrose, A. M., Adnan, W. A. W., Villa, G. F., & Abdullah, A. H. A. (2007). The use of classroom training and simulation in the training of medical responders for airport disaster. *Emergency Medical Journal*, 24, 7-11.
- Ihlenfeld, J. T. (2003). A primer on triage and mass casualty events. *Dimensions of Critical Care Nursing*, 22(5), 204-207.
- Impact, Dutch Knowledge & Advice centre for Post-Disaster Psychosocial Care. (2007). *Multidisciplinary guideline: Early psychosocial intervention after disasters, terrorism and other shocking events*. Retrieved March 2, 2010 from [http://www.impact-kenniscentrum.nl/download/file\\_1221124881.pdf](http://www.impact-kenniscentrum.nl/download/file_1221124881.pdf).
- Inter-Agency Standing Committee (2007). *IASC guideline on mental health and psychosocial support in emergency setting*. Retrieved August 22, 2008 from <http://humanitarianinfo.org/iasc/content/products>.
- International Committee of the Red Cross. (2006). *Primary health-care services: Primary level*. Retrieved May 4, 2010 from <http://www.icrc.org/eng/resources/documents/publication/p0887.htm>.
- International Food Safety Authorities Network. (2005). *Food safety in natural disaster*. Retrieved April 5, 2010 from <http://www.doh.gov.za/department/foodcontrol/pesticides/naturaldisasters.pdf>.
- James, D., & Duarte, V. (2006). Disaster preparedness of Colorado nurses. *Clinical Simulation in Nursing Education*, 2, e59-e64.

- Joint UNEP/OCHA Environment Unit. (2005). *Indian Ocean tsunami disaster of December 2004. UNDP rapid environmental assessment in the Democratic Socialist Republic of Sri Lanka*. Retrieved February 20, 2010 from <http://ochaonline.un.org>.
- Kaewlai, R., Srisuwan, T., Prasitvoranant, W., Meennuch, W., Yenarkarn, P., Kitayaporn, D., et al. (2007). Radiologic findings in tsunami trauma: Experience with 225 patients injured in the 2004 tsunami. *American Society of Emergency Radiology, 14*, 395-402.
- Kak, N., Burkhalter, B., & Cooper, M. A. (2001). Measuring competence of health providers. *Quality Assurance Project, 2*(1), 1-28.
- Keim, M. E. (2006). Cyclones, tsunamis, and human health. *Oceanography, 19*, 40-49.
- Krishnamoorthy, K., Jambulingam, P., Natarajan, R., Shriram, A. N., Das, P. K., & Sehgal, S. C. (2005). Altered environment and risk of malaria outbreak in South Andaman, Andaman & Nicobar Islands, India affected by tsunami disaster. *Malaria Journal, 4*(32), 1-9.
- Kuntz, S. W., Frable, P., Qureshi, K., & Strong, L. L. (2008). Association of community health nursing educators: Disaster preparedness white paper for community/public health nursing educators. *Public Health Nursing, 25*(4), 362-369.
- Kurniawati, A., & Widyalolita. (2005). *The power of emergency nursing at the time of disaster*. Retrieved November 12, 2009 from <http://ebooks.lib.unair.ac.id/download.php?id=1316>.



- Lee, S. H., Choi, C. P., Eun, H. C., & Kwon, O. S. (2006). Skin problems after a tsunami. *Journal of the European of Dermatology and Venereology*, 20, 860-863.
- Lukthitikul, S., & Hatthakit, U. (2007). Wound care for tsunami victims of nurses at hospitals of Phang-Nga province. *Songhklanagarind Medical Journal*, 25, 391-400.
- Lundy, K. S., & Butts, J. B. (2001). The role of the community health nurse in disasters, in K. S. Lundy & S. Janes (Eds.), *Community health nursing: Caring for the public's health* (2nd ed, pp. 596-598). Sudbury, MA: Jones and Bartlett.
- Magkos, F., Arvaniti, F., Piperkou, I., Katsigaraki, S., Stamatelopoulos, K., Sitara, M., et al. (2004). Nutritional risk following a major disaster in a previously well-nourished population: Who is vulnerable? *Public Health*, 118, 143-145.
- McDonald, M.E, (2002). *Systematic assessment of learning outcome: Developing multiple-choice exams*. Sudbury, MA: Jones and Bartlett.
- McEntire, D. A., Fuller, C., Johnston, C. W., & Weber, R. (2002). A comparison of disaster paradigms: The search for a holistic policy guide. *Public Administration Review*, 62(3), 267-281.
- Medical Emergency Relief International. (2005). *Nurse training in tsunami survivor camps*. Retrieved February 26, 2010 from <http://www.merlin-usa.org/Lists/Feature-Detail.aspx?id=523>.
- Ministry of Health of Republic of Indonesia. (2006). Pedoman penyelenggaraan upaya keperawatan kesehatan masyarakat di Puskesmas, [Guidelines for providing community health nursing care in public health center]. Retrieved

November 7, 2010 from <http://perpustakaan.depkes.go.id:8180/bitstream//123456789/796/4/BK2006-G18.pdf>.

Ministry of Health of Republic of Indonesia. (2008). *Database puskesmas*. Retrieved April 1, 2010, from <http://www.bankdata.depkes.go.id/puskesmas/public/report/>.

