Psychosocial and environmental distress resulting from a volcanic eruption: A mixed methods study

Thesis submitted by

Sri Warsini, BSN. M. Med

for the Degree of Doctor of Philosophy

College of Healthcare Sciences, Discipline of Nursing, Midwifery and Nutrition

James Cook University

2015

Advisory Team

Professor Kim Usher (Primary Advisor)

Professor Jane Mills (Co-Advisor)

Dr Caryn West (Associate Advisor)

Statement of Access

I, the undersigned, the author of this thesis, understand that James Cook University Library, by microfilm or by other means, allows access to users in other approved libraries. All users consulting this thesis will have to sign the following statement:

> 'In consulting this thesis, I agree not to copy or closely paraphrase it in whole or part without the consent of the author; and to make proper written acknowledgement for any assistance, which I have obtained from it'.

Beyond this, I do not wish to place any restriction on access to this thesis.

Signed Date: 18 May 2015

Statement of Sources Declaration

I declare that this thesis is my own work and had not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published, unpublished or oral work of others has acknowledged in the text and a list of references is given.

Signed Date: 18 May 2015

Statement of Contribution of Others

Nature of Assistance	Contribution	Names, Titles, and Affiliations of Co-contributors
Intellectual support	The supervisory team provided assistance with proposal writing and data analysis within the remit of their roles as described in the 'The Role of the Advisory Panel in Providing Regular Guidance and Support to Research Students' policy. Editorial assistance was provided to the candidate by both the supervisory team and professional editors. Proof reading was restricted to correcting the presentation of the text to conform to standard usage and conventions of grammar and syntax, use of clear language, logical connections between phrases, clauses, sentences, paragraphs and sections, voice and tone and repetition.	Professor Kim Usher, School of Health, University of New England Professor Jane Mills, College of Healthcare Sciences, Nursing, Midwifery and Nutrition, James Cook University Dr Caryn West, College of Healthcare Sciences, Nursing, Midwifery and Nutrition, James Cook University
Financial support	Tuition fee Stipend Field research	Research Tuition Scholarship, James Cook University Postgraduate Research Scholarship, James Cook University Graduate Research School, James Cook University
Preparation before data collecting	Indonesian translation for informed consent, information sheet and tools	Amin Basuki, English Lecturer, Faculty of Cultural Sciences, Universitas Gadjah Mada, Indonesia PeMad International Translation, Authorised and Sworn Translation, Jl Damai Mudal Rt01/19, Sariharjo, Ngaglik, Sleman, Jogjakarta, Indonesia
Data analysis	Quantitative data analysis for psychometric testing and large surveys	Associate Professor Petra Buettner, School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University

Acknowledgements

I would like to dedicate this thesis to those who made a major contribution to my PhD journey through their assistance, encouragement, advice, attention and affection. First, I express my deepest gratitude to Allah the Greatest, the Most Compassionate and Merciful, because of his blessings and permission I received a scholarship from James Cook University and was placed in the hands of reliable and kind-hearted supervisors. I am deeply indebted to and admire Professor Kim Usher who guided me from the very beginning, providing her time and attention to me and always being the first to reply to my emails. I also acknowledge Professor Jane Mills and Dr Caryn West who equally directed my research, always encouraged me to be a reliable researcher and convinced me that I had the capability to conduct research and publish my writings. I would also like to thank and express how grateful I am to Associate Professor Petra Buettner for the very useful knowledge and assistance she provided me with during the analysis of quantitative data. My interest in statistics has grown from this experience.

I would like to express my deepest gratitude to the respondents who were kind enough to give their time and complete the questionnaires. Hopefully, the results of this research will prove to be useful to everyone. To my students, who willingly allocated their time during holidays and lifted my spirits when there were difficulties collecting the data, you too have made considerable contribution to studies.

Next, I would like to thank my beloved husband for his support, love and patience in taking care of Kalila alone. To my little angel, Kalila, *Bunda* apologises for leaving you while studying in Cairns. *Bunda* did this all for the sake of our future. I would also like to thank the Indonesian students studying at James Cook University for wonderful memories and their attention and support. To the family of Intansari, Adi Gunawan and Bu Kasiah, I thank you

for making me a part of your family so that I could survive life in Cairns. Last but not least, to Mr Amin Basuki, who was always ready to be the man behind the scene. Indeed, only God can repay your kindnesses to me.

Abstract

The eruption of Mount Merapi in October 2010 was one of the largest natural disasters to occur in Indonesia in the last four years. This disaster not only resulted in individuals experiencing multiple losses, but also caused extensive damage to the environment. Very little is known about the psychosocial impact of volcanic eruptions or the effects of living under the continual threat of volcanic eruptions. Similarly, little is known of the psychosocial distress associated with the environmental damage caused by natural disasters. The aim of this study was to determine the psychosocial and environmental distress experienced by survivors as a result of the 2010 Mount Merapi eruption. This study also aimed to explore the experience of individuals living near Mount Merapi and their experiences of living in an environment that had been damaged by a volcanic eruption.

This study implemented an explanatory mixed methodology over three phases. The first phase involved preparing the instruments and conducting a pilot test of the study protocol. Two measurement tools, the Environmental Distress Scale (EDS) and the Impact of Event Scale–Revised (IES-R), were translated into Bahasa Indonesian, back translated to English and then tested on 30 respondents. A further test to measure the validity and reliability of the tools was then conducted with 80 and 110 respondents. In the second phase of the study, 350 respondents from the Cangkringan and Pakem sub-districts were surveyed using systematic stratified sampling. Data was analysed using descriptive and inferential statistics with the aid of the Statistical Package for the Social Sciences (SPSS) (Version 21). Parametric tests (t tests) and non-parametric tests (Mann Whitney, Chi-square and Fischer tests) were conducted to compare the scales scores of respondents in both sub-districts. Multivariate analysis was performed using multiple linear regressions to predict the risk factors of Post-traumatic Stress Disorder (PTSD) and the environmental distress experienced by respondents. In the final phase of the study, in-depth interviews were conducted with

20 Cangkringan respondents to follow-up issues raised in the quantitative phase and investigate the personal experiences of the respondents. A dual analysis of qualitative data was conducted; a phenomenological type analysis was used to understand the experiences of the respondents and a descriptive analysis was used to analyse the qualitative data collected and explain the quantitative findings.

The Indonesian versions of the IES-R (i.e., the I-IES-R) and EDS (i.e., the I-EDS) scales were found to be reliable and valid tools for determining the psychosocial impacts of natural disasters among Indonesian survivors. Interestingly, it was found that survivors living in Cangkringan had a higher risk of PTSD and environmental distress than survivors living in Pakem. PTSD varied with age, gender and home ownership status. Linking the qualitative findings to predictive factors revealed a number of themes. First, in relation to age, themes identified included: (i) hope and desire; (ii) role and responsibility; and (iii) life experiences and coping. In relation to gender, identified themes included: (i) role and concern; and (ii) emotional status and coping. Factors that affected survivors' levels of environmental distress, age, education level and employment status, were linked to the following themes: (i) exposure; (ii) disturbance; and (iii) knowledge and awareness. The following three themes emerged from the phenomenological analysis of interviews: (i) connectivity; (ii) dislocation; and (iii) reconnection (which reflected respondents' feeling of having an emotional connection to the volcanic mountain).

Individuals who live in the Mount Merapi area have a strong connection to the mountain. Survivors who lived in the area most affected by the 2010 volcanic eruption were found to have a higher risk of experiencing psychosocial problems (i.e., PTSD and environmental distress). Overall, the findings suggest that natural disasters (such as volcanic eruptions) have a significant impact on survivors and result in high levels of psychosocial and environmental distress. The levels of environmental distress identified in this study provide

support for the theory of solastalgia and its relevance in natural disaster settings. Solastalgia is a concept which represents the feelings of sadness or lack of solace experienced by individuals facing negative changes in the environment where they live.

This study identified the impact of a volcanic eruption on psychosocial and environmental distress. The results of this study can be used as a baseline to develop strategies to assist similarly affected communities to recover more effectively from natural disasters and prevent the development of serious psychosocial problems in individuals impacted by future disasters.

Table of Contents

List of Tables

List of Figures

Abbreviations

ADRC	Asian Disaster Reduction Center
APA	American Psychologist Association
ARC	Action for the Rights of Children
Bappenas	Badan Perencanaan Pembangunan Nasional
BNPB	Badan Nasional Penanggulangan Bencana (National Board of Disaster Management)
DSM	Diagnostic and Statistical Manual of Mental Disorders
EDS	Environmental Distress Scale
HREC	Human Research Ethic Committee
I-EDS	Indonesian version of Environmental Distress Scale
I-IES-R	Indonesian version of Impact of Event Scale- Revised
ICC	Intra Class Correlation
IES-R	Impact of Event Scale- Revised
IFRC	International Federation of Red Cross and Red Crescent Societies
IQR	Inter Quartile Range
MHREC	Medical and Health Research Ethics Committee
PTSD	Post-Traumatic Stress Disorders
SPSS	Statistical Package for the Social Sciences
UNISDR	United Nations of International Strategy for Disaster Reduction
USA	United State of America
WHO	World Health Organization
WMA	World Medical Association

Chapter 1: Introduction

Disasters occur unpredictably and impact all dimensions of life: structural, physical, economic, environmental, social and psychological. A disaster is defined as ‘a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceeds the ability of the affected community or society to cope using its own resources’ (United Nations of International Strategy for Disaster Reduction [UNISDR], 2002 p. 131). According to Norris, Friedman et al. (2002), disasters occur across the world every day. Consequently, almost every human being will experience a disaster of some type during his or her lifetime. Within a 10 year period (i.e., 2003–2012) as many as 2 million people experienced disasters and more than 80% of those affected were citizens of Asian countries (International Federation of Red Cross and Red Crescent Societies [IFRC], 2013). Further, the World Disaster Report (2012) found that of 6,699 recorded disasters, 40% occurred in Asia and more than 60% of survivors were citizens of Asia (IFRC, 2013). Thus, it is evident that Asia is an area of frequent disasters.

In general, disasters can be classified into two main types: natural and human-induced (Division of Mental Health World Health Organization, 1992; Grant, Stewart, & Ritchie, 2008). Natural disasters have three specific sub-groups: hydro-meteorological, geophysical and biological. Comparatively, human-induced disasters can be classified as accidental and intentional disasters or sociological and technological disasters (where technological disasters can be further categorised into industrial, transport and miscellaneous accidents (UNISDR, 2002)).

Indonesia, a country located between two continents (i.e., Asia and Australia) and two oceans (i.e., the Pacific and Indian), is susceptible to natural disasters because it lies along a volcanic belt (known as the ‘Ring of Fire’). As a result of its geographic location, there are at least 150 volcanoes in Indonesia (Simkin & Siebert, 1994); 127 of which are active today.

Additionally, Indonesia is located between the Indo-Australian, Eurasian and Pacific tectonic plates; making it highly prone to earthquakes. Over the past 10 years, Indonesia has experienced more than 70 major disasters, including earthquakes, landslides, two tsunamis and 12 volcanic eruptions (Asian Disaster Reduction Center [ADRC], 2014).

In Indonesia, volcanic eruptions are the type of disaster that most often causes loss of life (ADRC, 2014). Given that volcanic eruptions cannot be accurately predicted and, similar to earthquakes, strike suddenly, the loss of life from volcanic eruptions is often great.

Mount Merapi is one of the most active volcanoes in Indonesia. It is located between 7°32’ latitude south and 110°026’ longitude east, on the most populated island in Indonesia, Java Island. To date, it has erupted more than 80 times (33 times before the 19th century and 28 times in the 19th and 20th centuries) (Badan Nasional Penanggulangan Bencana [BNPB], 2012) and is believed to be the most active volcano in Indonesia (Sagala, 2009; Surono et al., 2012). It has a summit elevation of 2,980 meters above sea level and more than 226,000 individuals currently inhabit its danger zone (i.e., the area less than 20 km from the crater). The inhabitants are spread across 57 villages in four districts: the Klaten, Boyolali, and Magelang Districts in Central Java Province; and the Sleman District in Yogyakarta Province (BNPB & Badan Perencanaan Pembangunan Nasional [Bappenas], 2011). The cool weather and the abundant natural resources on the slopes of the volcano attracted settlement in these districts.

Mount Merapi’s 2010 eruption was the most powerful volcanic eruption of the century and immediately declared national disasters because of the high number of deaths and extensive damage and losses that occurred in the two provinces (i.e., the Jogjakarta and Central Java area). The Indonesian National Board for Disaster Management, locally called *Badan Nasional Penanggulangan Bencana* (BNPB), reported 386 deaths, 2,856 missing and damaged houses and an estimated total loss of approximately four trillion rupiahs

(AUS$ 314 million). As many as 15,466 families who lived in the danger zone had to be evacuated during the active phase of the eruption and resettled in the post eruption recovery phase (BNPB & Bappenas, 2011).

Despite the fact that Mount Merapi repeatedly erupts, residents around the volcano are unwilling to leave their homes. This occurred during the 2010 eruption. A lack of awareness about the danger of further eruptions means that individuals are not proactive in evacuating when the alert status of Mount Merapi is raised (Dove, 2008). This lack of preparedness and the increasing population surrounding the volcano has contributed to the high number of lives lost from eruptions (Surono et al., 2012).

In addition to the loss of life and property, the Mount Merapi eruption of October and December of 2010 caused extensive environmental damage. Hot lava and mudflow flood burned and swept an 840-hectare community forest, agricultural lands and farms (BNPB, 2012). The Mount Merapi area experienced extensive damage due to its conical shape or stratovolcano structure (Surono et al., 2012). The deposition of volcano material has resulted in its having a cone and steep shape (Feldman & Tilling, 2011). Thus, at the time of eruption tremors and small earthquakes were able to easily collapse the crater, trigger very high speed lava flows and cause landslides on the mount cliffs (Surono et al., 2012), which are hazardous to the individuals who inhabit the surrounds of the mountain. As a result of the damage caused by the eruption, inhabitants lost their homes and livelihoods. Even three years after the eruption, the environmental damage is evident. Thus, it is evident that the environmental impacts caused by volcanic eruptions continue for a long time after the disaster itself has passed (Baxter, 2011; Feldman & Tilling, 2011).

Despite the frequency of Mount Merapi eruptions and the number of casualties of these eruptions, limited research has been conducted to examine the psychosocial impact experienced by the victims. Murphy (2012) conducted a research study on Mount Merapi,

examining different cultural perspectives on mental health and disaster among women following the 2010 Mount Merapi eruption. There has also been a recent flurry of research in relation to natural disasters (Norris, Friedman et al., 2002; Warsini, West, Mills, & Usher, 2014); however, publications related to volcanic eruptions are infrequent.

The 2010 eruption of the Mount Merapi volcano traumatically affected the local inhabitants. Survivors were considered to have a high risk of developing post-traumatic stress disorder and environmental distress due to the personal and environmental losses experienced. Thus, to better understand experience of the survivors and identify the interventions needed to prevent and resolve future problems, research is needed that investigates the psychosocial impact of the eruption on survivors and the emotional distress that arose as a result of the environmental damage.

1.1 Research Aims

This study aims to examine the levels of psychosocial and environmental distress resulting from the 2010 Mount Merapi volcanic eruption and explore the experiences of inhabitants living near an active volcano and in an environment damaged by a volcanic eruption.

1.2 Research Questions

This study specifically addresses the following research questions:

1. How did the volcanic eruption(s) of Mount Merapi affect the psychosocial health of individuals living nearby?
2. What levels (if any) of emotional distress is caused to individuals as a result of living in an environment damaged by a volcanic eruption(s)?
3. What are the experiences of the inhabitants who live near a highly active volcano and what impact does this have on their mental health?

1.3 Research Hypotheses

To answer the research questions, the following research hypotheses were derived:

1. Individuals who experienced the 2010 Mount Merapi eruption (i.e., inhabitants

of Cangkringan) will score higher on the Impact of Event Scale-Revised (I-ESR) than individuals who did not experience the 2010 Mount Merapi eruption (i.e., inhabitants of Pakem).
2. Individuals living in an environment damaged as a result of the 2010 Mount Merapi eruption (i.e., the Cangkringan area) will score higher on the Environmental Distress Scale (EDS) than individuals living in another local area (i.e., the Pakem area).

1.4 Purpose of the Research

As stated above, this study has three research purposes. First, it will measure the psychosocial distress levels of survivors and these results will be used as an indicator of the impact of the 2010 eruption of the Mount Merapi volcano. Second, it will explore the solastalgia (i.e., the psychological distress resulting from the environmental damage caused by the volcanic eruption) of community members. Finally, it will explore the experiences of inhabitants who live near a highly active volcano, in an environment damaged by volcanic eruptions and under the threat of future volcanic eruptions. The recommendations derived from this mixed methods study aim to influence education, future research, practice and policy.

1.5 Overview of Study Design

A mixed methods approach is a valid research alternative when quantitative or qualitative approaches cannot fully answer research question(s) (Creswell & Plano Clark, 2011). It was an appropriate design for this study, as the complex research questions could not have been answered using a singular method or approach (Creswell & Plano Clark, 2011; Lingard, Albert, & Levinson, 2008; Plano Clark, Creswell, Green, & Shope, 2013). Explanatory mixed methods designs enable researchers to assess phenomena using a quantitative approach and, through a qualitative approach, obtain a depth of information that cannot be examined quantitatively (Creswell & Plano Clark, 2007, 2011). By adopting this design in the current study, information was obtained in relation to the psychosocial impact

of the 2010 Mount Merapi volcanic eruption on individuals, which can be generalised to other similar populations and also provide a deeper understanding of the experience (Plano Clark et al., 2013).

1.6 Study Setting

The research was conducted in two Indonesian sub-districts; that is, Cangkringan and Pakem in the Sleman District of the special province of Jogjakarta. Cangkringan and Pakem are neighbouring sub-districts and share similar social, religious and cultural characteristics. The majority of the population is Javanese, Moslem and speak the local language (Javanese). The inhabitants and communities share a mutual spirit of cooperation, locally referred to as '*gotong royong*' (BNPB & Bappenas, 2011).

The Cangkringan sub-district was severely affected by the Mount Merapi eruption in 2010; however, previously (i.e., in 2006, 2001, 1998, 1997 and 1994), the most damaged area affected by the volcanic eruption was the Pakem sub-district located on the western side of Cangkringan (BNPB & Bappenas, 2011).

The following tables describe characteristics of the Pakem and Cangkringan sub-districts (see Table 1.1–1.3). The statistics cited refer to relevant demographics, the types of facilities available and the measurable impact of the 2010 eruption on listed characteristics.

Table 1.1

Comparison of Characteristics of Pakem and Cangkringan Sub-Districts

Variables	Pakem	Cangkringan
Number of villages	5	5
Number of hamlets	61	73
Total area (hectares)	4,384	4,799
Population	30,713	26,354
Density (km^2)	701	549

(Source: Pemerintah Kabupaten Sleman, 2014)

Table 1.2

Comparison of Health and Education Facilities in the Pakem and Cangkringan Sub-Districts

Variables	Pakem	Cangkringan
Education facilities		
Kindergarten	22	16
Elementary school	23	21
Junior high school	9	4
Senior high School	8	4
Academy and university	1	0
Health facilities		
Hospital	1	0
Maternity hospital	0	1
Policlinic	3	0
Public health centre	1	1
Auxiliary public health centre	4	4
Health care provider in the village		
General Practitioner (GP)	8	3
Dentist	2	0
Midwifery (diploma)	10	10
Other health care provider	1	9
Traditional birth attendant	10	17

(Source: BNPB & Bappenas, 2011)

Table 1.3

Comparisons of the Impact of the 2010 Eruption on the Two Sub-Districts

Variables	Pakem	Cangkringan
Numbers of deaths during 2010 eruption [a]	14	196
Number of education facilities damaged by eruption	0	14
Number of health care facilities damaged by eruption	5	5
Number of house or buildings devastated by eruption [b]	unknown	3,245

(Source: [a]Juliani, Bronto, Ribut, & Hamidin, 2011; [b]Pemerintah Kabupaten Sleman, 2010)

This study was conducted on 490 respondents who came from communities affected by the 2010 Mount Merapi volcanic eruption. Two villages in each of the two sub-districts (i.e., Cangkringan and Pakem) were included in the study. Respondents included individuals

who had experienced the 2010 Mount Merapi eruption and continued to live on Mount Merapi following the disaster.

1.7 Theoretical Perspectives

1.7.1 Solastalgia.

A substantive area of enquiry for this study was the notion of solastalgia. The concept of solastalgia was first introduced by Albrecht (2005) who noted that individuals on mining sites in Australia lived in desolation due to the degradation of the land. It has been defined as the feelings of sadness or loss of solace experienced by individuals facing negative changes in the environment where they live (Albrecht, 2005; Albrecht et al., 2007). The concept of solastalgia has not yet been tested in relation to natural disasters; however, a discursive paper describing the notion of solastalgia (using the initial description of solastalgia by Albrecht (2005)) and linking it to natural disasters was published in the *Prehospital and Disaster Medicine Journal* in February 2014 (Warsini, Mills, & Usher, 2014).

Manuscript: Warsini, S., Mills, J., & Usher, K. (2014) Solastalgia: Living with the environmental damage caused by natural disasters. *Prehospital and Disaster Medicine*. *29*(1); 87–90.

Declaration of Authorship

Chapter	Publication Details	Author Contributions	Signature
1	Warsini, S., Mills, J., & Usher, K. (2014). Solastalgia: Living with the Environmental Damage Caused by Natural Disasters. *Prehospital and Disaster Medicine, 29*(1); 87–90 *Accepted for publication 31 July 2013* Published February 2014	Developed the initial idea and argument for the manuscript and assisted with writing and editing the article	Warsini, S.
		Assisted with the development of the initial idea and argument for the manuscript and assisted with writing and editing the article	Usher, K.
		Assisted with writing and editing the article	Mills, J.

SPECIAL REPORT

Solastalgia: Living With the Environmental Damage Caused By Natural Disasters

Sri Warsini, M.Med; Jane Mills, PhD; Kim Usher, PhD

1.7.2 Place attachment.

Solastalgia is closely connected with place attachment because individuals do not experience distress when they have no attachment to their environment. Bowlby introduced the term ‘place attachment’ 1973; however, it was popularised in 1992 when Altman and Low explored the concept in detail in their book entitled ‘Place Attachment’ (Brown, Altman, & Werner, 2012). Some experts have defined place attachment as an individual’s emotional bond towards the location in which he/she lives. However, Brown and Perkins gave a more complete definition of place attachment adding an environmental dimension and bonding development and elements (Brown et al., 2012). The experience of place attachment involves emotional, cognitive and behavioural elements (Jorgensen & Stedman, 2001; Kyle, Graefe, Manning, & Bacon, 2004). Hay (1998) asserted that to generate a feeling of attachment to an environment, an individual must live in an environment for a sufficient period of time to enable a sense of belonging to develop and feel that the environment is a part of their self-identity. Such feelings will ultimately make individuals unwilling to move from their environment.

Place attachment is related to both the physical and social dimensions of an environment (Hidalgo & Hernandez, 2001). It means individuals not only feel attached to the physical appearance of an environment (i.e., lovely, fresh), but also feel close to the people living in that environment. Other experts have asserted additional dimensions of place attachment, including place dependency, place identity (Kyle, Graefe, & Manning, 2005; Williams & Vaske, 2003) and social bonding (Kyle et al., 2005).

Place attachment develops from an individual perspective, yet the scope of place can be diverse and include the home and neighbourhood (Giuliani, 2003) or even the city or state (Hidalgo & Hernandez, 2001). These feelings of attachment may also change as time

progresses. Researchers have shown that place attachment may be threatened by factors such as natural disasters, war, changing atmosphere and climate change (Brown et al., 2012).

As such disasters usually result in negative environmental changes and losses of natural beauty (e.g., following a volcanic eruption a forest may become barren or disappear completely), natural disasters can threaten an individual's level of attachment to his or her environment. Additionally, such changes can reduce the ability of communities to live their normal life or have their daily needs met (e.g., fields may have been damaged or sources of drinking water are polluted) (Lai & Kreuter, 2012).

Research on the victims of Hurricane Katrina and floods in Carlisle, United Kingdom, demonstrated that changes to the environment resulted in community members no longer viewing the environment as they had prior to the disaster. These community members knew they could return and rebuild their houses in the former environment; however, they felt something was missing from their lives (i.e. memories of how their environment and life had been in the past and feeling safe in the environment) (Brown et al., 2012). Conversely, some individuals feel so attached to their environment that they are unwilling to move even when they know the environment is unsafe. In these cases, an individual's attachment to his/her environment exceeds their logical thinking capacity because of factors such as spirituality (Mazumdar & Mazumdar, 2004) or ideology (Billig, 2006).

Solastalgia and place attachment are two different but interrelated concepts. The feeling of solastalgia is strongly influenced by feeling attached to a home or a place. Individuals who do not have a strong attachment to the land will not suffer distress and might consider moving if the landscape negatively changes.

1.7.3 Post-traumatic stress disorder.

The American Psychiatric Association (APA) states that post-traumatic stress disorder (PTSD) occur as a result of an individual's exposure to a life-threatening traumatic event,

which he/she either experiences or witnesses (APA, 1994, 2000). This trauma may lead to individuals experiencing distress in any of their life dimensions (APA, 1994, 2000; Friedman, Resick, & Keane, 2007). The diagnosis of PTSD was first used in 1980 in place of the terms of fright neurosis or combat neurosis and gross stress reaction. PTSD was removed from the Diagnostic and Statistical Manual (DSM)-II; however, it was reinstated in DSM-III as part of the anxiety disorders and used to refer to trauma following incidents (such as violence) and trauma experienced by war veterans and victims of rape (Friedman et al., 2007). With the publication of DSM-V, PTSD was recognised as a separate class of disorder; that is, a trauma and stressor related disorder (APA, 2014a, 2014b).

In the DSM-IV, PTSD consists of seven characteristics and has 17 signs and symptoms covered by four criteria. Criterion A refers to the experience of a very intense traumatic stress marked by the presence of a life-threatening incident, a self-suffered or self-witnessed serious injury or the sudden death of a loved one (A1); these traumatic events cause someone who has experienced or witnessed them to suffer from excessive fear, feelings of helplessness and horror (A2). Criterion B–D relate to the signs and symptoms that may arise following the original experience; that is, symptoms of re-experiencing the event (B), symptoms of avoidance (C) and symptoms of arousal (D). Criterion E relates to the duration that an individual has experienced these symptoms (i.e. more than 1 month). Criterion F is concerned with the implications of the traumatic circumstances that may lead to an individual experiencing dysfunctions in their daily lives (e.g., social life, work life) (APA, 2000; First, Frances & Pincus, 2004; Friedman et al., 2007).

In the latest DSM (DSM-V), several changes to the PTSD criteria occurred; for example, Criterion A2 and sudden death of family or friends due to natural causes were eliminated from the PTSD stressor causal factors. Additionally, a symptom cluster of cognition and mood disorders was added so that there are now four symptom clusters.

Further, Criteria H was added and made it clear that PTSD is not a disorder caused by the use of certain medications or substances (APA, 2014a). Two PTSD subtypes were also created in DSM-IV relating to children and dissociative disorders (APA, 2014b). Notably, under the DSM-IV any diagnosis of PTSD requires: Criterion A (stressor); a minimum of one symptom from each of the intrusive and avoidance criteria; and a minimum of two symptoms from each negative mood, cognition and arousal criteria (APA, 2014a).

Several events can cause an individual to experience trauma and develop PTSD. Some experts divide the traumatic events into two categories, including violence (such as rape, abuse, crime, conflict and war) and other types of trauma (such as accidents, natural and man-made disasters) (Norris & Slone, 2007). The research also suggests that there are frequently occurring traumatic events and that results were different by gender. For female victims in the United States of America (USA) and Australia, the most widely experienced events that lead to PTSD are rape, sexual molestation and child abuse (Breslau et al., 1998; Creamer, Burgess, & McFarlane, 2001; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Comparatively, men, are more likely to develop PTSD as a result of physical abuse, war, natural disasters (Creamer et al., 2001; Kessler et al., 1995), accidents and fires (Breslau et al., 1998; Kessler et al., 1995).

Conversely, in developing countries or areas still prone to conflict or war, the most frequent causes of PTSD are natural disasters (Norris, Friedman et al., 2002) or conflict (de Jong et al., 2001); for example, a 2005 tsunami claimed a large number of victims and resulted in high rates of PTSD in Indonesia (Irmansyah, Dharmono, Maramis, & Minas, 2010; Musa et al., 2013) and Thailand (Tang, 2006, 2007). In addition, the results of research conducted by de Jong et al. (2001) in four conflict-prone areas (Cambodia, Algeria, Ethiopia and Gaza (Palestine)), found that the most frequent traumatic events experienced by victims included torture, death or separation from family.

Not all individuals who experience a traumatic event will develop PTSD (Friedman et al., 2007; Creamer & O'Donnell, 2002). PTSD risk factors can be divided into three groups: psychosocial, genetic and biological. Psychosocial factors include risk factors that occurred prior to, during and after the traumatic event (Vogt, King, & King, 2007). Individual characteristics (i.e., age, gender, social, economic and educational level), trauma history (i.e., past abuse) and family mental health history are pre-traumatic risk factors (Brewin, Andrews, & Valentine, 2000). Peri-traumatic factors include the severity of experienced events, exposure to violence, panic attacks and the emotional states experienced during the event (Galea et al., 2002). Post-traumatic factors include the social support received and additional post-traumatic events experienced (Brewin et al., 2000). Meta-analysis conducted by Brewin et al. (2000) found that post-traumatic factors are the strongest triggers for PTSD, particularly in relation to the social support obtained by the victims after they experience the trauma.

In general, PTSD is a temporary condition that will disappear of and by its own accord. However, there is a small group of individuals who may experience serious clinical disorders that require intervention; for example, PTSD also correlates with other mental health disorders such as depression (Galea et al., 2002), drug and alcohol abuse (Chilcoat & Breslau, 1998; Kofoed, Friedman, & Peck, 1993), suicide attempts (Sareen et al., 2007) and other anxiety disorders (Huppert et al., 2005). In addition, PTSD has been implicated in physical health problems such as inflammatory responsiveness alteration (O'Toole & Catts, 2008), hypertension (Abouzeid, Kelsall, Forbes, Sim, & Creamer, 2012), and musculoskeletal disorders (Schnurr, Spiro III, & Paris, 2000). Moreover, Sareen et al., (2007) proved that PTSD was ominously connected with cancer, cardiovascular disease, gastrointestinal distress and chronic pain.

In developed countries such as the USA and Australia, the prevalence of PTSD is estimated to be 7.8% (Tull, 2014) and 5% (Australian Centre for Posttraumatic Mental

Health, 2014), respectively. Conversely, only limited studies have explored the prevalence of PTSD (generally or on a national scale) in developing countries. Indeed, rates of PTSD in developing countries are usually estimated from a certain population after the occurrence of traumatic incidents (such as a conflicts or disasters) (Norris, Friedman et al., 2002).

It has been shown that disasters are one of the events that trigger PTSD (Norris, Friedman et al., 2002). A variety of instruments and methodologies have been used to conduct studies on PTSD resulting from disasters (Warsini, West et al., 2014). The results of a review of 39 research articles published in the period of 2002 to 2012 showed that the prevalence rate of PTSD in natural disaster survivors varies widely depending on the types of disaster (Warsini, West et al., 2014). For earthquake survivors, PTSD prevalence ranges from 23–43% in the first six months and 4.1–56.8% following the first six months. For flood survivors in Korea, the USA and the United Kingdom, the prevalence of PTSD is 15.6–39.5%. Notably, the prevalence of PTSD in tsunami survivors is also affected by whether or not the victims are displaced. For displaced survivors, the prevalence of PTSD varies between 7–81%; however, for those who have not been displaced the rate is less (i.e., 2–63%).

1.8 Outline of Thesis

This thesis is presented in seven chapters. Chapters 1, 2, 3 and 4 contain manuscripts that have been published in peer-reviewed journals. In these chapters, an introduction to each of these publications is provided and a conclusion is drawn that links the manuscript with the section that follows. Two further publications resulting from this study are referred to in the methodology chapter. These papers are included in Appendix I of the thesis.

Chapter 1 provided a background to the study, explained the research problem, aim, purpose and context of the study. An article published in *Pre Disaster and Hospital Medicine,* titled ‘Solastalgia: Living with the environmental damage caused by natural

disasters', was presented as it provided the theoretical context to emotional distress relating to environmental damage.

In Chapter 2, a review of the psychosocial impact of natural disasters is presented. This chapter includes an article entitled 'The Psychosocial Impact of Natural disasters Among Adult Survivors: An Integrative Review' that was published in *Issues in Mental Health Nursing.*

The third chapter outlines the research methodology with particular reference to the use of a mixed methods design that is theoretically underpinned by pragmatism. The third publication included in this chapter is entitled 'Psychosocial and environmental distress resulting from a volcanic eruption: study protocol' and was published in *Collegian: The Australian Journal of Nursing Practice, Scholarship and Research* (Warsini, Usher, Buettner, Mills & West , 2014). Two others publications on the translation and psychometric testing of the two tools used in the study have been attached as appendices.

Chapter 4 presents the quantitative research findings (published in two journals) from the second phase of research. The first article published in the *Nursing and Health Sciences Journal* is entitled 'Post-traumatic stress disorder among survivors two years after the 2010 Mount Merapi volcano eruption: A survey study'. This article explains how survivors feel about the eruption and measures the risk of PTSD using the Indonesian version of the Impact of Event Scale-Revised (I-IES-R). The second article is entitled 'The psychosocial impact of the environmental damage caused by the Mount Merapi eruption on survivors in Indonesia' and was published in *Eco Health*. This article reported on the emotional distress of survivors living in a severely damaged ecosystem as a result of the volcanic eruption and used the Indonesian version of Environmental Distress Scale (I-EDS) to determine levels of distress.

Chapter 5 presents the qualitative findings from phase three of the study. It is divided into two sections: a description of the experiences of Mount Merapi survivors and a presentation of the qualitative data that is used to further explain the quantitative results.

Chapter 6 provides an overview of the integrated results of this mixed methods study and discusses these results. This chapter sets out how the qualitative and quantitative data combine to provide a better understanding of the research problems of this study.

Chapter 7 concludes the thesis and outlines the strengths and limitations of the study. It also provides recommendations for education, future research and changes to practice and policy.

1.9 Chapter Summary

This chapter outlined the aims of the study and provided a discussion of the background and justification for the study. It also provided an overview of the theoretical background to the study and outlined the approach used. One publication was included in the chapter.

The following chapter provides a review of the literature in relation to the psychosocial impact and environmental distress that results from natural disasters. An integrative review paper that discusses psychosocial impacts, particularly those felt by adult survivors, due to natural disasters is included in Chapter 2. The definition of psychosocial (and its context in mental health) is also discussed.

Chapter 2: Literature Review

2.1 Introduction

This chapter begins by defining and discussing the terms psychosocial and psychosocial health in the context of the study. Then, an integrative review of the research evidence is undertaken in relation to the psychosocial impact of disasters on adult survivors. This comprehensive review identifies a number of literature reviews that discuss the psychosocial impact of natural disasters (Norris, Friedman et al., 2002; Sundram et al., 2008). Some of these reviews focused on specific problems such as PTSD (Galea, Nandi, & Vlahov, 2005; Neria, Nandi, & Galea, 2008) and suicide (Kolves, Kolves, & De Leo, 2013; Matsubayashi, Sawada, & Ueda, 2013; Panagioti, Gooding, & Tarrier, 2009); however, very few explored the impact of natural disasters on adults (i.e., individuals over 18 years of age). This knowledge is important given that adults are the largest population group globally (Department of Economic and Social Affairs Population Division, United Nation, 2013).

Adults have not been identified as a group vulnerable to post-disaster mental health disorders (Hoffman, 2009; WHO, 2014); however, adults have an important role in accelerating the recovery of post-disaster situations and often assume leadership and management roles in these situations by virtue of their status. By determining the psychosocial impact of natural disasters on adults, the support required to prevent them acquiring a mental health disorder should be clearly defined and keeping this group well should also accelerate post-disaster recovery in the future.

2.2 Psychosocial and Psychosocial Health

Previous studies have poorly defined the term psychosocial. It is important to define this concept as unspecified use may degrade its usefulness, such that it is used to refer to everything generally, but nothing specifically (Martikainen, Bartley, & Lahelma, 2002). Definitions of psychosocial generally refer to a mixture of social and psychological factors or

behaviours (Happel, Cowin, Roper, Lakeman, & Cox, 2013; Merriam-Webster's Collegiate Dictionary, 2014; Oxford Dictionaries, 2014). Happel et al. (2013) proposed a broader definition of psychosocial that refers to the close interrelationship between the psychological aspects of individuals, their social growth and the roles that affect their health and welfare. Thus, psychosocial is an umbrella term used to describe the pathways that lead to ill-health. Psychosocial factors: (i) mediate the effects of social structural factors on individual health outcomes or (ii) condition and modify social structures and the contexts in which they exist (Martikainen et al., 2002, p. 1091).