Ministry of the Environment of Republic of Indonesia. (2005). *Rapid environmental impact assessment. Banda Aceh, Indonesia*. Retrieved February 18, 2010 from [http://www.recoveryplatform.org/assets/submissions/200909010858\\_indonesia\\_tsumani\\_environment.pdf](http://www.recoveryplatform.org/assets/submissions/200909010858_indonesia_tsumani_environment.pdf).

Mitani, S., Kuboyama, K., & Shirakawa, T. (2003). Nursing in the sudden-onset disasters: Factors and information that affect participation. *Prehospital & Disaster Medicine, 18*(4), 359-366.

Mokdad, A. H., Hipgrave, D., Hudspeth, C., Sudiman, H., Widjojo, S. R., Chairul, Z., et al. (2005). *A rapid assessment of nutrition in Banda Aceh and Aceh Besar, Indonesia, three weeks after the tsunami*. Retrieved February 17, 2009 from [http://nutrition.tufts.edu/118493706715/NutritionPage12w\\_1184937205502.html](http://nutrition.tufts.edu/118493706715/NutritionPage12w_1184937205502.html).

Mondy, C., Cardenas, D., & Avila, M. (2003). The role of an advanced practice public health nurse in bioterrorism preparedness. *Public Health Nursing, 20*(6), 422-431.

Muhari, A., Diposaptono, S., & Imamura, F. (2007). Toward an integrated tsunami disaster mitigation: Lessons learned from previous tsunami events in Indonesia. *Journal of Natural Disaster Science, 29*(1), 13-19.

- National Geographical Data Center. (2010). *Tsunami report*. Retrieved October 27, 2010 from <http://www.ngdc.noaa.gov/nndc/struts/results>.
- Nishikiori, N., Abe, T., Costa, D. G. M., Dharmaratne, S. D., Kunii, O., & Moji, K. (2006). Who died as a result of the tsunami? Risk factors of mortality among internally displaced persons in Sri Lanka: A retrospective cohort analysis. *BMC Public Health*, *6*, 1-8.
- Noji, E. K. (1997). *The public health consequences of disaster*. New York: Oxford University Press.
- O'Sullivan, T. L., Dow, D., Turner, M. C., Lemyre, L., Corneil, W., Krewski, D. et al. (2008). Disaster and emergency management: Canadian nurses' perceptions of preparedness on hospital front lines. *Prehospital Disaster Medicine*, *23*, s11-s18.
- Piyasil, V., Ketuman, P., Plubrukarn, R., Jotipanut, V., Tanprasert, S., Aowjinda, S., et al. (2007). Post traumatic stress disorder in children after tsunami disaster in Thailand: 2 years follow-up. *Journal of Medical Association of Thailand*, *90*(11), 2370-2376.
- Plum, K. C., & Veenema, T. G. (2007). Management of psychosocial effects. In T. G. Veenema (Ed.), *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards* (2nd ed, pp. 254-271). New York: Springer.
- Polit, D. F., & Hungler, B. P. (1999). *Nursing research: Principles and methods* (6th ed.). Philadelphia: Lippincott.

- Polivka, B. J., Stanley, S. A. R., Gordon, D., Taulbee, K., Kieffer, G., & McCorkle, M. (2008). Public health nursing competencies for public health surge events. *Public Health Nursing, 25*, 159-165.
- Prasartritha, T., Tungsiripat, R., & Warachit, P. (2008). The revisit of 2004 tsunami in Thailand: Characteristics of wounds. *International Wound Journal, 5*, 8-19.
- Prasetyawan, Viora, E., Maramis, A., & Keliat, B. A. (2006). Mental health model of care programmes after the tsunami in Aceh, Indonesia. *International Review of Psychiatry, 18*(6), 559-562.
- Pryor, E. R. (2007). Surveillance systems for detection of biological events. In T. G. Veenema (Ed.), *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards* (2nd ed, pp. 389-402). New York: Springer.
- Raj, S. B. & Subramony, S. (2008). Impact of tsunami on the mental health of victims. *Journal of the Indian Academy of Applied Psychology, 34*, 132-140.
- Rebmann, T., Carrico, R., & English, J. F. (2008). Lessons public health professionals learned from past disasters. *Public Health Nursing, 25*(4), 344-352.
- Redwood-Campbell, L. J., & Riddez, L. (2006). Post-tsunami medical care: Health problems encountered in the International Committee of the Red Cross Hospital in Banda Aceh, Indonesia. *Prehospital & Disaster Medicine, 21*, s1-s7.
- Reference Centre for Psychosocial Support & International Federation of Red Cross and Red Crescent Societies. (2009). *Psychosocial intervention: A handbook*. Retrieved March 3, 2010 from <http://www.ifrc.org/Docs/pubs/health/psychosocial-interventions-handbook-en.pdf>.