Psychosocial health not only defines health in terms of the psychological and social dimensions, it includes all dimensions of health. According to psychosocial theory (Happel et al., 2013), psychosocial health has the same meaning as health in general, as it is an amalgamation of physical, psychological, social and spiritual health (Donatelle, 2005; Happel et al., 2013). Further, individuals who are considered psychosocially healthy not only have good general health, but are also resilient in the face of challenges and life difficulties (Donatelle, 2005). Thus, when discussing psychosocial problems, its scope is not just limited to mental health problems; rather, it is much broader and includes issues that impact on individuals' social lives, physical comfort and spiritual well being.

Psychosocial health includes micro-, meso- and macro-level concepts. At a micro-level the psychosocial impact of natural disasters includes post-traumatic stress disorder (PTSD), anxiety disorders, depression, suicide, acute stress disorders, decreased quality of life (Warsini, West et al., 2014), sleep disorders, alcohol abuse (Shinfuku, 2002) as well as grief, social issues (such as family problems), unemployment and loss of housing (Division of Mental Health, World Health Organization [WHO], 1992). Meso-level concepts include social networks and support, effort and rewards, security, autonomy, home and family. Macro-level concepts are much broader, occur at the social structure level and include the

structure of community welfare (Martikainen et al., 2002). Some events that may disrupt an individual's psychosocial health include disasters (natural and technological), terrorism, violence (Leon, 2004; Norris, Friedman et al., 2002), war, and abuse (Jaffe, Segal, & Domke, 2005). Of these events, the psychosocial impact of natural disasters on survivors has been widely studied (Galea et al., 2005; Neria et al., 2008; Norris, Friedman et al., 2002).

The psychosocial impact of disasters can be divided into two parts. First, the psychological perspective that relates to of cognitive, affective and behavioural disorders. This dimension also includes changes in perception, memory and emotion. Second, the social impacts associated with human relationships, changes in networking among members of the family and community, the erosion of adopted culture and traditions, alterations in roles and responsibilities of individuals in respect of economy and livelihood and changes in human relationships with the environment (Action for the Rights of Children, 2009).

In several sources (Goto, Wilson, Kahana, & Slane, 2006; Norris, Friedman et al., 2002) the psychosocial impacts caused by disasters has been referred to as psychological or emotional distress. Distress is defined as a response to a stressor that is harmful to an individual (Grendell, 2011; Ridner, 2004). The National Research Council of the USA (2008) concludes that distress occurs in situations when an individual recognises a harmful stressor, but is unable to adapt. Psychological or emotional distress is an uncomfortable feeling or emotion experienced by an individual in response to stressors or demands that pose a threat to the individual (Ridner, 2004). Hultzman (2014) noted that psychological distress is an unpleasant emotional state that can impact an individual's level of functioning. Meanwhile, emotional distress is an emotional reaction (such deep sadness or anger) that occurs as a result of an event (Merriam-Webster's Collegiate Dictionary, 2014). From the definition of psychological and emotional distress, it is clear that both terms have similar meanings. Thus, both terms have frequently been used interchangeably.

Recently, environmental distress has become a popular term. Professor Glenn Albrecht introduced the concept; he claims it represents the emotional state or psychological distress experienced by an individual as a result of a change or damage to the environment where they live (Albrecht, 2005). The term environmental distress is different from the term environmental stress. Evans and Cohen (1987) define environmental stress as a state of stress caused by external factors, especially the environment. It arises due to inability to respond well to the conditions or demands of an environment. Albrecht coined the concept solastalgia to explain the feelings that an individual experiences as a result of environmental distress (Albrecht, 2005). The concept of solastalgia was described in detail in Chapter 1.

The following article is an integrative review of studies related to the psychosocial impact of disasters on adult survivors. It also includes an overview of influencing risk factors in post-disaster situations. This article was published in *Issues in Mental Health Nursing Journal* (2014).

Manuscript: Warsini, S., West, C., Mills, J., Usher, K. (2014). The psychosocial impact of natural disasters among adult survivors: An integrative review. *Issues in Mental Health Nursing, 35(*6); 420–436

Declaration of Authorship

Chapter	Publication Details	Author Contributions	Signature
2	Warsini, S., West, C., Mills, ., Usher, K. (2014). The psychosocial impact of natural disasters among adult survivors: An integrative review. *Issues in Mental Health Nursing*, *35*(6); 420–436. *Accepted for publication* November 2013 Published June 2014	Developed the initial idea, study design, collected and analysed data and wrote article	Warsini, S.
		Assisted with the development of the initial idea, assisted with writing and editing the article	Usher, K.
		Assisted with the study design and writing and editing the article	Mills, J.
		Assisted with writing and editing the article	West, C.

Issues in Mental Health Nursing, 35:420–436, 2014

ISSN: 0161-2840 print / 1096-4673 online
DOI: 10.3109/01612840.2013.875085

informa
healthcare

The Psychosocial Impact of Natural Disasters among Adult Survivors: An Integrative Review

Sri Warsini, M. Med, Caryn West, PhD, Grad Dip Ed (TT), Grad Cert Res Meth, RN, and Jane Mills, RN. PhD, MN MEd, BN, GradCertEd, FACN
James Cook University, School of Nursing, Midwifery and Health Nutrition, Cairns, Australia

Kim Usher, RN BA DipAppSc MNSt PhD
School of Health, University of New England, Armidale, NSW, Australia

2.2.1 Discussion of manuscript.

The literature review showed that over a 10-year period (i.e., 2002–2012) research on the psychosocial impact of natural disasters have predominantly been conducted in relation to earthquakes; research relating to the psychosocial impacts of volcanic eruptions only appeared in one of the thirty nine articles reviewed. Further, researchers have not considered the micro-level psychosocial problems that arise from the psychosocial impact of disasters, including sleep disorders, suicide and environmental distress; rather, previous research has focused on the existence of PTSD, anxiety and depression.

The review showed that methodological issues affect the outcomes of psychosocial studies, which appear to depend heavily on the research instrument used and its implementation; for example, the IES-R or PTSD-Self Rating-Scale (PTSD-SS) used to investigate PTSD problems and the cut-off point determined by the researcher will affect the results. Research timing (i.e., the amount of time following the disaster before research was conducted), location and samples (i.e., whether the research was conducted in an heavily affected area or otherwise) will also influence the research questions and the outcomes of the research.

Further, the review also revealed that contrasting views exist in relation to the age group (i.e., the elderly aged 60 years and above or adults aged between 17–59 years) most vulnerable to the psychosocial problems that arise as a result of natural disasters. This research investigates this issue; this mixed methods study compares the psychosocial impact of a natural disaster in relation to age and gender.

These reviews recommend that researchers further explore the currently under-investigated psychosocial impact of natural disasters, especially in unique disaster settings. To produce valuable outcomes and valid research, it was also recommended that researchers

increase their awareness in relation to choice of research instruments, sample populations and timing. All of these recommendations provide justification for this mixed methods study.

2.3 Chapter Summary

This chapter defined the meaning of psychosocial health. A publication of an integrated literature review of the psychosocial impacts of natural disasters on adult survivors was included that provides strong support for the use of a mixed methods study.

The next chapter will discuss the methodology of mixed methods studies (theoretically and philosophically), the research design and protocol and methods used in the research. An article related to the study protocol, published in *Collegian: The Australian Journal of Nursing Practice, Scholarship and Research,* is inserted in Chapter 3 as a guideline to the stages of the research (Warsini, Usher et al., 2014).

Chapter 3: Theoretical Framework, Design and Methods

3.1 Introduction

This chapter discusses both the methodology and methods employed in this study to understand the psychosocial impact (i.e., PTSD and environmental distress) resulting from the eruption of Mount Merapi and the environmental damage. A brief history of mixed methods research is provided, followed by an overview of the adopted philosophy (i.e., pragmatism) and the selected mixed methods design; that is, a sequential explanatory design. In addition, the instruments used, data collection processes and data analysis are outlined in this chapter. An article included in the chapter details the research protocol utilised. Two further articles related to the methods of the study are included in the appendices (see Appendix I: The translation and testing of the IES-R and the EDS).

3.2 Mixed Methods Research

Previously, ‘mixed methods’ was known by a number of different names such as multitrait, integrated, hybrid, combined and mixed methodology (Creswell & Plano Clark, 2007, 2011), multimethod and triangulation (Creswell & Plano Clark, 2007, 2011; Halcomb, Andrew, & Brannen, 2009), multiple operationalism and between-method triangulation (Halcomb et al., 2009). The name mixed methods research was proclaimed as recently as 2003 by Tashakkori and Teddlie (Teddlie & Tashakkori, 2003, p. 10) and has now become the commonly used term to refer to the merging of both quantitative and qualitative approaches within a single study (Creswell & Plano Clark, 2011).

Though the definition of mixed methods varies among different authors, the broad definition implies a research approach or technique in which more than one method is used in the research process and the data obtained from both methods is integrated (Creswell & Plano Clark, 2007, 2011; Teddlie & Tashakkori, 2003). The need for mixed methods research is

quite strong considering the increasing complexity of research problems that are clearly almost impossible to be answer if only one methodology is used.

In addition, mixed methods researchers have outlined the many benefits and added value that can be obtained from the mixed methods approach, both for the benefits of the research or for the benefit of the researcher. By using a mixed methods approach, a research problem can be answered more comprehensively, the results of the statistical tests can be generalised and a narrative produced from the in-depth exploration of the research problem. Both methods can be mutually enriching, address any weaknesses that would be present if only one approach had been used and can lead to a more comprehensive research outcome (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2003). Further, by undertaking mixed methods studies, researchers are required to learn and eventually master various research methods and, more importantly, experience how to integrate data from these various methods (Plano Clark et al., 2013).

3.3 Mixed Method Studies: A History

Mixed methods approaches began being used in earnest in the 1900s when researchers started using various methods to collect data (Teddlie & Tashakkori, 2003); however, both quantitative and qualitative approaches had previously been used in the 1800s (Hesse-Biber, 2010). Over time, mixed methods approaches were implemented as a combination of two approaches. This first period of the development of mixed methods research is called the formative period (Creswell & Plano Clark, 2007, 2011) and the following period is called the paradigm debate period. The latter period was an exciting and challenging time in which there was heated debate among the opponents of mixed methods research. These purists argued that combining quantitative and qualitative methods was an absurd idea, as these approaches came from very different theoretical paradigms. Conversely, supporters of the

mixed methods approach argued that pragmatism could overcome the proposed difficulty of integrating what qualitative purists saw as two contradictory approaches (Bazeley, 2002).

By the 1980s, the paradigm had subsided, but the debate continued. Even today, some research experts will not accept mixed methods as a research approach. However, proponents of mixed methods research became bored with the debate and sought to further the development and knowledge of mixed methods research through the formulation of design types and application processes; rather than continuing to defend the approach. This third period of development in mixed methods research is known as the procedural development phase (Creswell & Plano Clark, 2007, 2011).

The fourth period of mixed methods research development was outlined by Creswell and Plano Clark (2007) and was known as the interest recent indicators period before being renamed the advocacy and expansion period (Creswell & Plano Clark, 2011). In this period, mixed methods research experienced very rapid progress, beginning with Creswell's attempt to proclaim it as a complete independent research approach. Consequently, mixed methods research has been widely used in various disciplines in many countries. Additionally, workshops and conferences have been conducted to introduce mixed methods research to researchers. Notably, the *Journal of Mixed Methods Research* was first published in 2007 as a forum for researchers to disseminate their research results and discuss any thoughts, trends and issues in the development of this type of research.

The last phase of the development of mixed methods research is known as the reflective period. This period started in the early 2000s and, in this phase, mixed methods experts focused on evaluating the journey of mixed methods and predicting future trends.

3.4 Philosophy of Mixed Methods Study: Pragmatism

The British scientist Charles Sanders Peirce first described pragmatism in 1878 (James, 1907/2004). Since then, many other scientists have helped to develop the notion of

pragmatism, including William James and John Dewey. Notably, James and Dewey are now considered to have played a more important role in the development of pragmatism than its original founder (Malachowski, 2010; Shields, 1998).

The root word *pragma* is Greek and means action. Pragmatism is defined as practical problem solving (Shields, 1998) or an attempt to interpret an idea or ideas by investigating the consequences of such practices (James, 1907/2004). According to James (1907/2004), pragmatism is a method and a theory about the meaning of truth. An individual who adopts pragmatism clings to existing facts and not something virtual.

In 1988, a scientist named Howe suggested pragmatism as a paradigm for mixed methods research (Teddlie & Tashakkori, 2003). He argued that the position of quantitative and qualitative research is equal and that there are no higher or lower types of research. The basis of pragmatism is that a plurality of methods is considered necessary to answer or prove the truth. Howe argued that conducting research using a variety of methods is justified if it better answers the research questions (Teddlie & Tashakkori, 2003).

As a very practical and applied philosophy of research, pragmatism encourages the use of mixed methods (Tashakkori & Teddlie, 1998b). A characteristic of pragmatism is that it emphasises consequences, practicality or the usefulness of an idea as the essential components of truth (Carr, 2008). For pragmatists, the purpose of science is not to seek the truth or reality, but to facilitate a resolution to a problem (Berwick, 2005).

The application of pragmatism in mixed methods research involves proposing research problems and utilising a variety of approaches to answer the research questions. Further, pragmatism emphasises the plurality of methods that give researchers the freedom to explore their concerns and use deductive and inductive approaches to answer their research questions to produce more valid and comprehensive research outcomes (Cameron, 2009; Creswell & Plano Clark, 2007).

Mixed methods researchers, however, are not united in relation to a single or multiple paradigms. Further, those who support the single paradigm approach are split into two groups. Proponents of the first group argue that it is sufficient to mention pragmatism alone as the selected paradigm. Howe is one expert who upholds this principle (Teddlie & Tashakkori, 2003). Proponents of the second group argue that researchers should include an adopted paradigm based on the most dominant paradigm of the research methods. Conversely, those who support the multiple paradigm approach argue that researchers should list the name of the research paradigm regardless of whether one research method is more dominant than another, as the essence of pragmatism is actually the alignment of methods (Teddlie & Tashakkori, 2003). Creswell and Plano Clark (2007) favour the use of multiple paradigms whereby a researcher undertakes a sequential explanatory design and outlines post positivism and constructivism as the two paradigms; rather than pragmatism. Debate continues in relation to the technical writing of the chosen paradigm in mixed methods research; however, it is essential to remember that researchers must explicitly convey their adopted paradigms (Greene & Caracelli, 1997) and there should be a consistency between the design chosen and the paradigm or worldview adopted.

3.5 Sequential Explanatory Mixed Methods Design

Of the 40 mixed methods designs, a sequential explanatory design is the most straightforward (Tashakkori & Teddlie, 2003) and the method most widely employed by researchers (Ivankova, Creswell, & Stick, 2006). At least four different terms have been used to refer to this type of design, including sequential triangulation, iteration design, sequential mixed methods design and qualitative follow-up approach; however, today, the full and most commonly used name is the sequential explanatory mixed methods design (Creswell & Plano Clark, 2007, 2011).

In this design, the data is collected in (separate) phases. First, data is collected and analysed using the quantitative method. Next, a qualitative method is implemented to collect data. Finally, the data of both phases is integrated and interpreted (Creswell & Plano Clark, 2011; Kroll & Neri, 2009). The benefits and purposes of this type of design have been frequently mentioned in the mixed methods literature (Creswell & Plano Clark, 2007). Its weaknesses are mainly due to the long period of time required to complete the study design and possible obstacles in the administration of ethics (Creswell & Plano Clark, 2011). However, these obstacles have been commonly experienced by researchers and can be managed with adequate preparation.

A majority of sequential explanatory researchers emphasise quantitative methods as the primary method; however, it is possible to allocate an equal priority to both methods or place more emphasis on a qualitative method (Creswell & Plano Clark, 2007, 2011). The priority of a sequential research design depends heavily on the research objectives, the justification of the researcher in emphasising one approach over another (Creswell & Plano Clark, 2007) and which data collection and analysis type is broader and more valid (Ivankova et al., 2006).

The design adopted in this study is a modification of the sequential explanatory design whereby the quantitative method was divided into two phases (i.e., modification and instrument testing and a cross-sectional survey). From the beginning, the researcher decided that the priority of this study was the quantitative phase because the objective of the research was directed at measuring the psychosocial impacts experienced by survivors of volcanic eruptions. As a result, quantitative data was rigorously collected, starting with the development, modification and testing of instruments and followed by the survey being conducted on a large number of respondents. The qualitative phase was then conducted to provide an explanation of the results obtained in the previous phase of the research and to

answer the remaining questions (Creswell & Plano Clark, 2007, 2011; Kroll & Neri, 2009; Tashakkori & Teddlie, 2003).

The following journal article outlines the protocol developed for this mixed methods research study (Warsini, Usher et al., 2014). It provides information in relation to the background and aims of the study, and describes the research steps as well as the research methodology. This article was published online in *Collegian: The Australian Journal of Nursing Practice, Scholarship and Research* in 2014.

Manuscript: Warsini, S., Usher, K., Buettner, P., Mills, J., West, C. (2014). Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol, *Collegian: The Australian Journal of Nursing Practice, Scholarship and Research.* In press, available online 22 April 2014.

Declaration of Authorship

Chapter	Publication Details	Author Contributions	Signature
3	Warsini, S., Usher, K., Buettner, P., Mills, J., West, C. (2014). Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian: The Australian Journal of Nursing Practice, Scholarship and Research.* Accepted for publication 18 March 2014 Published online 22 April 2014	Developed the initial idea and argument for the manuscript and assisted with writing and editing the article	Warsini, S.
		Assisted with the development of the initial idea and argument for the manuscript and writing and editing the article	Usher, K.
		Assisted with writing and editing the article	Mills, J.
		Assisted with writing and editing the article	Buettner, P.
		Assisted with writing and editing the article	West, C.

Collegian (2014) xxx, xxx–xxx

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/coll

Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol

Sri Warsini, RN, MNS[a,1], Kim Usher, RMRN, MNSt, PhD[a,*], Petra Buettner, MSc, PhD[b,2], Jane Mills, RN, MN, PhD[a,3], Caryn West, RN, GDip Res Methods, PhD[a,4]

[a] *School of Nursing, Midwifery and Nutrition, James Cook University, PO Box 6811, Cairns, Queensland 4870, Australia*
[b] *School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Townsville, Queensland 4811, Australia*

Received 20 September 2013; received in revised form 7 March 2014; accepted 18 March 2014

KEYWORDS
Volcanic eruption;
Psychosocial distress;
Environmental distress;
Natural disaster;
Mixed methods

Summary
Aim: To examine the psychosocial and environmental distress resulting from the 2010 eruption of the Merapi volcano and explore the experience of living in an environment damaged by a volcanic eruption.
Background: Natural disasters cause psychosocial responses in survivors. While volcanic eruptions are an example of a natural disaster, little is currently known about the psychosocial impact on survivors. Volcanic eruptions also cause degradation of the environment, which is linked to environmental distress. However, little is currently known of this phenomenon.
Design: An explanatory mixed method study.
Methods: The research will be divided into three phases. The *first phase* will involve instrument modification, translation and testing. The *second phase* will involve a survey to a larger sample using the modified and tested questionnaire. The *third phase* will involve the collection of interviews from a sub set of the same participants as the second phase.

* Corresponding author. Tel.: +61 7 404 21391; fax: +61 7 404 21590.
E-mail addresses: sri.warsini@my.jcu.edu.au (S. Warsini), kim.usher@jcu.edu.au, kim.usher@une.edu.au (K. Usher), petra.buttner@jcu.edu.au (P. Buettner), jane.mills@jcu.edu.au (J. Mills), caryn.west@jcu.edu.au (C. West).
[1] Tel.: +61 7 404 21391; fax: +61 7 404 21590.
[2] Tel.: +61 7 443 31750; fax: +61 7 404 31767.
[3] Tel.: +61 7 404 21548; fax: +61 7 404 21590.
[4] Tel.: +61 7 404 21825; fax: +61 7 404 21590.

http://dx.doi.org/10.1016/j.colegn.2014.03.004

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

Discussion: Quantitative data will be analyzed to determine the extent of psychosocial and environmental distress experienced by the participants. Qualitative data will be analyzed to explain the variation among the participants. The results of the study will be used to develop strategies to support survivors in the future and to help ameliorate distress.

Introduction

There has been a proliferation of disasters in the last few years including natural disasters, disasters associated with climate-change, and human-made disasters (Simpson, Weissbecker, & Sephton, 2011). One massive natural disaster that occurred in Indonesia in the last three years is the eruption of Mount Merapi in the Yogyakarta region, Indonesia. This mountain is located on Java Island, on the borderlines of Sleman District, Yogyakarta Special Region Province and Magelang, Klaten, and Boyolali Districts, Central Java Province. In the last eruption of Mount Merapi, on October 26 and November 5, 2010, 386 people died, and over two hundred people were injured, mostly due to severe burns. The eruption forced more than 300,000 people from four districts in Yogyakarta and Central Java to be evacuated to cramped emergency shelters (Surono et al., 2012). This disaster inflicted a financial loss up to US$400 million, resulted in the loss of a large area of fertile land, and impacted many settlements (Wartatmo, 2010). This paper describes a study protocol to explore the psychosocial distress related to the volcanic eruption and the emotional distress resulting from living in an environment damaged by the volcano.

Background

Many scientists have conducted research on the psychosocial impacts of natural disaster. However, research related to the psychosocial impact specifically related to volcanic eruptions and the environmental distress resulting from these disasters is limited.

From the research conducted to date, it is evident that a volcanic eruption causes several psychosocial problems including depression and posttraumatic stress disorder (PTSD) (Araki, Nakane, Ohta, & Kawasaki, 1998; Goto, Wilson, Kahana, & Slane, 2006; Howard et al., 1999; Ohta et al., 2003). Goto et al.'s (2006) research concluded that the loss of goods and uncertainty related to the future plays an important role in causing these symptoms. Meanwhile, survivors who undergo several relocations are more likely to suffer from psychosocial distress compared to those who only experience it once. Some demographic data such as age, marital status, social economy, education, and duration of living around the mountain are related highly to the occurrence of psychosocial problems (Goto et al., 2006). This could be because eruptions do not occur over a short period of time like earthquakes, and because of the frequency of eruptions by some active volcanoes which may burden the people living around it and finally result in psychosocial problems.

People living in damaged environments may feel distressed by the changes they see. Studied to date by two research teams (Connor, Albrecht, Higginbotham, Freeman, & Smith, 2004; Higginbotham, Connor, Albrecht, Freeman, & Agho, 2007), the studies support Albrecht's claim (2002), that people can feel 'homesick' at home when the landscape around them is significantly changed or damaged. Albrecht defined the term 'solastalgia' that he proposed is the distress or sadness a person feels when his or her home environment is negatively changed. Solastalgia may result in people feeling unfamiliar in their own environment, even though they continue to live where they always have. This distinguishes solastalgia from nostalgia; that is, survivors experience a type of homesickness even though they have not moved from their homes (Warsini, Mills, & Usher, 2014). Although Albrecht (2005) hypothesized that solastalgia may result from the damage resulting from natural disasters, to date this has not been tested. The research that has been reported about volcanic eruptions mostly discusses the survivors' responses to the disaster or to living in a relocation area or a shelter. However, the fact that eruptions can have a lasting impact on the environment and even trigger a second disaster, has received little attention to date. In addition to that, research on the role of place attachment and its impact on the survivors' experience in overcoming the environmental change caused by an eruption, has not previously occurred.

The study

Aims

The aims of the research are to measure the psychosocial and environmental distress resulting from the 2010 eruption of the Merapi volcano and explore the experience of living in an environment damaged by a volcanic eruption.

Specifically, we aimed to answer the following research questions:

1. How has the eruption of Merapi affected the psychosocial health of people who live near the volcano?
2. What is the level of environmental distress caused by living in an environment damaged by a volcanic eruption?
3. What is the experience of living in the shadow of a very-active volcano and how does this impact on the mental health of the local community?

Design

An explanatory mixed method design (Creswell & Plano Clark, 2011, p. 82) will allow the researcher to assess a phenomenon using a quantitative approach and then obtain

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

depth of information that cannot be examined quantitatively, through a qualitative approach. Mixed method is considered appropriate to gain information about the psychosocial and environmental distress experienced by people who live nearby the Merapi volcanic mountain. Integration of the data, an important aspect of all well designed mixed method studies, will occur between the second and third phase of the study, where the results of phase two will drive the questions in phase three, and in the final analysis where all data will be merged to answer the research questions (Creswell & Plano Clark, 2011, p. 234).

Participants and setting

The research will be conducted in the Merapi community in Indonesia, primarily in Cangkringan and Pakem sub districts of Jogjakarta province. Cangkringan sub district experienced the worst damage and the most deaths from the Merapi eruption in 2010 while Pakem sub district experienced several eruptions before the 2010 eruption but was not damaged in the 2010 eruption.

In the first phase of the research (quantitative), a convenience sample will initially be used to test the appropriateness of the tools with a representative group of participants ($n = 30$), and to perform a test retest ($n = 80—110$) of the tools. Once this has been completed, a larger stratified sample will be recruited to complete the questionnaire ($n = 350$). Systematic stratified sampling means the population will be divided into at least two different subgroups (or strata) that share similar characteristics (Triola, 2009). The advantages of systematic stratified sampling are ensuring of sampling representativeness and gain greater accuracy (Schofield, 2003, pp. 181—182). A further sample will target people not affected by the 2010 Merapi eruption, living in areas not destroyed by the eruption, to get a baseline level of distress for the local population.

A group of 350 survivors will be recruited to participate in this survey from a total population of about 13,000 people residing in the area. A final sample of 350 is considered sufficiently powered to answer the research questions. The target sample size of 175 people from Cangkringan and 175 from Pakem enables us to detect a mean difference of 1 unit in the EDS scale (assumed standard deviation (SD) 3 based on Higginbotham et al., 2007) with a power in excess of 80% and an overall level of significance of 0.05. Systematic stratified sampling will be used to recruit participants. The researcher will stratify samples by sub-district (Cangkringan and Pakem) then chose two villages from each sub-district. Further classification, according to gender and age groups (elderly and young adult) will be performed. Residents of every fifth house in the selected sub-districts will be approached to participate. The adult resident whose next birthday is closest will be invited to participate if they meet the inclusion criteria.

In the third phase of the study, a smaller sample drawn from the same individuals in the second phase of the research will be undertaken using purposive sampling. Respondents with high and low EDS and IES-R scores from the quantitative result will be sought to help explain the phenomenon further (Creswell & Plano Clark, 2011, p. 235). The purpose of this sample is to enhance understanding of environmental distress and to understand the impact of the event in each group, and to determine if the groups are typical or average in relation to their psychosocial response. Interviews will be continued until data saturation occurs, that is, where the same information is being heard (Streubert, 2011). We expect that a sample of about 15—20 will be required to achieve this goal.

Inclusion criteria

The respondents must meet the following inclusion criteria:

1. lived in the area all of their life;
2. experienced the eruption of Merapi in 2010 and now live in an area with environmental damage (study cohort);
3. experienced the eruption before 2010 and now live in an area with no environmental damage (comparison cohort);
4. adult, over 18 years old;
5. willing to consent to the study;
6. able to communicate their experiences to the researcher;

Exclusion criteria

The exclusion criteria are as follows:

1. evidence of a severe mental illness/disturbance;
2. difficulty hearing or speaking;

Data collection

Measures

A *demographic section* will be included in the survey. Participants will be asked to complete a number of questions such as age, gender, education level, living arrangements, employment, pre-disaster experiences, and post-disaster experiences including losses experienced. The survey will also have an area where the participant can indicate their willingness to be interviewed.

The Environmental Distress Scale (EDS) is a 117 item scale developed by Higginbotham et al. (2007). The EDS was designed to measure how people appraise the environmental degradation produced by activities of open-cut mining industries. However, it has been suggested that this tool can be adapted to measure distress arising in other contexts such as climate change, and natural disaster. The scale has been tested with populations in Upper Hunter Valley, Australia and demonstrated strong internal consistency (Cronbach's alpha = 0.79—0.96) and test retest reliability (ICC = 0.67—0.73) (Higginbotham et al., 2007). The tool will initially undergo modification in preparation for use in a volcano setting as while Higginbotham et al. (2007) suggest the tool may be useful for natural disasters. It has not previously been used in this context. Translation and back translation prior to testing and dissemination will also be undertaken.

The Impact of Event Scale—Revised is a self-report measure of current subjective distress in response to a specific traumatic event and contains 22 items. The original scale, developed by Horowitz, Wilner, and Alvarev (1979), was revised by Weiss and Marmar (1997) in order to better correspond with the Diagnostic and Statistical Manual for Mental Disorders-IV (DSM-IV) for the symptoms of Posttraumatic

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

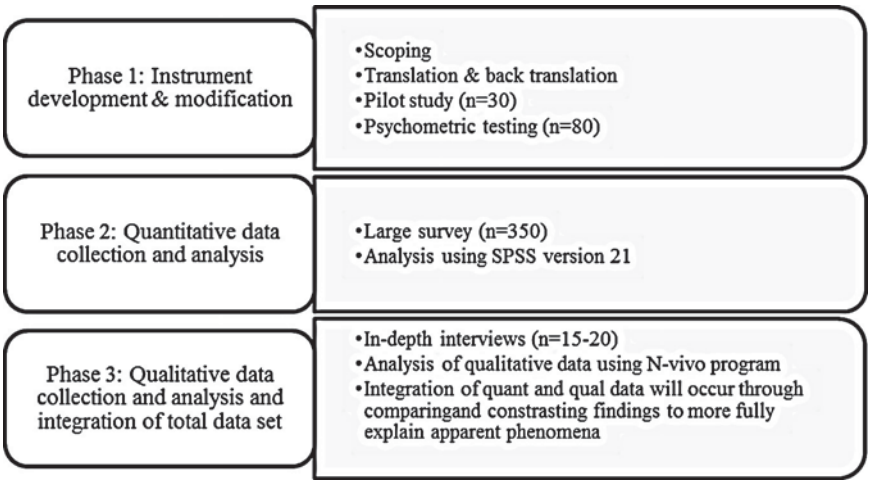

Figure 1 Study design.

Stress Disorder (PTSD). The IES-R has recently been tested and has high internal consistency (alphas ranging from .87 to .94) (Creamer, Bell, & Failla, 2003). However, the tool has not been translated and validated into an Indonesian language. Therefore, in this research the IES-R will be translated into Bahasa Indonesia before it undergoes pilot and psychometric testing.

Procedure

The research will be divided into three phases over two years (see Fig. 1).

Phase 1

The goal in this phase is to modify the Environmental Distress Scale (EDS) (Higginbotham et al., 2007) to ensure its appropriateness for use in Indonesia with residents of the Merapi volcano area. An initial scoping exercise will assist the researcher to understand the need for amendment of the tool. After the EDS scale content is modified it will be translated into Bahasa Indonesia and then back translated as required by an authenticated person (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001). The IES-R scale will also be translated using the same process. Brislin's (1986, p. 159) translation model requires three steps: (1) forward translation of the tools into Bahasa and Jawa checked by two bilingual experts; (2) back translation (into English) by two different bilingual experts; and (3) comparison of the original English version by two back-translation experts (Chen et al., 2011; Jones et al., 2001). The aim of the translation process is to produce a version of the tool that is culturally and setting specific yet as close as possible to the original version (Chen et al., 2011). The survey, which will include both measurement tools and a demographic section, will then be pilot tested (sample $n = 30$), and followed by a test-retest determination (sample $n = 80$) to assure the validity and reliability of the survey tool (Bland & Altman, 1986; Gau, Buettner, Usher, & Stewart, 2012). The final instrument will result from these steps.

Phase 2

The second phase is the conduct of the correlational survey research. As many as 350 people living in the Cangkringan and Pakem sub district will be recruited to the study using systematic stratified sampling. The researcher will stratify samples by villages (hamlets), and then sample households systematically within villages/hamlets. The researcher will visit every fifth house in every lane in a village until the sample for that area is fulfilled. The proportion of respondents according to age (adult and elderly), and sex (female and male), are expected to be similar in both groups (Pakem and Cangkringan sub district).

Data collection will be performed through researcher-assisted interviews for elderly respondents who may find it difficult to fill out the tools themselves. Otherwise the tool will be self-administered. The survey tool is expected to take participants about 20 min to complete. See Fig. 2 for the data collection procedure.

Phase 3

A *descriptive exploratory qualitative* study will be undertaken. The qualitative phase will aim to explore and explain the particular characteristics and experiences of different groups of respondents. For example, this phase will attempt to unravel why some respondents score higher or lower on the subscales of the survey tool, and why some respondents have average score. The sample for the qualitative data collection phase will be chosen purposively from representative respondents with the lowest and the highest scores on the EDS and IES-R scores and who have indicated their willingness to be interviewed. Further, the information gathered in the initial phase of the study will be used to develop the questions to be explored in the qualitative phase. Interviews will continue until the same information is being heard. We expect this to occur after interviewing approximately 15—20 participants. Interviews will be conducted at a time and place of the participants choosing. A venue that is conducive to an interview and where privacy can be assured will be recommended.

During qualitative data collection, the interviews will be recorded and the researcher will take additional notes

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

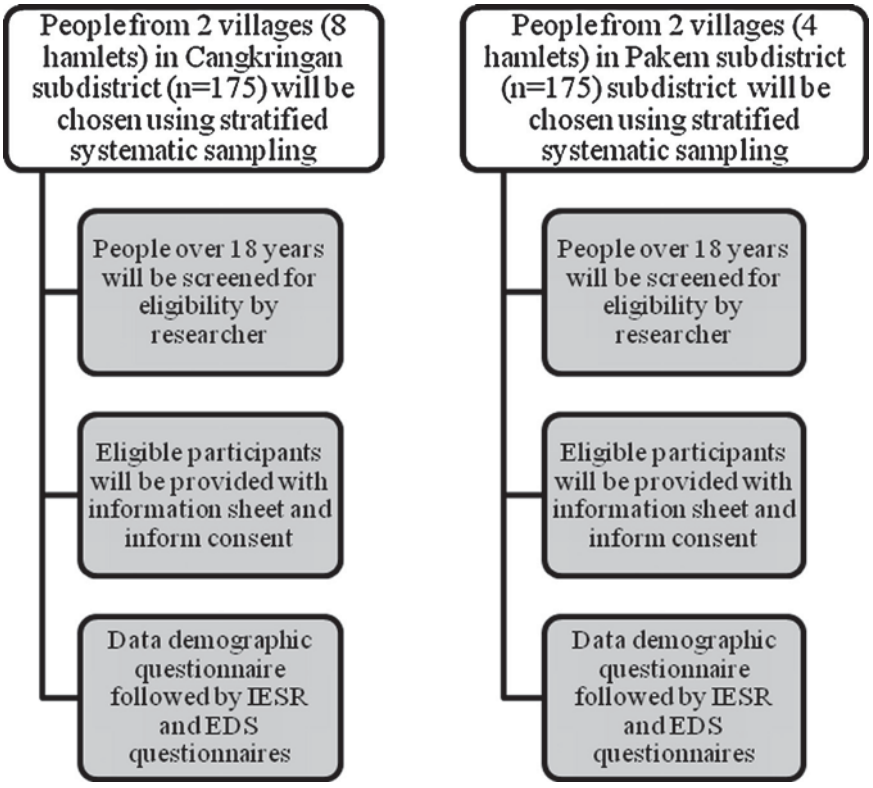

Figure 2 Data collection process.

as required. The interviews will then be transcribed verbatim ready for data analysis. The interviews will be conducted in Bahasa Indonesia, the transcriptions will be in Bahasa Indonesia and the data analysis conducted in Bahasa Indonesia. Approximately two transcripts will also be transcribed to English to allow for cross checking of analysis.

Data analysis

All quantitative data will be analyzed using the Statistical Package for the Social Sciences (SPSS) version 21. Data from psychometric testing (phase 1) for both scales will be assessed using intra class correlation coefficients or concordance correlation coefficients. Internal consistency will be measured using Cronbach's alpha test. Cronbach alpha and Intra Class Correlation scores of more than 0.6 will be set in this research.

Data from the second phase (large survey) will be subjected to descriptive statistics and inferential statistics conducted as required. Descriptive statistics will be used to gain information about percentages, mean standard deviations and median values of EDS, IES-R score and demographic data related to respondents such as age, and gender. Bivariate tests will be conducted using parametric tests such as un-paired t tests or non-parametric Mann—Whitney tests to compare EDS and IES-R results among groups to address the main research questions. Further, bivariate statistics will also be used to compare EDS and IES-R results according to respondent demographic characteristics (such as age, gender, education, pre and post disaster experienced). Multivariate linear regression analyses will be conducted in cases where groups are compared (i.e. people who experienced the Merapi eruption and people who did not; people who live in Merapi eruption damaged area and people who do not).

Qualitative data will be analyzed using NVivo software. The data will be searched for codes and themes in order to answer the qualitative research questions arising from the quantitative data. Thematic analysis is a process whereby the data is examined and searched for recurring patterns (Rebar, Gersch, Macnee, & McCabe, 2011). For example, in this case the data will be searched for themes that help to illuminate the answers to questions raised from phase 2 of the study.

Finally, both the quantitative and qualitative data will be merged to unravel the complexities of the phenomenon under study. Integration is an essential component of the analytic phase of a mixed method study (Kroll & Neri, 2009, p. 38).