- Reid, W. M., Ruzycki, S., Haney, M. L., Brown, L. M., Baggerly, J., Mescia, N., et al. (2005). Disaster mental health training in Florida and the response to the 2004 hurricanes. *Journal Public Health Management Practice, November*, S57-S62.
- Rothman, K. J., Greenland, S., & Lash, T. L. (2008). *Modern epidemiology* (3rd ed.). Philadelphia: Lippincott Williams & Wilkins.
- Rowney, R., & Barton, G. (2005). The role of public health nursing in emergency preparedness and response. *Nursing Clinic of North America, 40*, 499-509.
- Saeki, K., Izumi, H., Uza, M., & Murashima, S. (2007). Factors associated with the professional competencies of public health nurses employed by local government agencies in Japan. *Public Health Nursing, 24*, 449-457.
- Saha, D. (2006). *Improving Indonesian nursing students' self directed learning readiness*. Thesis of Doctor of Philosophy, Queensland University of Technology, Australia.
- Serambinews. (2009). Retrieved November 4, 2010 from <http://www.serambinews.com/news/view/19456/dr-ella-meilianda-m-sc-si-peramal-dari-enschede>.
- Shih, F., Liao, Y., Chan, S., Duh, B., & Gau, M. (2002). The impact of the 9-12 earthquake experiences of Taiwanese nurses as rescuers. *Social Science & Medicine, 55*, 659-672.
- Sinar Indonesia Online. (2010). Korban tewas akibat tsunami Mentawai capai 445 orang [The number of tolls in the Mentawai tsunami reached 445 people]. Retrieved November 7, 2010 from <http://hariansib.com/?p=149985>.

- Singchangchai, P., Khampalikit, S., & Na-Sae, T. (1996). *Nursing research: Principle and process*. Songhkla, Thailand: Tame Printing.
- Slepsi, L. A. (2007). Emergency preparedness and professional competency among health care providers during Katrina and Rita: Pilot study results. *Disaster Management Response, 5*, 99-110.
- Sousa, D. A. (2006). *How The Brain Learns* (3rd ed). Thousand Oaks, CA: Corwin Press.
- South-East Asia Disaster Health Information Network. (2009). *Guideline on disaster management: A compilation of expert guidelines on providing healthcare*. Retrieved March 5, 2010, from [http://www.seadhin.org/bitstream/123456789/418/1/Disaster\\_Management\\_eLearning\\_Module\\_1.pdf](http://www.seadhin.org/bitstream/123456789/418/1/Disaster_Management_eLearning_Module_1.pdf)
- Stein, S., & Okal, E. A. (2005). Seismology: Speed and size of the Sumatra earthquake. *Nature, 434*, 581-582.
- Strand, C. & Masek, J. (2007). *Sumatra-Andaman Island earthquake and tsunami of December 26, 2004*. Retrieved February 12, 2010 from [http://books.google.co.id/books?id=BHmzI2m14XkC&printsec=frontcover&dq=tsunami&lr=&as\\_brr=3&cd=18#v=onepage&q=&f=false](http://books.google.co.id/books?id=BHmzI2m14XkC&printsec=frontcover&dq=tsunami&lr=&as_brr=3&cd=18#v=onepage&q=&f=false).
- Sumargono, E., Hayashi, Y., Tamura, Y., Nishiguchi, N., Yoshida, T., Wada, A., et al. (2005). How to help Acehnese helping themselves? A note after a visit with Kobe University medical team. *Kobe Journal of Medical Science, 51* (2), 29-34.
- Suserud, B. O., & Haljamae, H. (1997). Role of nurses in pre-hospital emergency care. *Accident and Emergency Nursing, 5*, 145-151.

- Tang, C. S. (2007). Trajectory of traumatic stress symptoms in the aftermath of extreme natural disaster: A study of adult Thai survivors of the 2004 Southeast Asian Earthquake and Tsunami. *The Journal of Nervous and Mental Disease*, 195(1), 54-59.
- Teutsch, S. M. (2000). Consideration in planning a surveillance system, in S. M. Teutsch & R. E. Churchill, *Principles and practice of public health surveillance* (2nd ed). New York: Oxford University Press.
- 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.
- The Executive Agency of Rehabilitation and Reconstruction for Aceh and Nias. (2009). *Tsunami: From disaster to the emergence of light*. Retrieved October 16, 2010 from <http://know.brr.go.id/brr-book-series.html>.
- The Meteorology and Geophysics Agent of Indonesia. (2010). *Gempa Terkini [Latest earthquakes]*. Retrieved October 24, 2010, from: <http://www.bmg.go.id/60gempa.bmkg?Jenis=URL&IDS=9279258135813849788>.
- Thomas, J. (2005). A self-study educational approach to bioterrorism/disaster preparation. *American Journal of Infection Control*, 33(5), e45.
- Thorburn, C. (2007). *The Acehese gampong three years on: Assessing local capacity and reconstruction assistance in post-tsunami Aceh, report of the Aceh Community Assistance Research project (ACARP)*. Retrieved January 30, 2009 from <http://www.indo.usaid.gov.au/featurestories/acarpreport.pdf>.
- United States Agency for International Development. (2007). *Fact sheet: Tsunami reconstruction, three years later*. Retrieved February 26, 2010 from

[http://www.usaid.gov/locations/asia/documents/tsunami/Final\\_Tsunami\\_3rd\\_Anniversary\\_Fact\\_Sheet.pdf](http://www.usaid.gov/locations/asia/documents/tsunami/Final_Tsunami_3rd_Anniversary_Fact_Sheet.pdf).

Veenema, T. G. (Ed). (2007). *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards* (2nd ed). New York: Springer Publishing Company.

Wacharong, C., Chukpaiwong, B., & Mahaisavariya. (2005). After the tsunamis. *The Lancet*, 265, 203-203.

Wang, C., Wei, S., Xiang, H., Wu, J., Xu, Y., Liu, L., et al. (2008). Development and evaluation of a leadership training program for public health emergency response: Results from a Chinese study. *BMC Public Health*, 8(377), 1-8.

Waring, S. C. & Brown, B., J. (2005). The threat of communicable diseases following natural disaster: A public health response. *Disaster Management & Response*, 3, 41-47.

Wattanawaitunechai, C., Peacock, S. J., & Jitpratoom, P. (2005). Tsunami in Thailand. Disaster management in a district hospital. *The New England Journal of Medicine*, 352(10), 962-964.

Wilder-Smith, A. (2005). Tsunami in South Asia: What is the risk of post-disaster infectious disease outbreaks? *Annals Academy of Medicine Singapore*, 34, 625-631.

Williams, R., Alexander, D. A., Bolsover, D., & Bakke, F. K. (2008). Children, resilience and disasters: recent evidence that should influence a model of psychosocial care. *Current Opinion in Psychiatry*, 21, 338-344.

Wisner, B., & Adams, J. (Eds). (2002). *Environmental health in emergencies and disasters*. Geneva: World Health Organization



- Wong, K. F., & Yau, S. Y. (2009). Nurses' experiences in spirituality and spiritual care in Hong Kong. *Applied Nursing Research*, *xx*, xxx-xxx.
- World Health Organization. (2005). *Tsunami affected areas, 2005: Communicable disease risks and intervention*. Retrieved December 8, 2009, from <http://www.who.int/infectious-disease-news/IDdocs/whocds200534.pdf>.
- World Health Organization. (2006a). *The contribution of nursing and midwifery in emergencies*. Retrieved October 6, 2009 from [www.thebreakingnews.com/files/midwives-in-emergencies.pdf](http://www.thebreakingnews.com/files/midwives-in-emergencies.pdf).
- World Health Organization. (2006b). *Mental health and psychosocial relief effort after the tsunami in South-East Asia*. Retrieved February 26, 2010, from <http://www.searo.who.int/en/Section1174/Section1199/Section1203.htm>.
- World Health Organization. (2006c). *The mental health and psychosocial aspects of disaster preparedness: Report of an intercountry meeting Khao Lak, Thailand, 20-23 June 2006*. Retrieved February 2, 2008 from: [http://www.searo.who.int/LinkFiles/Meeting\\_reports\\_SEA-Ment-150.pdf](http://www.searo.who.int/LinkFiles/Meeting_reports_SEA-Ment-150.pdf).
- Yang, Y. N., Xiao, L. D., Cheng, H. Y., Zhu, J. C., & Arbon, P. (2010). Chinese experience in the Wenchuan earthquake relief. *International Nursing Review*, *57*, 217-223.
- Zoraster, R. M. (2005). Barriers to disaster coordination: Health sector coordination in Banda Aceh following the South Asia Tsunami. *Prehospital & Disaster Medicine*, *21*, s13-s18.

**APPENDICES**

APPENDIX A

Geographic Location of Research Setting

Map 1: Geographic location of districts/municipalities in NAD/ Nias by severity of disaster impact, 2005



Legend:

- ■ ■ ■ ■ Selected tsunami affected area
- Selected tsunami non-affected area

Figure 2: Geographic location of tsunami impact of districts/municipalities in Aceh Province and Nias (UNORC-IAS, 2007)

## **APPENDIX B**

### **Informed Consent Form**

Dear Colleagues,

My name is Maulidar. I am a master's student of Faculty of Nursing, Prince of Songkla University, Thailand. My research title is "A Comparative Study of Knowledge and Perceived Skills Regarding Tsunami Disaster Nursing During Recovery Phase Between Public Health Nurses Working in Tsunami Affected and Non-Affected Areas in Aceh Province, Indonesia". Information from this study will be benefit for development of nursing profession in the future, particularly in disaster nursing.

The study and its procedures have been approved by the committee and the Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University, Thailand. The information gathered will be used to write a research report. All information and your responses in connection with this study will remain confidential. Only the researcher and advisors are eligible to assess the data. Your participation in this study is voluntary. If you agree to participate in this study, you will be asked to complete the questionnaires. During completing the questionnaires, you may feel some emotional distress such as sad, depressed, or guilty due to the previous tsunami event. If you feel uncomfortable while completing the questionnaires, you can stop until you feel better or you may also withdraw from this study any time without any negative consequences. Lastly, you are free to ask any question about a study or being participant.

If you have any inquiries, please contact me or my thesis advisor (Assist. Prof. Dr. Urai Hatthakit) at the following address:

Maulidar

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Signature of researcher

---

Maulidar

## APPENDIX C

### The Demographic Data Questionnaire (DDQ)

Code:.....

Date:.....

**Instruction:**

Please answer by filling in the blank or marking (✓) in the available space that is appropriate for you.