Ethical issues

Ethical approval has been obtained from the University Human Research Ethics Committee (HREC) and Institutional Review Board of Medicine Faculty, Universitas Gadjah Mada, Indonesia. All participation in the study will be voluntary and participants will be informed of their right to withdraw from the study at any time. Participants will be provided with an information sheet for each phase of the study and those who agree to participate will be asked to sign a consent form. The participant information sheet will contain details of local support services should a participant become

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

distressed due to the completion of the survey questionnaire. Local support services will be made aware of the research study and asked to provide support to participants should this be required. The researcher will also return to the villages over the following 12 months and continue to meet with local health services to determine the need for any ongoing support for participants. An agreement for the conduct of the study has been organized with the local village leaders. As the researcher (Warsini) is a local of the area, she is aware of the local cultural customs and will ensure these are respected in the conduct of the study. Research assistants will be trained and supervised by the researcher (Warsini) and will be provided with support from local agencies should they become distressed as a result of conducting the data collection. The researcher will ensure the confidentiality of participant data throughout the study. All resulting reports and publications will be de-identified and pseudonyms used to protect the confidentiality of the participants.

Validity and reliability

The validity and reliability of the measurement tools for use with the population will be determined prior to data collection. The rigor and trustworthiness of the qualitative phase of the study will be addressed by following the guidelines established by Lincoln and Guba (1985, p. 301).

Dissemination strategies

An easy to read report will be prepared for participating communities and distributed widely. Papers will also be prepared for relevant scholarly journals and presentations delivered to relevant nursing and health conferences.

Funding

The researcher was supported by a James Cook University International Postgraduate Research Scholarship (JCUIPRS) and James Cook University Graduate Research School funds to conduct data collection.

Discussion

It is expected that the results of this mixed methods study will provide unique insights into the psychosocial and environmental distress resulting from a volcanic eruption. Translated and tested measurement tools will provide insight into the extent of the psychosocial and environmental distress experienced by the participants while the qualitative phase of the study will help to unravel some of the unexplained results from the quantitative phase of the study. Results of the study may be used in the future to better support survivors after a volcanic eruption or similar natural disaster. As nurses make up the majority of first responders after a disaster and are also those who work with communities during periods of recovery, this research is potentially significant for nursing practice and education.

Limitations

The study will be conducted in one region of Indonesia. Therefore, the results of the study may not be generalizable to other volcano or natural disaster affected areas of Indonesia or the world. In addition, the IES-R only predicts the extent of psychosocial distress. To accurately determine the level of psychosocial distress and/or the existence of posttraumatic stress requires a clinical assessment.

Conclusion

The article describes a mixed method study designed to explore the level and experience of psychosocial and environmental distress resulting from a volcanic eruption. As little is currently known of these phenomena, the findings from the study will be used to guide future education, practice and research.

Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/ethical_1author.html)]:

- substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

Acknowledgement

The researcher is supported by an international student scholarship and research support from James Cook University.

References

Albrecht, G. (2005). 'Solastalgia'. A new concept in health and identity. *PAN: Philosophy Activism Nature*, *3*, 41.

Araki, K., Nakane, Y., Ohta, Y., & Kawasaki, N. (1998). The nature of psychiatric problems among disaster victims. *Psychiatry and Clinical Neurosciences*, *52*(Suppl.), 317—319.

Bland, J. M., & Altman, D. G. (1986). Statistical methods for asssessing agreement between two methods of clinical measurement. *Lancet*, *327*, 307—310.

Brislin, R. W. (Ed.). (1986). *The wording and translation of research instruments*. Newburry Park, CA: Sage Publications.

Chen, Y.-Y., Lai, Y.-H., Shun, S.-C., Chi, N.-H., Tsai, P.-S., & Liao, Y.-M. (2011). The Chinese Behavior Pain Scale for critically ill patients: Translation and psychometric testing. *International Journal of Nursing Studies*, *48*, 438—448.

Connor, L., Albrecht, G., Higginbotham, N., Freeman, S., & Smith, W. (2004). Environmental change and human health in Upper Hunter communities of New South Wales, Australia. *EcoHealth*, *1*(2), SU47—SU58.

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

Creamer, M., Bell, R., & Failla, S. (2003). Psychometric properties of the Impact of Event Scale—Revised. *Behaviour Research and Therapy Journal*, *41*(12) http://dx.doi.org/10.1016/j.brat.2003.07.010

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Gau, Y.-M., Buettner, P., Usher, K., & Stewart, L. (2012). Development and validation of an instrument to measure the burden experienced by community health volunteers. *Journal of Clinical Nursing*, http://dx.doi.org/10.1111/j.1365-2702.2012.04336.x

Goto, T., Wilson, J. P., Kahana, B., & Slane, S. (2006). The Miyake Island volcano disaster in Japan: Loss, uncertainty, and relocation as predictors of PTSD and depression. *Journal of Applied Social Pstchology*, *36*(8), 2001—2026. http://dx.doi.org/10.1111/j.0021-9029.2006.00091.x

Higginbotham, N., Connor, L., Albrecht, G., Freeman, S., & Agho, K. (2007). Validation of an Environmental Distress Scale. *EcoHealth*, *3*, 245—254. http://dx.doi.org/10.1007/s10393-006-0069-x

Horowitz, M., Wilner, N., & Alvarev, W. (1979). Impact of Event Scale: A measure of subjective stress. *Psychomatic Medicine*, *41*(3), 209—218.

Howard, W., Loberiza, F., Pfohl, B., Thorne, P., Magpantay, R., & Woolson, R. (1999). Initial results, reliability, and validity of a mental health survey of Mount Pinatubo disaster victims. *Journal of Nervous and Mental Disease*, *187*(11), 661—672.

Jones, P. S., Lee, J. W., Phillips, L. R., Zhang, X. E., & Jaceldo, K. B. (2001). An adaptation of Brislin's translation model for cross cultural research. *Nursing Research*, *50*(5), 300—304.

Kroll, T., & Neri, M. (Eds.). (2009). *Designs for mixed methods research*. Oxford, UK: Wiley-Blackwell.

Lincoln, Y. S., & Guba, E. G. (Eds.). (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publication.

Ohta, Y., Araki, K., Kawasaki, N., Nakane, Y., Honda, S., & Mine, M. (2003). Psychological distress among evacuees of a volcanic eruption in Japan: A follow-up study. *Psychiatry and Clinical Neurosciences*, *57*, 105—111.

Rebar, C., Gersch, C., Macnee, C., & McCabe, S. (2011). *Understanding nursing research: Using research in evidence-based practice* (3rd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Schofield, M. (Ed.). (2003). *Sampling in quantitative research*. French Forest, New South Wales: Pearson Education.

Simpson, D. M., Weissbecker, I., & Sephton, S. E. (2011). Extreme weather-related events: Implications for mental health and well-being. In I. Weissbecker (Ed.), *Climate change and human well-being: Global challenges and opportunities* (2nd ed., pp. 57—78). New York, NY: Springer.

Streubert, H. J. (2011). The conduct of qualitative research: Common essential elements. In H. J. Streubert, & D. R. Carpenter (Eds.), *Qualitative research in nursing. Advancing the humanistic imperative* (5th ed., pp. 18—32). New York, NY: Lippincott, Williams, & Wilkins.

Surono, Jousset, P., Pallister, J., Boichu, M., Buongiorno, M. F., Budisantoso, A., et al. (2012). The 2010 explosive eruption of Java's Merapi volcano—A '100-year' event. *Journal of Volcanology and Geothermal Research*, 1—62. http://dx.doi.org/10.1016/j.jvolgeores.2012.06.018

Triola, M. F. (Ed.). (2009). *Essentials of statistics*. New York, NY: Addison Wesley.

Warsini, S., Mills, J., & Usher, K. (2014). Solastalgia: Living with the environmental damage caused by natural disasters. *Prehospital and Disaster Medicine*, *29*(01), 87—90. http://dx.doi.org/10.1017/S1049023X13009266

Wartatmo, H. (2010). Disaster task force's management support at emergency response phase in the Merapi eruption November 2010. *Prehospital and Disaster Medicine*, *26*(Suppl. 1), S86.

Weiss, D. S., & Marmar, C. R. (1997). The impact of event scale—-Revised. In J. P. Wilson, & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (4th ed., pp. 399—411). New York, NY: The Guilford Press.

Please cite this article in press as: Warsini, S., et al. Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol. *Collegian* (2014), http://dx.doi.org/10.1016/j.colegn.2014.03.004

Mixed methods research consists of several crucial phases. Creswell and Plano Clark (2007, 2011) designed a visual model to facilitate researchers in preparing and conducting research and to make this type of design more understandable. Ivankova et al., (2006) noted that, as well providing detailed and valuable information, such images assist researchers in determining the priority of the methods used and demonstrating the basis for correlating the results of one method and another.

For research with a sequential explanatory design, Creswell and Plano Clark (2007) developed a detailed procedure that they displayed horizontally in a drawing (i.e., from left to right). In 2011, Creswell and Plano Clark improved their visual model by reducing the existing images of steps displaying them vertically (i.e., top-down) and adding a column chart that contains detailed information on each step. Given that there are no rules on how to create mixed methods models, Ivankova et al., (2006) used existing experts' sources and made ten rules for visualising a good and clear mixed methods process.

The process of this research used Ivankova et al.'s (2006) model and rules (see Figure 1). This research aimed to identify the psychosocial impacts experienced by survivors of volcanic eruptions. The first phase of the study aimed to modify, produce and test the validity and reliability of the two instruments used in the research. Using these instruments, measurements of any of PTSD and environmental distress were then completed to identify the perceived psychosocial impacts of the eruption. Next, the results of the quantitative phase were analysed to identify the differences in the psychosocial impacts on the survivors living in Cangkringan and Pakem and determine the differences between high and low scores of the psychosocial impact reported by the survivors. Using the data obtained in the second (quantitative) phase, in-depth interviews were performed to further explore the reasons behind the quantitative results. The quantitative results were used to guide the qualitative selection samples and develop interview questions.

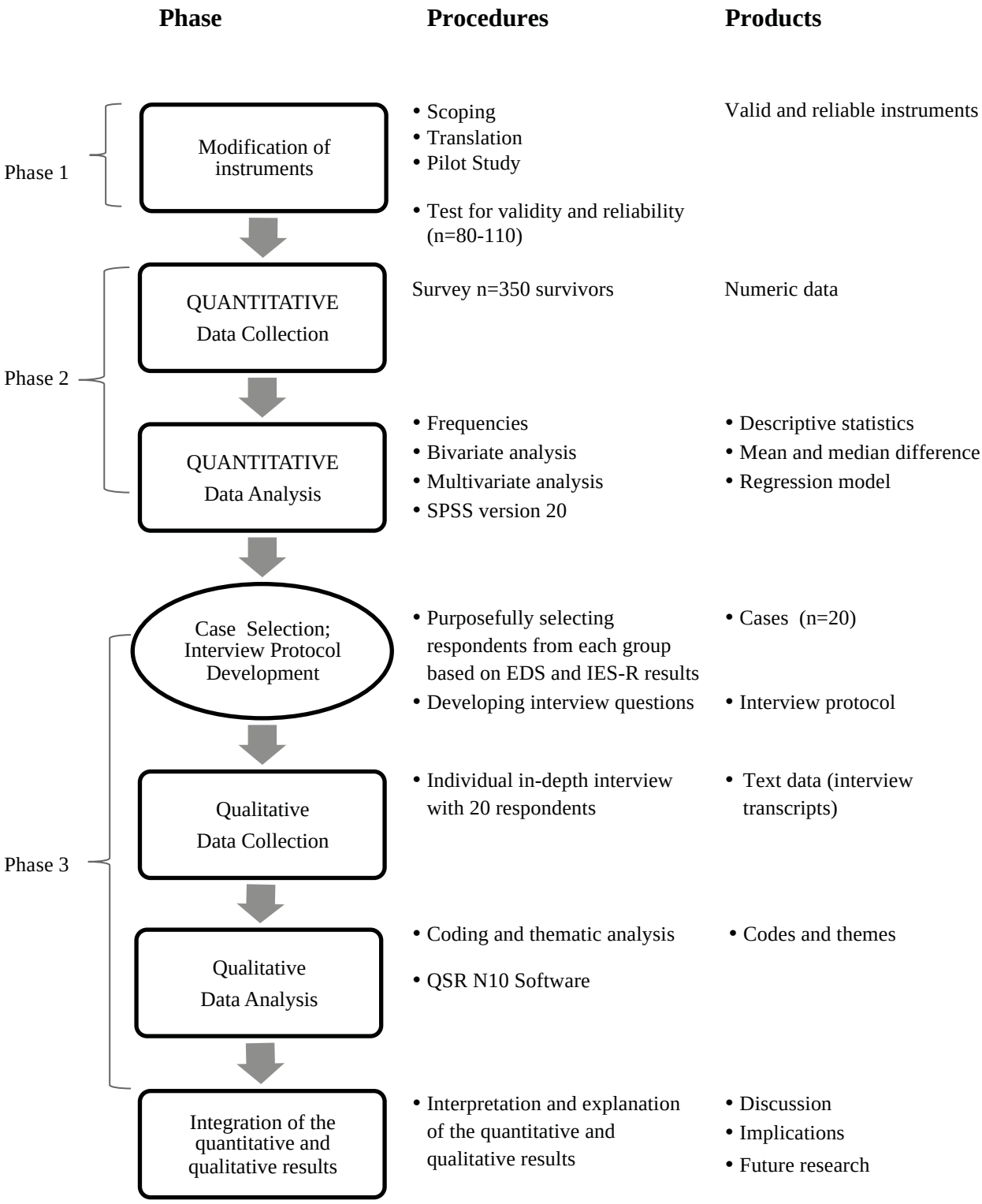

Figure 1. Visual model of sequential explanatory design based on the work of Ivankova et al., (2006).

3.6 Ethical Considerations

Ethical permission for this study was received from the Human Research Ethic Committee (HREC) of James Cook University and the Medical and Health Research Ethics Committee (MHREC) of the Faculty of Medicine, Universitas Gadjah Mada, Indonesia. It would have been sufficient to use the ethics approval from the institution at which the researcher was studying; however, the researcher felt an obligation to obtain ethics approval from the country/place where the data would be collected. This is in accordance with the Ethical Principles for Researchers for studies that involve human subjects (World Medical Association [WMA], 2001). Ethical approval letters are included in Appendix A. Generally, all ethical principles issued by professional associations require that researchers using human being research subjects should prioritise the health, safety and welfare of respondents. Further, researchers must obtain consent from the respondents and appreciate the privacy and freedom of the respondents (Drew, Hardman, & Hosp, 2007; WMA, 2013).

Informed consent written was directly obtained from all the respondents involved in the survey or interview phases of this study. Respondents were provided with information relating to the research prior to being asked to engage in the research and sign the informed consent form (Drew et al., 2007). It was also explained to each respondent that there was no compulsion to participate in the study and they could withdraw from the data collection process at any time (Drew et al., 2007). To minimise the potential risk of psychological problems that might be felt by the respondents as a result of the research (WMA, 2013), information was also provided to respondents as to the availability of a hotline service or that a consultation could be arranged with a psychiatric nurse. Respondent information sheets and consent forms are included at Appendices C–F.

The data obtained was only accessible by the researcher and a consultant. In accordance with the recommendations of the National Health and Medical Research Council

(2007) and James Cook University Ethics requirements for data storage, all informed consents forms and data were stored in secure storage after being packaged and labelled to protect the privacy of the respondents.

3.7 Respondents and Recruitment

3.7.1 Respondents.

In this mixed methods study, the unit of sample were individuals representing a household in the Mount Merapi area. Cangkringan residents participated in the three phases of research whereas Pakem respondents were only recruited in the second phase (large survey), as the goal in the second phase (survey) was to compare the psychosocial impact of the 2010 Merapi Mountain eruption from survivors in two locations; that is, an area that had been (Cangkringan), and an area that had not been (Pakem), severely affected by the 2010 eruption.

3.7.2 Inclusion criteria.

To participate in this study all respondents were required to meet the following inclusion criteria:

- be adults, over 18 years of age;
- have experienced the Mount Merapi 2010 eruption and be currently living in a devastated environment (i.e., for the Cangkringan inhabitants);
- experienced the Mount Merapi 2010 eruption and the volcanic eruptions that occurred several years earlier, but not be living in a damaged environment (i.e., for the Pakem inhabitants);
- be able to communicate in Indonesian; and
- be willing to consent to participate in the study.

Respondents were excluded if they:

- suffered from or had a history of severe mental illness such as schizophrenia or depression; and
- had hearing or speaking difficulties.

3.7.3 Sample size and sampling methods.

Sample size and sampling technique has a very important role in ensuring the quality of quantitative data (Schofield, 2004). In a mixed methods study, sampling plays an essential part as both qualitative and quantitative research methods are used.

In the quantitative phases of this study a probability, sampling technique (i.e., systematic stratified sampling) was used. The researcher divided the sample into two groups (i.e., Pakem and Cangkringan groups) that shared similar characteristics (Triola, 2009). For each group, the data was stratified based on age and gender. Every fifth house in each hamlet was systematically visited to choose the sample. Systematic stratified sampling provides greater precision to study outcomes (Hunt & Tyrell, 2004).

To provide convergence results that expanded the quantitative results, samples in the qualitative phase were purposively selected (by non-probability sampling) from the large group of survey respondents who had high or low scores on the I-IES-R and I-EDS scales to (Brannen & Halcomb, 2009; Creswell & Plano Clark, 2011). Samples in mixed methods studies usually link together or comprise of the same individuals even though the numbers of respondents in the research phases may differ (Creswell & Plano Clark, 2011).

The sample required for the quantitative phases was considered in relation to the goal of each phase. For psychometric testing, the sample size was calculated based on a minimum ratio of items in each scale (i.e., a minimum of 1:5) or minimum of around 100 respondents (Gorsuch, 1983; Hatcher, 1994). In the large quantitative survey, a sample size of 350 was deemed sufficient to estimate or detect the psychosocial impacts (i.e., PTSD and environmental distress) among respondents. This number was calculated by considering the

following statistical variables: precision, power, level of significance and level of confidence. In the qualitative phase of study, 20 respondents were selected; this sample was considered sufficient to gain data saturation.

3.7.4 Recruitment.

The researcher went to the head of each village to provide the research permission letter issued by the Sleman Agency for Regional Development and provide information about the research project. The researcher then visited the chiefs of each hamlet to explain the research and request permission to conduct the research. At this time, the researcher also sought information about the community and the inhabitants of the hamlet. Some of the chiefs were able to provide information about the demographics of the inhabitants and maps of the hamlet. This information was valuable when performing quantitative sampling.

Respondents were recruited at their houses. Upon visiting the houses of potential respondents, the researcher began by introducing herself and explaining the study. Following this, respondents were asked for if they would be willing to participate in the study. If they agreed to participate in the study, informed consent was obtained and data collection began.