1. Gender

1 ( ) Male

2 ( ) Female

2. Age: ..... Years

3. Marital status

1 ( ) Single

2 ( ) Married

3 ( ) Divorced

4 ( ) Widowed

4. Education

1 ( ) SPK

2 ( ) Diploma level

3 ( ) Bachelor level

4 ( ) Master level or higher

5. Duration of working as a nurse: .....years .....months

6. Experience working with tsunami victims

1 ( ) yes

2 ( ) no

7. If have experience, please specify:

1 ( ) Providing mental health and psychosocial care for tsunami victims

2 ( ) Providing spiritual care for tsunami victims

3 ( ) Involving in surveillance activity

- 4 ( ) Participate in tsunami-related outbreaks investigation
- 5 ( ) In charge of health center in the tsunami survivors' shelter
- 6 ( ) Participating in food provision and nutritional support programs for tsunami survivors
- 7 ( ) Administering vaccination for tsunami victims
- 8 ( ) Referring tsunami victims to higher level of health care service
- 9 ( ) Performing health education to tsunami victims in the shelter
- 10 ( ) Participating in vector control program
- 11 ( ) Educating and monitoring the shelter's sanitation and waste disposal management
- 12 ( ) others (identify) .....
8. Duration of involvement with tsunami recovery activity: ..... year(s), .....month(s)
9. Number of attending training provision and training attendance within past 5 years

No	Trainings	Training provision (frequency)	Training attendance (frequency)
1 ( )	None		
2	Disaster management	1( ) none 2( ) every year 3( ) Other (specify)...	_____ time(s)
3	Psychosocial and mental health care	1( ) none 2( ) every year 3( ) Other (specify)...	_____ time(s)

No	Trainings	Training provision (frequency)	Training attendance (frequency)
4	Surveillance	1( ) none 2( ) every year 3( ) Other, specify...	_____ time(s)
5	Immunization	1( ) none 2( ) every year 3( ) Other (specify)...	_____ time(s)
6	Environmental health	1( ) none 2( ) every year 3( ) Other (specify)...	_____ time(s)
7	Infection and vector control	1( ) none 2( ) every year 3( ) Other (specify)...	_____ time(s)
8	Other (identify).....	1( ) none 2( ) every year 3( ) other (specify)....	_____ time(s)

10. Perceived threat of future tsunami:

a. Tsunami is likely to occur in near future time:

1 ( ) yes                      2 ( ) no

b. Tsunami is likely to occur in the working area:

1 ( ) yes                      2 ( ) no

11. Self preparedness of knowledge and skills related disaster nursing:

a. Reading books and materials related to disaster

0 ( ) never                      1 ( ) sometimes

2 ( ) often                      3 ( ) always



b. Searching and reading disaster related materials from internet

0 ( ) never                      1 ( ) sometimes

2 ( ) often                      3 ( ) always

c. Attending seminar and conference related to disaster

0 ( ) never                      1 ( ) sometimes

2 ( ) often                      3 ( ) always

## APPENDIX D

### Public Health Nurses' Knowledge Regarding Tsunami Disaster Nursing Questionnaire (PHNK-TDNQ)

This questionnaire is developed to measure public health nurses' knowledge regarding tsunami disaster nursing in recovery phase. Please read the following statements and mark (✓) "yes or no" for each statement based on your knowledge.

No	Item	Mark	
		Yes	No
	<b>Public health impacts of a tsunami</b>		
	<i>Mortality and morbidity</i>		
1	Most deaths caused by tsunami are due to drowning		
2	Female, children and elderly are the most vulnerable population in tsunami disaster		
3	Tsunami-related wounds are often multiple sites and organs involvement		
4	Tsunami-related wounds will not develop infection		
5	Tsunami-related respiratory diseases are tsunami lung, emphysema, and aspiration pneumonia		
	<i>Environmental impact</i>		
6	Delay clean up of tsunami debris and dead body can prolong infectious disease		
7	The devastation of water system after tsunami does not have impact on community health		
	<i>Psychosocial and mental health impacts</i>		
8	Tsunami victims may have post-traumatic stress disorders (PTSD), anxiety and depression		
9	Children and elderly do not experience traumatic feeling as same as adults		

No	Item	Mark	
		Yes	No
10	Mental health and psychosocial problems can occur similarly among tsunami victims regardless of age, gender, social support		
11	Psychosocial distress among tsunami survivors are resulted from the loss of their loved ones and community members, being homeless, and loss of livelihoods		
	<b><i>Disease outbreaks after a tsunami</i></b>		
12	The common food-borne and water-borne diseases after tsunami are diarrheal diseases, typhoid fever, hepatitis A, and hepatitis E		
13	The common vector-borne diseases after tsunami are malaria, dengue fever, shigellosis, and leptospirosis		
14	There is an association between tsunami events and measles outbreak		
15	Poor sanitation and hygiene in tsunami shelter result in occurrence of some diseases such as helminthes and skin problems		
	<b>Tsunami Disaster Nursing in Community</b>		
	<b><i>Mental health care</i></b>		
16	Psychological triage is aimed to distinguish psychologically pathology from normal stress reactions after fearful event such as tsunami		
17	Acute distress symptom (ADS) is similar to post-traumatic stress disorder (PTSD)		
18	Depression can be signed by physical, emotional, cognitive, and behavior symptoms		
19	Emotional symptoms of depression are tiredness, fatigue, aches and pain		
	<b><i>Psychosocial care</i></b>		
20	Assessment of basic physical needs is not necessary in addressing psychosocial support to tsunami survivors		
21	Early psychosocial intervention after tsunami is aimed to		

No	Item	Mark	
		Yes	No
	integrate medical intervention to volunteers and social workers		
22	Essential psychosocial interventions for adults include ventilation, empathy, active listening, social support, and relaxation techniques		
23	Psychosocial support to children and adolescent can be provided regardless of their age and level of development		
	<b><i>Spiritual care</i></b>		
24	Tsunami survivors may have disruption of spiritual faith and practice		
25	Communication is important to gain data about spiritual issue in tsunami victims		
26	Nursing intervention for spiritual care for tsunami victims are providing social support and medical services and referring the patients for appropriate treatment		
27	Evaluation of spiritual intervention covers the appropriateness of intervention to the right person at the right time		
	<b><i>Surveillance and outbreak investigation</i></b>		
28	In passive surveillance, public health centers actively searches for the tsunami-related cases		
29	After tsunami, surveillance is needed to monitor the extent of health problems occur as tsunami aftermath		
30	Surveillance is useful to monitor the effectiveness of tsunami relief effort		
31	Potential outbreaks after tsunami are diarrheal diseases and respiratory diseases		
	<b><i>Primary care services after a tsunami (nutritional support, vaccination, water supply and sanitation, health education, shelter management, vector control and collaboration and referral services)</i></b>		
32	Infant and children in the tsunami shelter have high risk of malnutrition		

No	Item	Mark	
		Yes	No
33	Encourage the distribution of formula milk in the shelter while mother is available will promote nutritional status of infant		
34	Measles immunization is important to prevent measles transmission in tsunami shelter		
35	It is important to perform mass tetanus vaccination program for tsunami disaster victims		
36	It is important to separate containers of water for drinking, cooking and washing purposes in the tsunami shelter		
37	Chlorination of wells and other water resources are not important in post tsunami event		
38	Health education program after tsunami is aimed to prevent and limit transmission of common infectious diseases that may occur after tsunami		
39	Vector control is used to prevent the incidence of vector-borne diseases		
40	Collaboration and referral service is important for caring tsunami victims in primary care level		

## APPENDIX E

### Public Health Nurses' Perceived Skills Regarding Tsunami Disaster Nursing Questionnaire (PHNS-TDNQ)

This questionnaire is developed to measure public health nurses' perceived skills regarding tsunami disaster nursing in recovery phase. Please read the following statement and give circle on the number that most closely measures your opinion how much you can perform each skill. There are five possible options that indicate the level of skill that you have regarding tsunami disaster nursing:

1 = very poor

2 = poor

3 = fair

4 = good

5 = very good

No	Skill	Perceived ability to perform				
		1	2	3	4	5
	<b><i>Mental health care</i></b>					
1	Assess signs and symptom of PTSD (re-experience of tsunami, numbing and hyperarousal)					
2	Assess signs and symptoms of depression (physical symptom, emotional symptoms, cognitive symptoms and behavior symptoms)					
3	Assess signs and symptoms of psychological problem which require appropriate referral service (persistent sleep disruption, thought disruption, increasing use drug and alcohol,					

No	Skill	Perceived ability to perform				
		1	2	3	4	5
	presence indication of suicide, severe mental illness)					
4	Provide emotional support for people with PTSD (e. g. encourage people to talk about their feeling, encourage friendship and group healing)					
5	Provide nursing intervention for depression people by providing information about depression and offering problem-solving counseling approach.					
6	Evaluate the effectiveness of mental health intervention by observing emotional healing response after intervention					
	<b><i>Psychosocial care</i></b>					
7	Assess psychosocial distress of tsunami survivor including impaired daily functioning, and disruption of social support pattern					
8	Assess psychosocial needs of vulnerable population (women, children and elderly)					
9	Teach stress reduction technique (ventilation, exercise, relaxation, rest and recreation)					
10	Provide psychosocial support for children and adolescent based on their age and development (e.g. reconnect children with peer network, encourage play group, enable them to return to school as soon as possible)					
11	Evaluate the effectiveness of psychosocial intervention by comparing the outcome with baseline data					

No	Skill	Perceived ability to perform				
		1	2	3	4	5
	<b><i>Spiritual care</i></b>					
12	Assess spiritual distress of tsunami victims (e.g. hopelessness, loss of life meaning, grief, anger)					
13	Provide nursing intervention to relieve spiritual distress for tsunami survivors such as communicating with empathy, helping to accept the current situation, facilitating religious coping, instilling hope for the future					
14	Facilitate religious coping					
15	Evaluate the effectiveness of spiritual care by assessing spiritual distress relieving					
16	Provide spiritual intervention to the right person in the right time					
	<b><i>Surveillance and outbreak investigation</i></b>					
17	Develop case definition for tsunami-related diseases					
18	Determine signs and symptoms of suspected diseases occurred after tsunami					
19	Participate in data collection for tsunami surveillance					
20	Make report of tsunami surveillance data based on data collection					
21	Interpret the tsunami surveillance result					
22	Determine sign of disease outbreak after tsunami					
23	Determine risk populations for tsunami-related outbreaks					
24	Collect and analyze data for tsunami-related					