3.8 Data Collection Methods

Method has been defined as a way of collecting data and performing analysis (Creswell & Plano Clark, 2007; Rallis & Rossman, 2003). In mixed methods research more than one technique for collecting and analysing data is used. In this study, the data was collected separately by a questionnaire in the quantitative phase and face-to-face semi-structured guided interviews in the qualitative phase. Using both the questionnaire and in-depth interviews was considered an appropriate method to generate data that would answer the research questions. Further, these two techniques are complementary (Tashakkori & Teddlie, 1998a). Using both techniques produces many benefits. Questionnaires are a cheap method that is easy to apply on large samples in a short amount of time (Brannen &

Halcomb, 2009). Interviews are the most frequently used strategy for collecting qualitative data (Brannen & Halcomb, 2009), as they are very useful for exploring and confirming information from the quantitative findings (Johnson & Turner, 2003).

The original instruments used in this research were the IES-R and EDS. Both instruments are discussed further below.

3.8.1 Impact of Event Scale-Revised.

The IES-R is a self-reporting tool that measures current subjective distress in response to a specific traumatic event. Horowitz, Wilner and Alvarev (1979) developed the scale that originally comprised of 22 items. Weiss and Marmar (1997) revised the instrument to ensure that the symptoms of PTSD corresponded with the DSM-IV.

The IES-R has been used to examine the responses of survivors of a number of different natural disasters (Warsini, Buettner, Mills, West & Usher, 2015b) and other traumatic events, including accidents (Beck et al., 2008; Wu & Chan, 2004), chronic illnesses (e.g., cancer) (Mystakidou, Tsilika, & Parpa, 2007) and burn injuries (Sveen et al., 2010).

The IES-R has been tested and has high internal consistency (i.e., alphas range from .79 to .96) (Beck et al., 2008; Creamer, Bell, & Failla, 2003; King, Orazem, Lauterbach, King, & Hebenstreit, 2009; Weiss & Marmar, 1997). This instrument has also been translated into various languages in European and Asian countries and validated (Warsini, Buettner et al., 2015b). In this study, the IES-R was translated into Bahasa Indonesia using the Brislin's translation model and then validated by psychometric testing. The result of I-IES-R psychometric testing showed a very high Cronbach alpha (i.e., 0.90 for the test and 0.92 for the re-test) and the reliability coefficient of the test re-test results was 0.75 (95% confidence interval = (0.64, 0.83)). Thus, Indonesian version of IES-R (i.e., the I-IES-R) used in this study was shown to be a reliable and valid tool. A full paper on the psychometric testing of

the I-IES-R has been accepted for publication in the *Psychiatric and Mental Health Nursing Journal* (Warsini, Buettner et al., 2015b) and is attached at Appendix I2.

3.8.2 Environmental Distress Scale.

The EDS is a 117 item scale developed by Higginbotham Connor, Albrecht, Freeman, and Agho (2007) that was designed to measure how individuals appraise the environmental degradation produced by the activities of open-cut mining industries in New South Wales, Australia. The elements of this instrument are: place attachment, environmental degradation experiences (frequency, observation, and threat), impact, solastalgia, action and trustworthiness. The tool has been validated in the Upper Hunter Valley community and showed strong internal consistency (Cronbach alpha 0.79-0.96) and test re-test reliability (Intra Class Correlation [ICC] = 0.67-0.73).

In this study, the EDS was modified for the setting, translated into Bahasa Indonesia using Brislin's translation model and validated. The result of the I-EDS psychometric testing indicated very good internal consistency (Cronbach alpha 0.90-0.91) and good overall reproducibility with an intra class correlation of 0.81 (95% confidence interval = (0.72, 0.87)) (Warsini, Buettner et al., 2015a, 2015b). A full article on the I-EDS psychometric test results has been published in the *Disaster Medicine and Public Health Preparedness* (Warsini, Buettner et al., 2014b) and is available at Appendix I1.

3.8.3 Semi-structured in-depth interviews.

The purpose of the semi-structured in-depth interviews conducted in the qualitative phase was to collect more information about the experience of survivors. These interviews were also used to confirm and clarify the data obtained in the quantitative phase in relation to the impacts experienced by survivors as a result of the eruption and environmental damage.

The researchers conducted the interviews using predetermined topic questions set out in an interview guide. During data collection, the researchers used different words or

sequences of questions depending on the responses (Halcomb & Davidson, 2006; Johnson & Turner, 2003). In addition to being an easy and efficient technique (Creswell & Plano Clark, 2011; Johnson & Turner, 2003), such interviews are also more relaxed and not formal or rigid (Johnson & Turner, 2003). Interview protocols are needed in interviews to ensure that the process of data collection is well organised (Creswell & Plano Clark, 2011). The researcher and supervisors created the interview protocol based on the results obtained in the quantitative phase. A total of seven questions were developed and it was anticipated that responses to these questions would provide a clearer picture of the research issues and answer the set research questions.

3.9 Data Collection

Data collection for this mixed methods study was conducted between January to February 2013 for the quantitative phase and some seven months later for the qualitative phase. The quantitative study was conducted in four villages in the Cangkringan and Pakem sub-districts; however, the qualitative follow-up study was conducted only in the Cangkringan sub-district.

Shortly, after permission was gained from each of the chiefs of hamlet in each village researchers contacted potential respondents at their houses. At an initial meeting, the research team assessed potential respondents in relation to their eligibility to participate as per the inclusion criteria. An explanation about the research was given and potential respondents were asked if they would be willing to participate in the study. If respondents agreed to participate, a consent form was signed.

Then researchers then asked respondents to complete the questionnaires. It took approximately 30–40 minutes respondents to complete the questionnaires. If respondents had high or low scores in both questionnaires, they were asked if they would be willing to participate in the qualitative semi-structured interview phase of the research.

Upon completion of the quantitative research analysis, respondents were sought to participate in the qualitative data collection phase. Respondents living in Cangkringan who had scored high and low I-IES-R and I-EDS, receptively, were contacted. As in the previous data collection phase, all interviews were conducted at the homes of the respondents. Prior to any interviews being conducted, verbal and written informed consents were obtained. Interviews were recorded using recording devices and all audio files were saved and then processed for transcription. The duration of the interviews was approximately 30–40 minutes.

To support the data collection process, fourteen research assistants were hired to collect the survey data. A mental health nurse also assisted at the interviews. The mental health nurse and research assistants were fluent in the Javanese language and data collection training was performed prior to the survey being implemented to ensure quality and consistency in data collection. For elderly respondents who could not speak fluent Bahasa, the mental health nurse assisted in the survey interviews by translating the questions from Bahasa Indonesia to the local language.

Transcriptions were made of all the interviews. However, only 19 transcripts were analysed; no valuable data could be gained from the last interview, as the quality of the sound was poor due to background noise.

3.10 Data Analysis

Various data analysis methods were used in this mixed methods study. The data analysis for the sequential explanatory research process was performed separately (Bazeley, 2009). The quantitative data was analysed first. Next, the qualitative data was analysed. Finally, the results of the quantitative and qualitative data were integrated in an interpretation phase (Creswell & Plano Clark, 2011).

3.10.1 Quantitative data analysis.

Quantitative data analysis began in the first phase of the study (i.e., with the psychometric testing of the survey tools) and finished with the large survey. For both phases, the data was analysed using the SPSS version 21 software (IBM, SPSS).

The psychometric testing data was analysed by conducting a descriptive statistic test, validity and reliability tests (i.e., Cronbach's alpha, Pearson correlation coefficient and intra class correlation) and factor analysis tests of each of the scales (i.e., I-IES-R and I-EDS). In total, analysis was conducted on 80 data sets for I-EDS and 110 data sets for I-IES-R.

In the large survey, parametric tests (i.e., *t* tests) and three types of non-parametric tests (i.e., Mann Whitney, Chi-square and Fischer tests) were conducted to compare the scales scores of respondents in both sub-districts. Following this bivariate analysis, multivariate analysis was performed using multiple linear regressions to predict the risk factors of PTSD and the environmental distress experienced by respondents. In total, analysis was performed on 348 respondents.

3.10.2 Qualitative data analysis.

Qualitative data analysis is a process by which data obtained from research respondents, collected in the form of words, is treated in a particular way. It produces significant (Liamputtong & Serry, 2010), reliable (Gibbs, 2007) and reasonable accounts of experiences to answer relevant research question(s) (Merriam, 2009). There were two main objectives in the qualitative phase of research: first, to understand the experience of individuals living near a highly active volcano and, second, to investigate the quantitative results further. The quantitative results investigated, advanced knowledge about predictor factors of PTSD and environmental distress. As the objectives of each research question varied, the data analysis approach used also varied.

The first step in the data analysis process was to listen to the audio taped data and read the transcripts (Carpenter, 2010). Different methods were used to analyse the two qualitative datasets. A phenomenological analysis was used to examine the 'lived experience' data and a comparative qualitative analysis was conducted on data relating to the psychosocial impact of the eruption. A detailed description of both processes, and a justification for their use, is presented in the following sections.

3.10.2.1 Phenomenological analysis.

The qualitative research conducted in this research study was not in essence a phenomenological research study; however, the data analysis technique used was similar to a phenomenological approach. Several phenomenological researchers have produced guidelines for analysing data from phenomenological perspective (Priest, 2002). Each has a unique approach.

In this research, the analytic process involved the researcher listening to the recordings repeatedly and reading the transcripts of interviews several times. This process is the first and foremost step (Priest, 2002; Usher & Jackson, 2014) that has to be undertaken before other more complicated steps can begin. This activity is called imaginative reading (Grbich, 2013). The objective of this step is for the researcher to become familiar with the data, understand the data more deeply and thus be more able to capture the 'sense' presented by each respondent (Liamputtong, 2009).

When reading transcripts of the interviews, the researcher underlined or highlighted any answers or statement by respondents that there were important or interesting and responded to the research questions. Van Manen described this process as the 'highlight and line by line approach' (Creswell, 2013); however, other phenomenological experts, such as Moustakas, refer to this step as 'horizontalisation' (Usher & Jackson, 2014). In addition to highlighting the words or phrases considered important, the researcher also writes comments

on the left hand side of the transcript (Merriam, 2009). In this study, the researcher undertook this process with the help of a computer, as this was considered more convenient, efficient and environmentally friendly.

In the next step, the 'NVivo' software package was used to help identify the various responses of all respondents and perform further analysis. All the words or phrases obtained from the previous step were combined, classified and given appropriate names to complete the coding and thematic process.

Once the codes and themes had emerged from the data, the researcher developed a description from the story that illustrated the experience of the diverse respondents (i.e., a textual description). Consistent with the steps of phenomenological data analysis suggested by Creswell and Moustakas (Creswell, 2013; Usher & Jackson, 2014), the researcher also integrated the story line by line, inserting chronological times and the locations of respondents.

Finally, the narrative storyline of the respondents' lived experiences is integrated back into the themes. In accordance the principles of phenomenological analysis, the researcher attempted to comply with special techniques such as epoche, bracketing, phenomenological reduction, horizontalisation and imaginative variation (Merriam, 2009; Priest, 2002; Usher & Jackson, 2014).

3.10.2.2 Descriptive comparative analysis.

Sandelowski's (1995) descriptive analysis formed the basis of the descriptive comparative analysis used in this study. The goal of this phase of analysis was to determine differences in the responses between the groups with high and low I-IES-R and I-EDS scores. The quantitative survey results (e.g., about age, gender, level of education and type of employment) were analysed to split the dataset into the two groups (i.e., high and low scores of I-IES-R and I-EDS). A comparative coding process was then used.

Initial analysis included a familiarisation process that oriented the researcher to the data. Following this orientation process, the data was analysed systematically and consistently using the versus coding method outlined by Saldana (2009). Versus coding is a process that uses categorisation to identify similarities and differences in datasets that have been split into two opposing groups (Saldana, 2009). In this study, versus coding was used to isolate and identify the factors that influenced some survivors to perceive or experience the psychosocial impact of the eruption more strongly than other survivors. Versus coding was used to identify whether the group with high I-IES-R and I-EDS scores answered the question about psychosocial impact differently from the group with low I-IES-R and I-EDS scores. This qualitative analysis method was also used to identify themes and characteristics in the different groups in relation to the psychosocial impacts. Versus coding was deemed an appropriate technique to apply (Saldana, 2009) as it identified the commonalities and differences between the two groups in their answers to questions about psychosocial impacts.

The researcher then inserted coding for both groups of respondents into a table to make the comparison of the responses between the two groups easier (see Table 3.1).

Table 3.1

Example of Versus Coding

Adult	Theme	Elderly
- Not ready to die yet - A lot of hope and desire - Thinking about the future	Hope and Desire	- Not afraid to die - Less hope and desire

The researcher grouped all the codes and developed themes after investigating the connections among them. Descriptive analysis is different to many other qualitative analysis approaches, as the researcher does not need to apply sophisticated interpretation, but instead describes the facts from the data (Lambert & Lambert, 2013; Sandelowski, 2000). The results

were ordered by theme from most frequently applied to least frequently applied (Lambert & Lambert, 2013; Sandelowski, 2000).

3.10.3 Integration of the data.

Integration is a characteristic of mixed methods research. In the integration process, the results of both methods (i.e., quantitative and qualitative) are combined using specific methods to provide a more complete picture and generate more significance. The main aim of integration is to ensure both data strands are able to answer all of the research questions proposed, including the mixed methods research questions (Creswell & Plano Clark, 2011). Previously, researchers have used similar terminologies that actually have different meanings to refer to this process (such as, integration, combination, mixing and merging). However, Moran-Ellis et al., (2006), asserted that integration is not the same as a combination; rather integration is a special relationship of two or more methods in which each method is processed by the paradigm used and then linked the other methods to produce something more. Conversely, combination only uses the results of one method to explain the previous method. According to Creswell and Plano Clark (2011), merging and mixing are the process by which researchers combine two databases. Merging attempts to determine whether there is a mutually reinforcing similarity or there are contradictory results from both methods; however, mixing emphasises timing and how the mixing process happens. Thus, integration is different to other terminologies, as its process involves more than just combining research results and can ultimately increase the value of the research itself (Fetters, Curry, & Creswell, 2013).

According to Creswell and Plano Clark (2011), integration may occur at four different stages: interpretation, data analysis, data collection and design. Creswell (2012) also noted that integration can be performed through design, philosophical, methodology and methods perspectives. Fetters et al., (2013) further add that integration at the interpretation and

reporting level can occur through three approaches; narrative, data transformation and joint display.

In this research, integration was performed at both the methods and interpretation levels. Integration at the methods level means that the second data collection process started with the selection of respondents and included the development of the interview protocol (which was strongly influenced by the results obtained from the first study). The term describing these processes is connecting and building (Creswell & Plano Clark, 2011; Fetters et al., 2013). Connecting means one database links to the other through sampling, whereas building means one database directs the approach of the following data collection. The integration at the interpretation and reporting stage means that the analysis of the results of both methods were connected at the final stage after both of had been separately analysed during the different phases (Creswell & Plano Clark, 2011; Fetters et al., 2013). Figure 2 sets out where integration occurred in this research.

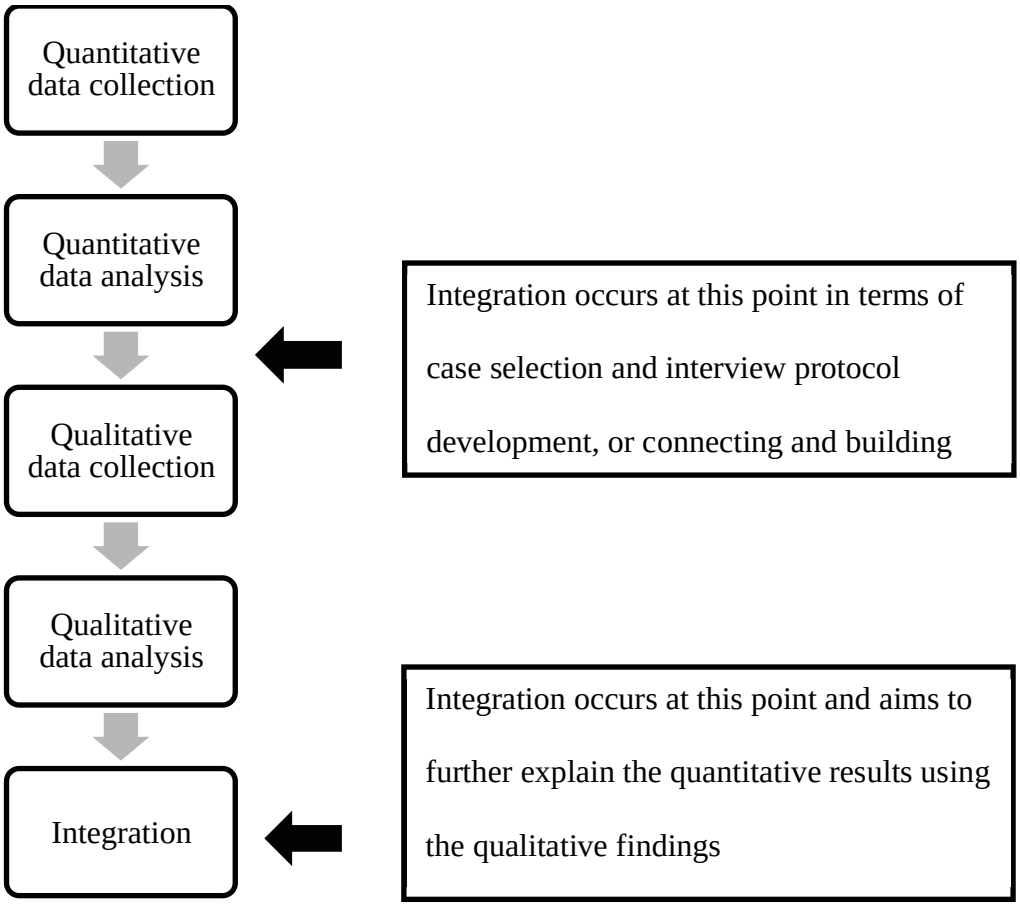

Figure 2. Points of integration in the research study (Creswell & Plano Clark, 2011, pp. 66–67).

Several integration techniques exist such as thread (Moran-Ellis et al., 2006; O'Cathain, Murphy, & Nicholl, 2010), meta-matrix (O'Cathain et al., 2010), joint display (Creswell & Plano Clark, 2011; Fetters et al., 2013), triangulation (O'Cathain et al., 2010), narrative (Fetters et al., 2013) and data transformation (Creswell & Plano Clark, 2011; Fetters et al., 2013). Thread and the use of a mixed methods matrix are performed during analysis while other techniques are performed at the interpretation phase. Some techniques require specific software such as CAQDAS and NVIVO to analyse the mixed methods data; however, narrative results do not require complicated techniques.