No	Skill	Perceived ability to perform				
		1	2	3	4	5
	outbreaks (time of onset, place, and person characteristics)					
	<b><i>Primary health care services after a tsunami (nutritional support, vaccination, water supply and sanitation, health education, shelter management, collaboration and referral services)</i></b>					
25	Assess nutritional status of tsunami victims					
26	Promote breastfeeding practice among mothers in the shelter					
27	Give vaccine appropriately (e.g. measles, polio)					
28	Ensure proper sanitary facilities in the shelter					
29	Provide educational information to prevent and limit infectious disease transmission (water-borne, food-borne and vector-borne diseases)					
30	Provide educational information to promote good hygiene practice, safe water and food consumption and early seeking treatment behavior					
31	In charge health service center in the tsunami shelter					
32	Perform basic physical assessment for common health problems in the shelter (e.g. diarrhea, common cold, skin infection)					
33	Administer simple medications for common health problems in the shelter (e.g. diarrhea, common cold, skin infection)					
34	Assess health-related need of community in the shelter (e.g. continuity of TB drug for TB patient)					

No	Skill	Perceived ability to perform				
		1	2	3	4	5
35	Make planning to prevent disease spread in the shelter					
36	Educate tsunami survivor about vector control means					
37	Ensure the appropriateness of shelter that can reduce the number of vector such as mosquito and flies					
38	Identify cases in the shelter who need further referral service					
39	Determine signs and symptoms of advance diseases in the shelter for referral and better treatment					
40	Arrange referral process for people in the shelter who need better treatment of the disease					

## APPENDIX F

### Experiences and Trainings

Table 9

*Frequency and Percentage of Public Health Nurses' Experiences in Caring for Tsunami Victims in the Tsunami Affected Areas (N = 118)*

Experience	n	%
In charging health center in the tsunami survivors' shelter	94	79.7
Providing mental health and psychosocial care for tsunami victims	74	62.7
Providing spiritual care for tsunami victims	73	61.9
Administering vaccination for tsunami victims	70	59.3
Performing health education to tsunami victims in the shelter	66	55.9
Referring tsunami victims to higher level of health care service	63	53.4
Involving in surveillance activity	51	43.2
Educating and monitoring the shelter's sanitation and waste disposal management	47	39.8
Participating in food provision and nutritional support program for tsunami survivors	44	37.3
Participate in tsunami-related outbreak investigation	34	28.8
Participating in vector control program	32	27.1
Assisting labor process in the shelter	6	5.1

Table 10

*Frequency and Percentage of Public Health Nurses' Training Attendance in the  
Tsunami Affected Areas (N = 118)*

Training	n	%
Immunization	25	21.1
Disaster management	24	20.3
Psychosocial and mental health care	22	18.6
Environmental health	15	12.7
Surveillance	13	11.0
Infection and vector control	6	5.0
Family planning and emergency contraception	4	3.3
TB management in community	1	0.8
Intranatal care	1	0.8
TOT for health volunteer	1	0.8

## APPENDIX G

Table 11

*Five items with highest and five items with lowest percentage correct answer of knowledge regarding tsunami disaster nursing in public health nurses working in the tsunami affected areas (N = 118)*

Knowledge regarding tsunami disaster nursing	n	%
<i>Five items with highest mean percentage score</i>		
1. Depression can be signaled by physical, emotional, cognitive, and behavior symptoms	114	96.6
2. Psychosocial distress among tsunami survivors are resulted from the loss of their loved ones and community members, being homeless, and loss of livelihoods	113	95.8
3. Assessment of basic physical needs is not necessary in addressing psychosocial support to tsunami survivors	113	95.8
4. Health education program after tsunami is aimed to prevent and limit transmission of common infectious diseases that may occur after tsunami	111	94.1
5. Poor sanitation and hygiene in tsunami shelter result in occurrence of some diseases such as helminthes and skin problems	110	93.2
<i>Five items with lowest mean percentage score</i>		
1. Mental health and psychosocial problems can occur similarly among tsunami victims regardless of age, gender, social support	8	6.8
2. The common vector-borne diseases after tsunami are malaria, dengue fever, shigellosis, and leptospirosis	14	11.9
3. Tsunami-related respiratory diseases are tsunami lung, emphysema, and aspiration pneumonia	15	12.7
4. Nursing intervention for spiritual care for tsunami victims are providing social support and medical services and referring the patients for appropriate treatment	20	16.9
5. There is an association between tsunami events and measles outbreak	22	18.6

Table 12

*Five items with highest and five items with lowest percentage correct answer of knowledge regarding tsunami disaster nursing in public health nurses working in the tsunami non-affected areas (N = 107)*

Knowledge regarding tsunami disaster nursing	n	%
<i>Five items with highest percentage answered correctly</i>		
1. Poor sanitation and hygiene in tsunami shelter result in occurrence of some diseases such as helminthes and skin problems	101	94.4
2. Essential psychosocial interventions for adults include ventilation, empathy, active listening, social support, and relaxation techniques	99	92.5
3. Infant and children in the tsunami shelter have high risk of malnutrition	99	92.5
4. Potential outbreaks after tsunami are diarrheal diseases and respiratory diseases	98	91.6
5. Psychological triage is aimed to distinguish psychologically pathology from normal stress reactions after fearful event such as tsunami	98	91.6
<i>Five items with lowest percentage answered correctly</i>		
1. Encourage the distribution of formula milk in the shelter while mother is available will promote nutritional status of infant	11	10.3
2. It is important to perform mass tetanus vaccination program for tsunami disaster victims	14	13.1
3. Nursing intervention for spiritual care for tsunami victims are providing social support and medical services and referring the patients for appropriate treatment	16	15.0
4. Tsunami-related wounds will not develop infection	17	15.9
5. Tsunami-related respiratory diseases are tsunami lung, emphysema, and aspiration pneumonia	17	15.9

Table 13

*Means and Standard Deviations of Five Items with the Highest and the Lowest Mean Score of Perceived Skills Regarding Tsunami Disaster Nursing in Public Health Nurses Working in the Tsunami Affected Areas (N = 118)*

Skills regarding tsunami disaster nursing	M	SD
<i>Five items with highest percentage answered correctly</i>		
1. Promote breastfeeding practice among mothers in the shelter	3.65	0.91
2. Provide educational information to promote good hygiene practice, safe water and food consumption and early seeking treatment behavior	3.51	0.83
3. Provide educational information to prevent and limit infectious disease transmission (water-borne, food-borne and vector-borne diseases)	3.50	0.85
4. Give vaccine appropriately (e.g. measles, polio)	3.47	0.96
5. Provide nursing intervention for depression people by providing information about depression and offering problem-solving counseling approach.	3.47	0.89
<i>Five items with lowest percentage answered correctly</i>		
1. Teach stress reduction technique (ventilation, exercise, relaxation, rest and recreation)	3.10	0.99
2. Assess signs and symptom of PTSD (re-experience of tsunami, numbing and hyperarousal)	3.12	0.84
3. Make report of tsunami surveillance data based on data collection	3.12	0.98
4. Arrange referral process for people in the shelter who need better treatment of the disease	3.14	0.84
5. In charge health service center in the tsunami shelter	3.17	0.94

Table 14

*Mean and Standard Deviation of Five Items with the Highest and the Lowest Mean Score of Perceived Skills Regarding Tsunami Disaster Nursing in Public Health Nurses Working in the Tsunami Non-Affected Areas (N = 107)*

Skills regarding tsunami disaster nursing	Mean	SD
<i>Five items with the highest mean score</i>		
1. Provide nursing intervention to relieve spiritual distress for tsunami survivors such as communicating with empathy, helping to accept the current situation, facilitating religious coping, instilling hope for the future	2.79	0.94
2. Perform basic physical assessment for common health problems in the shelter (e.g. diarrhea, common cold, skin infection)	2.78	0.91
3. Facilitate religious coping	2.77	0.89
4. Give vaccine appropriately (e.g. measles, polio)	2.74	0.87
5. In charge health service center in the tsunami shelter	2.74	0.96
<i>Five items with the lowest mean score</i>		
1. Provide nursing intervention for depression people by providing information about depression and offering problem-solving counseling approach.	2.43	0.82
2. Determine risk populations for tsunami-related outbreaks	2.45	0.82
3. Collect and analyze data for tsunami-related outbreaks (time of onset, place, and person characteristics)	2.47	0.87
4. Assess signs and symptom of PTSD (re-experience of tsunami, numbing and hyperarousal)	2.50	0.95
5. Assess signs and symptoms of psychological problem which require appropriate referral service (persistent sleep disruption, thought disruption, increasing use drug and alcohol, presence indication of suicide, severe mental illness)	2.50	0.80



## **APPENDIX H**

### **List of Experts**

Three experts validated the content validity of The Demographic Data Questionnaire (DDQ), Public Health Nurses' Knowledge Regarding Tsunami Disaster Nursing Questionnaire (PHNK-TDNQ), and Public Health Nurses' Perceived Skills Regarding Tsunami Disaster Nursing Questionnaire (PHNS-TDNQ), they were:

1. Asst. Prof. Dr. Umaporn Boonyasopun, RN  
Nursing lecturer, Faculty of Nursing Prince of Songkla University
2. Asst. Prof. Dr. Piyanuch Jittanoon, RN  
Nursing lecturer, Faculty of Nursing Prince of Songkla University
3. Dr. Hathairat Sangchan, RN  
Nursing lecturer, Faculty of Nursing Prince of Songkla University

## VITAE

**Name** : Mrs. Maulidar

**Student ID** : 5110420060

### Education Attainment

Degree	Name of Institution	Year of Graduation
Bachelor of Nursing	Syiah Kuala University	2007

### Scholarship Award during Enrolment

Scholarship of Aceh Governance 2007

The Robert Wood Johnson Foundation

### List of Publication and Proceedings

Maulidar, Hatthakit, U., & Chaowalit, A. (November 2010). Knowledge, self-preparedness and perceived skills regarding tsunami disaster nursing among public health nurses working in tsunami affected area in Aceh Province, Indonesia. Paper presented at the 5<sup>th</sup> Annual International Workshop & Expo on Sumatra Tsunami Disaster & Recovery 2010, Tsunami & Disaster Mitigation Research Centre, Syiah Kuala University, Banda Aceh, Indonesia.