3.11 Limitations of Design

The design used in this research is not as powerful or valid as the embedded designs used in experimental research (e.g., randomised control trials). However, due to the lack of evidence or baseline data about the psychosocial impacts (i.e., PTSD and environmental distress) of the 2010 Mount Merapi eruption on survivors, a sequential explanatory design was considered the most appropriate design to answer the research questions and objectives of this mixed methods study. Thus, the results of this research can provide a baseline of information for future research.

3.12 Chapter Summary

This chapter explained the theoretical aspects of the mixed methods approach, including in relation to the history, philosophy adopted and design used. A description of the study protocol used and how it was implemented was also provided. In addition, an explanation of the research processes or methods used (including data collection, sampling and recruitment, data collection processes, ethical considerations, data analysis and data integration) was given. Finally, the limitations of the approach used were discussed.

The next three chapters (i.e., Chapters 4, 5 and 6) present the results of the mixed methods research. Chapter 4 sets out the survey results of the quantitative phase. Two papers related to the results of the I-IES-R and I-EDS surveys are presented. Chapter 5 presents the interview findings that outline the lived experience of survivors and help explain the survey results. Finally, Chapter 6 discusses the integration of the results of the quantitative and qualitative research.

Chapter 4: Quantitative Results

4.1 Introduction

This chapter presents the findings from the quantitative phase of the study. Specifically, it reports on the psychosocial and environmental distress experienced by survivors of the 2010 Mount Merapi eruption. The results of the two surveys have been published and the articles are presented in this chapter. Both articles present similar information in relation to the data collection procedures, sample and demographic characteristics of the respondents; however, the articles measure and report different data.

4.2 Psychosocial Impact of the 2010 Mount Merapi Eruption on Survivors

The following journal article (Warsini, Buettner et al., 2015a) describes the survey results obtained using the I-IES-R to measure the psychosocial impact of the 2010 Mount Merapi eruption on survivors. This article was published in *Nursing and Health Sciences Journal* and presents the quantitative results that address research question one. Notably, the article describes the measurement of indicators of PTSD caused by 2010 Mount Merapi eruption and discusses the factors that influence the development of PTSD as experienced by the respondents. After a clinical examination, the IES-R was considered the most appropriate tool to measure PTSD (Christianson & Marren, 2008).

Manuscript: Warsini, S., Buettner, P., Mills, J., West, C., Usher, K. (2015) Post-traumatic stress disorder among survivors two years after the 2010 Mount Merapi volcano eruption: A survey study, *Nursing and Health Sciences Journal, 17;* 173-180.

Declaration of Authorship

Chapter	Publication Details	Author Contributions	Signature
4	Warsini, S., Buettner, P., West, C., Mills, J., Usher, K. (2015) Post-traumatic stress disorder among survivors two years after the 2010 Mount Merapi volcano eruption: A survey study. *Nursing and Health Sciences*, *17*; 173-180 Accepted for publication 24 April 2014 E-publication 21 May 2014 Published May 2015	Developed the initial idea and argument for the manuscript and assisted with writing and editing the article	Warsini, S.
		Assisted with the argument for the manuscript and writing and editing the article	Usher, K.
		Assisted with writing and editing the article	Mills, J.
		Assisted with the statistical analysis and writing and editing the article	Buettner, P.
		Assisted with writing and editing the article	West, C.

Nursing and Health Sciences (2015), **17**, 173–180

Research Article

Post-traumatic stress disorder among survivors two years after the 2010 Mount Merapi volcano eruption: A survey study*

Sri Warsini, BNS, M. Med,[1] Petra Buettner, MSc, PhD,[2] Jane Mills, RN, PhD, MEd, MN, BN, FACN,[1]
Caryn West, RN, Cert CR, GCP, GDip Res Methods, PhD[1] and
Kim Usher, RN, RPN, A/DipNEd, BA, BHSc, MNSt, PhD, FACN, FACMHN[1]
[1]*School of Nursing, Midwifery and Nutrition, James Cook University, Cairns, and* [2]*School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Townsville, Queensland, Australia*

 doi: 10.1111/nhs.12152

4.3 Environmental Distress Due to the Environmental Degradation Caused by the 2010 Mount Merapi Eruption

This article presents the survey results from the I-EDS that were used to measure environmental distress in the respondents. The content of this manuscript addresses research question two and presents the major quantitative findings of the study that illustrates that the various threats and distress experienced by individuals living in a damaged environment as a result of a volcanic eruption. In addition, the factors that influence distress caused by living in a damaged environment are included.

A correction to this article was required and the following was provided to the editor and added to the manuscript:

Corrigenda

The Psychosocial Impact of the Environmental Damage Caused by the Mt Merapi Eruption on Survivors in Indonesia (In press).

Sri Warsini[1], Petra Buettner[2], Jane Mills[1], Caryn West[1], and Kim Usher[1]. School of Nursing, Midwifery and Nutrition, James Cook University, PO BOX 6811, Cairns, QLD, 4870, Australia.

School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Townsville, QLD, Australia.

The interpretation of the solastalgia score in this paper was incorrect as the scores are reversed. Hence, Pakem residents scored lower on the experience of solastalgia than the Cangkringan residents post the eruption.

In other words, this means that Pakem respondents experienced worse solastalgia than the Cangkringan respondents.

Manuscript: Warsini, S., Buettner, P., Mills, J., West, C., Usher, K. (2014). The Psychosocial Impact of the Environmental Damage Caused by the Mt Merapi Eruption on Survivors in Indonesia, *EcoHealth*, *11*(4); 491-501.

Declaration of Authorship

Chapter	Publication Details	Author Contributions	Signature
4	Warsini, S., Buettner, P., West, C., Mills, J., Usher, K. (2014). The Psychosocial Impact of the Environmental Damage Caused by the Mt Merapi Eruption on Survivors in Indonesia. *EcoHealth*, *11*(4); 491-501 Accepted November 2013 E-publication 24 April 2014 Published December 2014	Developed the initial idea and argument for the manuscript and assisted with writing and editing the article	Warsini, S.
		Assisted with the argument for the manuscript and writing and editing the article	Usher, K.
		Assisted with writing and editing the article	Mills, J.
		Assisted with the statistical analysis and writing and editing the article	Buettner, P.
		Assisted with editing the article	West, C.

EcoHealth 11, 491–501, 2014
DOI: 10.1007/s10393-014-0937-8

EcoHealth

Original Contribution

The Psychosocial Impact of the Environmental Damage Caused by the MT Merapi Eruption on Survivors in Indonesia

Sri Warsini,[1] Petra Buettner,[2] Jane Mills,[1] Caryn West,[1] and Kim Usher[1]

[1]*School of Nursing, Midwifery and Nutrition, James Cook University, PO Box 6811, Cairns, QLD 4870, Australia*
[2]*School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Townsville, QLD, Australia*

4.4 Chapter Summary

Chapter 4 presented and discussed the results of the quantitative phase of this mixed methods study. The results indicated that, some two years after the event, the survivors who lived in the area most severely affected by the 2010 Mount Merapi eruption continue to be psychosocially impacted as a consequence of the eruption. Psychosocial impacts include PTSD and environmental distress. From the findings, it can also be concluded that the PTSD experienced by respondents varies with age, gender and home ownership status. Conversely, the factors that affect the environmental distress experienced by the respondents include age, education level and employment status.

Chapter 5 describes the findings from the qualitative phase of the study. It consists of two sections: a description about survivors' experiences in Mount Merapi and the impact of the eruption and environmental degradation experienced by respondents. The qualitative findings provide some clarification and explanation to the multivariate analysis results generated in the quantitative phase of the study.

Chapter 5: Qualitative Findings

5.1 Introduction

This chapter presents the qualitative results of the study and aims to extend understandings of the lived experience of Mount Merapi inhabitants. This study is the first to give a voice to survivors living near an active volcano. The specific question asked during qualitative data collection was: 'What is the experience of living in the shadow of an active volcano and how does this impact on the mental health of the local community?'.

Each of the 20 respondents interviewed for this part of the study had experienced the 2010 Mount Merapi volcanic eruption. The age of respondents ranged from 27–80 years; 14 of the respondents were female and five male. The demographic characteristics of respondents are set out in Table 5.1. The names used this chapter for the respondents are pseudonyms.

Of the 20 interviews conducted, 19 interviews were transcribed; one interview had to be excluded because of the poor quality of the data. Specifically, the environmental conditions of that interview meant researcher could not understand or transcribe the interview.

An analysis of the interviews identified numerous factors that represented the 'lived experience' of the respondents. These factors have been addressed individually; however, it is important to note that in the process of analysis an individual's experiences were not viewed as isolated events, but were intertwined and overlapped to form the entirety of the phenomenon. To preserve the cultural integrity of the respondents the data was divided into two sections:

1. Emotions (i.e., lived experiences): presented using the chronological time of events in three defined subsections: pre eruption, during eruption and post eruption. Each subsection presents a theme and associated sub-themes.
2. Impacts: explores the impact of the volcanic eruption on the inhabitants of Mount Merapi.

Table 5.1

Interview Respondents and their Demographic Characteristics

No	Name	Age	Gender	Occupation	Level of education
1	Thursina	41	Female	Unemployed	Elementary
2	Kalista	54	Female	Farmer	Illiterate
3	Puri	41	Female	Unemployed	Senior High
4	Sumawarni	39	Female	Merchant	Senior High
5	Sudaryanto	53	Male	Labour	Junior High
6	Jemima	71	Female	Unemployed	Illiterate
7	Kasima	76	Female	Unemployed	Illiterate
8	Waljinah	58	Female	Farmer	Elementary
9	Mariam	36	Female	Unemployed	Senior High
10	Muningsih	31	Female	Unemployed	Junior High
11	Yatiman	67	Male	Farmer	Elementary
12	Gunawan	75	Male	Farmer	Junior High
13	Sri Ariyani	42	Female	Merchant	Elementary
14	Risnayanti	27	Female	Merchant	Senior High
15	Gertrude	71	Female	Unemployed	Illiterate
16	Kemala	64	Female	Farmer	Illiterate
17	Warseno	56	Male	Farmer	Junior High
18	Ponty	57	Male	Farmer	Elementary
19	Muhammad	64	Male	Farmer	Elementary

5.2 The ‘Lived Experience’: Living in the Shadow of a Very Active Volcano

By recognising the life experiences of the respondents, these findings provide an explanation of how the survivors feel today and how their experiences affected their actions in addressing the impacts of the eruption. As stated above, the life experiences of respondents living on Merapi Mountain during the 2010 volcanic eruption are described chronologically (i.e., before the eruption, during the eruption, the first few months after the eruption and later in time after the eruption).

5.2.1 Pre eruption: ‘Connectivity’.

Before the 2010 eruption, the majority of respondents indicated that they felt happy and committed to living near Mount Merapi. Respondents spoke of a connection to place and country and a birth right inherited from their parents and great ancestors. Living in a place inhabited by their ancestors and that they would hand on to their descendants gave the inhabitants of Mount Merapi a sense of upholding a legacy. The respondents from Mount Merapi expressed a feeling that they were destined by God to live close to the mountain regardless of whether it erupted or not. One respondent, Warseno, stated:

> *Of course, I’m happy. I was born there, and I also earn my source of livelihood such as farming, gardening, and raising livestock from there.*

Similarly, Mariam stated:

> *I’m also happy because this is an inherited land from my father and then my grandmother, so to leave it is difficult to do. It’s been ingrained you know, [since] my parents and I were born here.*

Sumawarni stated:

> *Of course, I feel at home here, this is my home, anyway [laughter].*

Entwined with these feelings of place and country was a feeling of being connected to other local inhabitants. Good relationships with neighbours enhanced the commitment of respondents to live on Mount Merapi. Respondents reporting that they all lived in harmony and mutual cooperation and considered their neighbours to be their family. Respondents felt that having many neighbours equated to having many friends and were thus supported when problems arose or, as in this case, disaster struck. Kalista stated:

> *My neighbours and I are close. They are all very kind, and never make any trouble. So, I feel at home here.*

Warseno reported:

The neighbourhood here has been already built together by the residents.

Living in a beautiful and safe environment with fresh air and fertile land, rich in natural resources (such as water and sand) created a sense of comfort in the respondents and further reinforced their bond with Mount Merapi. Mariam stated:

Here, the soil is fertile, the water is available and pure, and the air is still fresh.

The feelings of connectivity experienced by respondents also incorporated their livelihoods. All, but one, of the respondents were farmers or retired farmers who had benefited from the fertile soil of Mount Merapi prior to the eruption. Vast amounts of land located close to their houses had been planted with crops ready for harvest and sale. Prior to the eruption, crops were varied and numerous and farmers never had to worry about a shortage of food and, for those farmers with livestock, there were no concerns in relation to the availability of feed. Sri Ariyani stated:

Before the eruption, we could plant anything in the field including rice or the like. For those who don't have a rice field, they could go to moorland to take coconuts or woods to be sold for money.

Thursina said:

Before eruption, it was very easy to find the food source for animal.

Only two of the respondents reported suffering hardships in their life prior to the 2010 volcanic eruption. Both had lived close to the volcanic crater and thus in the dry season they had to work hard and travel long distances to find water. It did not, however, deter them from living on the mountain. Kasima stated:

Long time ago, when we didn't have much water from Bebeng…we must find it up to Guling area.

This first theme, connectivity, is important as it explains the emotions and connections of the respondents to Mount Merapi prior to the eruption in 2010. The strength of these connections and the fundamental beliefs of respondents that the mountain would provide influenced the experiences of the respondents (during and post eruption) and influenced their decisions to stay on the mountain.

5.2.2 During eruption: 'Dislocation'.

When the 2010 volcanic eruption occurred, the respondents experienced a variety of situations. All elderly respondents (both male and female) were evacuated from their homes and sought shelter in government buildings, designated as disaster shelter locations, a friend's or family's home or, in some cases, the respondents were evacuated to the nearby city of Klaten. Similarly, a majority of the female respondents were evacuated with their children. Younger respondents, the majority of whom were male, remained at their homes; however, later many had to be evacuated during the middle of the night of the eruption (i.e., 26 October 2010).

The second theme, dislocation, explains the emotional experience of respondents during and in the months following the eruption. Respondents indicated a strong sense of dislocation with Mount Merapi. As Mount Merapi erupted respondents were forced to flee, many nearly fell victim to the threatening pyroclastic ash and molten lava that exploded from the mountain as they raced to save their lives. As the respondents and their families struggled to reach the safety of evacuation shelters they could feel the heat in the environment, hear the horrific explosion sounds, feel the tremors of the earth and feel the ash as it rained down from Merapi Mountain. The respondents reported experiencing confusion, fear, panic and trauma. The emotional and physical experiences of the evacuation, such as separation from family members, confusion and uncertainty on how and where to escape to, followed by transient

living arrangements that lacked direction or permanence, intensified the respondents' feelings of anxiety.

Sudaryanto stated:

On that day, I had stood guard here since 07:30 (in the evening). At 11:00 p.m., there was a greater shake. The sound of the eruption was incredible. After that, there was no popping sound again. At that time, I was lying here. When I was about to go to bed, my daughter who was in the refugee camp went home. She woke me up; then asked me to go. At 12:00 p.m., I arrived at Kalasan. Just after I got in Kalasan, this area had been completely destroyed. And [I] could see what was going on. At the time, I crossed Gendol River, I wore long-sleeve shirt and I still felt the heat. I could only see the blasting bamboos, some were reddish, and some others were black. After that, I got in Cangkringan, Ngangkruk that was already covered by dry ash.

Risnayanti mentioned:

When it happened, [I] had just at home [sic]. Suddenly, my husband called [me]. He asked me to get ready. About five minutes later, I was out of my house. Then, I waited for other families while deciding where we would go. At that time, my mother and my family were about to buy gasoline at that corner. Suddenly, it [the hot cloud] already reached Banjarsari. The one who sold the gasoline was even dead [a victim]. Then, my family was stuck there. Fortunately, there was another way. Then my uncle and I rode [different] motorcycle[s] through that way. When we were passing that way, my uncle was not able to cross over the road, while my brother and I could do it. I looked back, but I couldn't find [my uncle] so I was confused about where to go. Finally, I returned to the Banjarharjo intersection. Here, a lot of other people run into the same thing like us—didn't know where to go. Then, we just followed the others, anyway.

It was not only the respondents who remained at home that experienced fear, panic, and trauma; respondents evacuated a few days before the eruption experienced similar emotions. These respondents could see Merapi Mountain in the distance and imagine the devastation that was occurring; hear the explosions, and feel the earth quaking. Even from the relative safety of the shelters, they experienced rock and ash raining from the sky. Those evacuated to different regions or cities watched the news on television as Mount Merapi devastated their homeland and livelihoods. Despite being removed from the hazard site, the fear these experienced was not lessened. Yatiman stated:

> *I was [evacuated] in Klaten. You know, I still felt the vibration when I was at Prambanan. I also saw the ashes there and heard the sound of the eruption.*

Kalista stated:

> *I heard the rumble at night, even from Prambanan. I immediately thought about my house, what if it hit by the hot clouds. I was so afraid…even I couldn't sleep just when I kept thinking about it.*

Respondents explained how their suffering did not cease when the eruption ended. The eruption led to forced relocation at temporary refugee camps, friends or family's houses or temporary shelters. Respondents stated that it was difficult living in a strange environment. They were not ungrateful to have survived the eruption, but found the transience of their current situation unsettling. Further, the location respondents were evacuated to, such as family members' homes, did not lessen their feelings of dislocation. Overwhelmingly, respondents stated that they wanted was to go home and these feelings often manifested in physical symptoms such as sleep disorder and loss of appetite. Kalista stated:

> *Loss of [my] appetite in the refugee camp. Although the meals were varied and plentiful, free, no need to buy; [but] the taste was not as delicious as those cooked at home. At my own home, although I had rice meals [with side dishes] of papaya*

leaves, I feel the taste was good. Conversely, in the refugee camp, although I ate chicken, eggs, it tasted bad. Foods will be more delicious if eaten at home, anyway. Every time I thought about Merapi, I was so frightened…so frightened because I kept thinking about that only.

Kasima stated:

I was running down up to Joho's school, Joho in Klaten…but I stayed there a day only when someone asked me to go with them went back home by truck. Then my son picked me up and took me to Klaten Tubukan…then my grandson picked me up, he lives in Jogja [studying] in UGM [Universitas Gadjah Mada]. He took me to his father's home in Jambi…but when I stayed there for a month I felt I couldn't stand it anymore.

Mariam noted:

The most troubled [sic] part is when we were in evacuation. Moreover when we wanted to go home our home is gone…it was sad Miss…I fled not in those camps but to my relatives' houses. It was in Umbul, down there for four times. The last place was in a relative's house nearby the National Heroes cemetery in Semaki, but their places were too small whereas we were a big family.

It is clear from this theme that respondents were frightened and traumatised by the eruption; however, they still felt an overwhelming connection to Mount Merapi. Their feelings of dislocation appear not only to be linked to their forced evacuations and the transience of living in refugee camps, but also to the fact they were away from their home on the mountain.

5.2.3 Post eruption: 'Reconnection'.

The third theme explains the experiences of respondents upon returning to the mountain. Homes were destroyed, farming land devastated; however, the connection the

respondents felt with Mount Merapi remained strong. This theme highlights how the post eruption experience of respondents reflected their reconnecting with the mountain and is thus intrinsically linked with the first theme of connection. Some respondents experienced feelings of desperation and betrayal, others believed that the disaster was ‘God’s will’; however, all respondents expressed a wish to reconnect with their mountain home.

In the months following the eruption, many respondents continued to live in semi-permanent shelters provided by the government; however, those who were able, returned to their homes. The altered conditions of the mountain forced many respondents to seek new jobs or roles in the village to meet their family responsibilities. Those whose livestock had survived would leave their shelters during the day to take care of their animals. Some respondents worked to re-cultivate the land and others worked as sand miners. At the end of their working days, the respondents returned either to the temporary shelters or their damaged homes. Sri Ariyani recalled:

> *In the daytime, people in the refuge who were under 50 years old usually went to their village to see their houses [if they still existed], and then back again to the refuge to visit their children, and those who had animals would back home again for taking care of the animals that were still alive.*

Sudaryanto stated:

> *Yes, at 12 noon usually the refugees returned to their village again, making a living for their family.*

However, the peril of the eruption continued to haunt the survivors especially those living near Gendol River, as the river that fed their village now flowed thick with mud.

Sudaryanto stated:

> *After Merapi erupted, we lived in refugee camps. After coming out from the refuge, I returned to my own house. After 12:00, although a bit cloudy, we were back together*

to the refuge, so I was a little afraid remembering that the lava may run from the top of the mount again. This road was passed by cold lava flood four times in the period of 3–4 months.

For the adult respondents (aged 27 to 59 years old), the 2010 eruption was their first experience of a volcanic disaster. Many elderly respondents (aged 60 years and over) had experienced volcanic eruptions previously; however, this was their first experience of the pyroclastic ash and lava flows that swept their village away. For the respondents interviewed, it was the magnitude of the 2010 eruption that made it more traumatic; for example, it was the first time they had experienced massive mudflow floods that flooded the roads, destroyed the water sources and swamped their villages. Kalista said:

During my lifetime, this is the first time I experienced such a disaster. In the past, even though the lava floods were large enough, those never got out of the rivers.

Gunawan stated:

I've experienced Merapi disaster three times, but all of them were not as horrible as this time. In the past, the flood only flew through the gorges. Even the volcanic ash rain [it never happened before].

After nearly a year of living in temporary shelters, many of the survivors whose houses were buried under sand and ash were relocated to more permanent housing (often located in different villages or districts). This reinforced feelings of dislocation. Additionally, the instability of Mount Merapi did nothing to lessen the fear and anxiety of the survivors. Mount Merapi continued to smoke, and the tremors persisted. Kalista recalled:

I'm a little bit confused to describe my own feeling. Sometimes I feel serene, but sometimes I feel scary [sic]. If Merapi doesn't [show its volcanic activity] yeah then I'll feel peaceful but if the smoke or ashes come out from the Mount I'll be scared. Before [the eruption], while I went to the market, moorland or everywhere; I did not

rush. But now when I'm farming in the moorland for only a few hours and at the same time it's getting dark [cloudy], I'll be scared, [then] I'll hurry home.

Although some of the respondents experienced feelings of betrayal from Mount Merapi and asked 'Why did this have to happen to us?', the majority of the respondents viewed the disaster as God's will. As the custodians of Merapi Mountain, to live in harmony with the mountain, they have to accept that volcanic eruptions will occur. Sri Ariyani stated:

I spoke while sobbing, O God, when does this disaster finish? An earthquake like occurred in Bantul only happens once. But, this is different; it lasted up to four months. I was really depressed during that time.

Warseno said:

Indeed, the thing that can make a calamity or disaster is the nature. Can humans control the will of nature? Certainly not! Therefore, we become patient ourselves. There is no grudge because it is a natural occurrence, the will of God.

The traumatic event of 26 October 2010 left traces on the memories of those who survived, yet the resilience of the inhabitants and their connection with the mountain remains. In the aftermath of this catastrophic event, the respondents explained how living on the mountain meant a number of things to them: never take anything for granted, always trying to learn a lesson from every bad situation, always helping others, focusing more on simplicity, not placing too much value on material goods, finding strength and faith in God and willingly accepting their fate. As Sri Ariyani said:

The condition is like this, just the same before and after the eruption. It is okay, I'm still grateful. Praise God, my [nuclear] family is still complete, still healthy, even though I lost my sister, my brother-in-law, my nephews, and my mother.

5.3 The Impact of a Volcanic Eruption

The main negative impact respondents perceived in relation to the eruption was loss. Some respondents suffered multiple losses, including houses, properties, rice field, livestock and family members. Disappointment, fear, trauma, unstable emotions and anxiety were a few of the feelings expressed by respondents in response to a question about the losses they had suffered as a result of the eruption. In relation to family loss, some respondents lost their entire nuclear family, while others lost only distant relatives. One participant lost five family members because of the eruption and mudflow flooding. Sri Ariyani stated:

> *At a glance I can remember that before the eruption I still had a mother, siblings, and nephew. But now after the eruption…I don't have sister, mother and nephews. I lost five members of my family during the disaster. I admit it's hard to forget this miserable memory. Moreover, my house was also hit by the cold lava flood.*

In addition, most of the survivors lost their livelihood as a result of the eruption. Today, some farmers continue to suffer from a shortage of animal feed and others had to change their farming methods, as their land is still filled with sand and gravel. Thursina noted:

> *The difference is that in the past it's easy to find grass but now it is rather difficult.*

Muningsih stated:

> *It's because of that, back then when you cultivate, you plant on the soil. But now, it is mixed with sand and small rocks. We used to cultivate directly on the soil. If it's hot like this, sometimes some (plants) die. We are supposed to bring water from our homes to water the plants. But it's hot [now].*

In terms of physical problems, some respondents, mainly mothers, complained about their current health and expressed a belief that their children's immunity had decreased since the eruption. A young male respondent complained that he gets sick easily because of the air

pollution from the volcanic dust on the road that flows into the air when vehicles move across the road surface.

Sudaryanto noted:

Before the eruption, I'd never been injected [seeing a doctor] never. But now, it is almost every month every time I feel some health complain I have to go to the doctor immediately.

Muningsih stated:

Well, my child's health was better before the eruption. Yes, my child could go twice in a month [to the doctor]. I rarely had to go then… maybe [every] three months my child catches the flu or something…but now, just now we got back from the public health centre because my child is puked.

There are also reports of mental health disorders, such as memory loss, confusion and social anxiety (i.e., fear of interactions) towards family members or neighbours. Further, one respondent described her neighbour as suffers from stress as a result of the eruption. Waljinah stated:

Yes, there is, my aunt who lives in Jetis Sumur. Her memory is now different, not like it used to be before the eruption. Sometimes, she is afraid of people.

Despite these negative impacts, many respondents experienced a noticeable positive impact, especially economically. The sand produced from the eruption was a blessing in disguise for many of the survivors. One respondent reported that survivors in another hamlet could afford to buy new cars and motorcycles because of their sand mining work. Several respondents also expressed positive feelings after the eruption, as their houses were still intact and it was now easier to make a livelihood. Sri Ariyani explained:

Now in the Banjarsari shelter if you go there later, [you will see] the people seem to have been happy. Their houses are good…they have this or that. Even, those who live

at the upper part now have a car whereas in the past they couldn't buy it, and those who used to have a motorcycle now they have two. At that time, the sand was still abundant, isn't it? In one day, each of them can get no less than IDR 100,000.

The psychosocial impacts experienced by respondents varied in accordance with their experiences during the eruption, the emergency shelters and refugee camps they lived at post eruption and the level of loss they suffered. The impact of the eruption also differed in across age and gender.

Compared to the elderly, adult respondents were more impacted by the eruption because of their breadwinning role in the family and their feelings that they had to meet the needs of family members (including parents). Notably, the adult respondents reported that they found it more difficult to provide for their family because the eruption had led to job losses and workplace change. Further, the adult respondents reported that their hopes and dreams for themselves and their children had been shattered as a result of the eruption; this in turn led to deep feelings of disappointment. These adult respondents had not previously experience Mount Merapi erupting and found coping with their losses very difficult.

Conversely, according to Indonesian culture, an adult's duty to provide for other family members is completed once the children are married. Thus, post eruption the needs of the elderly were not as serious as those experienced by other adult family members. Elderly respondents reported that their main concerns related to the safety and health of their families and their desire to live safely. Previous experience with other major life events (such as war, poverty and previous eruptions) appears to have made it easier for the elderly respondents to cope with the impact of the 2010 eruption. In addition, the elderly respondents were more sincere in accepting what had happened as being the will of God. Muningsih noted:

If people are still young, they still have a long thought. They keep thinking about the future of their children. In contrast, the elderly will live with their children, so

automatically those who make a living are their children. That's why their minds are more relaxed.

Similarly, Muhammad said:

Because [they are] still young, Miss. Young people usually have a lot of dreams, Oh I [want to] buy a car, [a] motorcycle, because they still can generate more income. Conversely, old man like me is already weak. What else I can think about. I was just thinking about the call of God [laughter].

Yatiman noted:

Because if the adults [thought] will become like this [sic] then how my life runs. I've been old. All of my children have been married. I leave it to God; it is God's will.

Jemima stated:

As an old woman, my mind is just like this, dear. What else I can think about? If it is the will of God, what can I do then, I surrender to God. When God give me, my children, and my grandchildren health, it is enough for me.

A difference arose between the attitudes of middle aged females and middle aged males in relation to dealing with the impact of the volcanic eruption. Middle aged females felt the impact more than middle aged males because they were more concerned with family matters such as their children, life needs, family income and managing the limited income to meet the family needs. In addition to their main duty of supporting the family, they also had the immense responsibility of helping their husbands to derive an income. Previously, a majority of females in the Merapi Mountain area had worked to take care of the farmland; however, due to the environmental damage this was now difficult. Sri Ariyani explained:

Well, before the eruption, we can plant anything in the field including rice. Those who did not have a rice field usually went to the moorland. They could take coconuts or woods to be sold. But now? Nothing can be sold because the land has been destroyed.

A husband may feel enough only with this livelihood but not a wife. She will be thinking how to take care of her kids, but she can no longer grow crops.

Jemima stated:

A wife would think of anything, but the husband can just feel free. A woman usually will think of something using her heart.

Males were less concerned with family matters and more relaxed about dealing with such problems. In this community, the responsibility of males is to make money and the rest is not their concern. Some adult male respondents described the strategies they used to support one another and reduce the impact of the eruption on their health and well being. Yatiman stated:

When I'm out of house for buying rice, I usually get together with friends for chatting. Later it [the sadness] can disappear. By this way, troubles in my mind also disappear slowly. The women rarely chat while getting together with their women friends, while it is common for men. I can meet friends in Prambanan or in Pakem, and then we talk each other about our lives. By this way, later it [the sadness] disappears gradually.

The 2010 Mount Merapi volcanic eruption caused extensive and severe environmental damage. Some of the environmental changes were discussed by respondents and included: hotter temperatures, a lot of dust, damaged roads, barren land and a river level that is now higher than the surface level of the village.

The damaged environment also had an impact on the affection that some of the respondents felt for the environment. Indeed, some respondents reported that their love of Merapi Mountain has changed or decreased as a result of the environmental damage. They also reported that decreases in the value of their properties had resulted in feelings of fear.

Sri Ariyani stated:

A little bit reduced [the love]. In the past, this place was used to be [sic] a park, and others. Even the price of land here was used to be [sic] expensive. Land on the side of the roads might cost up to 500 [thousand IDR] per meter. Now who wants to buy it? Of course, no one. Now people are afraid to buy the land here even though the price has gone down about half times...even more.

Warseno answered:

[Has] my love for Merapi [lessened]? yes it does. I liken the environment around Merapi to a beautiful garden but it is now so barren and damaged. So, my love for the natural environment of Merapi has been kind of changed.

However, the majority of respondents stated that their love for the mountain had not faded because of the eruption or the damage to the environment. They believed that one day nature would be restored. They also felt an emotional bond with Merapi Mountain that continued to sustains them. Thursina said:

I still love it, because all of this is the will of God.

Kemala stated:

It does not diminish my love for Merapi. Whether Merapi will recover or not, it is His [Allah's] will. Although Merapi is not recovered as usual, I remain grateful. If there is no longer [a disaster], I would stay tranquilly at my home.

Similarly, Muningsih said:

No, it doesn't change, because this [is] the place where I was born.

In relation to the environmental changes, some adult respondents expressed feelings of misery concern, fear and horror and upset due to environmental changes such as the dusty, damaged and crowed roads. Elderly respondents, however, were not as troubled by the resulting environmental changes, as they rarely left their homes.

Yatiman stated:

Yes, what I see now is [the dust] really… That's because there is no rain. But for me it does not matter. In the dry season [like now] the situation is usually like that—a lot of dust, the soil drying up, the plants withering, it's a usual thing. If that road has a lot of dust, I will use this road. If there are some trucks crossing the road, I will wait until the trucks pass by. So, there is no problem for me.

Respondent who were presently working and used the road frequently were more aware of the disruption caused by the environmental damage. When commuting to work they experienced damaged roads and delays due to trucks carrying loads of sand and excess volcanic dust away. Not only did these environmental factors add time to the daily commute of workers, they also led to feelings frustration in relation to the post-disaster environment. Respondents who did not work (such as housewives, elderly or retired) were less aware of the effects of the environmental damage.

Educated and uneducated respondents also had different points of view on the impact of the environmental damage. Educated respondents usually held better jobs; thus, they had a chance to visit other places and compare these places to their home and were more aware of the damage that had occurred. They also have better knowledge about the impacts and consequences of the environmental degradation they were experiencing; for example, the impact of dust on health and the risk of accidents due to damaged roads. Additionally, they had extensive networks from which to obtain information and could engage in related actions. Conversely, the uneducated respondents, most of whom were elderly, only knew the condition of their surrounding environment and did not have any knowledge or awareness of the dangers that they might encounter as a result of the environmental impact.

Sumawarni noted:

Educated people are knowledgeable so they must be thinking about the impacts—we also sometimes try to find out what we do not know. For example, this happens because of what, after this what will happen, etc. Definitely, their sense of anxiety will be greater. Meanwhile, uneducated people will think in a simple way—when a mount erupts, that's the way it is.

Warseno stated:

Yes, educated people automatically have rather extensive experience. In contrast, people who are not educated at all only know the environment around them.

5.4 Chapter Summary

This chapter presented the findings of the qualitative study in two sections: the lived experience and the impact of the eruption. The first section addressed the third research question; that is, 'What is the experience of living in the shadow of a very active volcano?'. The second section answered the questions that arose from the quantitative data and thus provided a clarification and deeper understanding of the results.

Some important findings can be drawn from the qualitative component of the study. First, before the eruption, the respondents felt a strong sense of place related to their connection with Mount Merapi. This feeling continued throughout their relocations and remains very strong today. Consequently, respondents reported a sense of displacement when they were evacuated and relocated. Further, despite their adverse situations, the respondents reported that they continued to love and wished to keep living in the Mount Merapi area. This strong connection affected how respondents reacted to the eruption and its impact. Second, the 2010 Mount Merapi eruption resulted in the survivors experiencing multiple losses and psychological problems such as PTSD. Conversely, the environmental degradation that occurred as a result of the eruption triggered physical health problems and solastalgia.

The next chapter presents the integration and discussion of the data for both phases of the research. It also provides an explanation of and support for the key findings arising from this study.

Chapter 6: Integration and Discussion of Results

6.1 Introduction

This chapter presents the integrated results of this mixed methods study. The results are presented in three tables that each address one of the key research questions. The quantitative results provide evidence to support the negative impact of natural disasters on the psychosocial health of survivors. In particular, they indicate a significant level of PTSD and environmental distress in survivors. The qualitative findings offer an explanation of the quantitative results, including factors that influence the post-traumatic stress and environmental distress experienced by survivors. They also provide insight into the experience of individuals living through and surviving a volcanic eruption.

6.2 Integration of Results

As detailed Chapter 3, the nature of the integration undertaken in this research study provides a more comprehensive picture of the results of this mixed methods study. A higher level of conceptual analysis is made possible through the collection, integration and interpretation of both quantitative and qualitative data.

The technique of joint display or side-by-side comparison (Creswell and Plano Clark (2011) is used to present the results in this study, such that the quantitative and qualitative are presented together as a further method of integration. This technique helps to identify similarities and expose contradictions in the results of the two methods of data analysis. It also provides an opportunity to interpret at and discuss the results.

6.2.1 The psychosocial impact of the Mount Merapi eruption on survivors.

This section addresses the integrated results of the first research question ‘How has the eruption of Mount Merapi affected the psychosocial health of people who live near the volcano?’ (see Table 6.1).

Table 6.1

Comparison of Information from the Survey and Interviews Related to Research Question 1.

Quantitative	Qualitative
a. Respondents from Cangkringan had a higher level of PTSD than those from Pakem. Median and IQR scores of the I-IES-R for Cangkringan and Pakem respondents were 17 (11–29) and 13 (8–19), respectively; p <0.001.	Respondents reported psychosocial health disturbances among their family or neighbours: *Some got angry easily. Well, maybe due to decreasing income, their health also worsened...then perhaps [when] they cultivated something, they ask why it [the condition] is like this and that. Sometimes because of the heat, some harvests failed. And now we have to cultivate from zero. We have to clear the land [first]. Then, trucks, for example, they use roads like their own sake. That makes us angry.*—Muningsih, adult respondent. *Well, there were some [having a condition].Once there was an old man who was shocked, got sick and then finally died.*—Puri, adult respondent.
b. Cangkringan respondents had greater feelings of intrusion compared to Pakem respondents. Median and IQR scores of the I-IES-R intrusion element for Cangkringan and Pakem respondents were 5 (2–10) and 3 (1–7), respectively; p =0.001.	Respondents reported having flashbacks and frightening thoughts: *I am so afraid of the hazard, I still remember that time. Every time I look at my moorland that was devastated and suddenly I remember it [the eruption night]. I am so afraid and worried that it will happen again.*—Kalista, adult respondent.
c. Cangkringan respondents had greater feelings of hyperarousal than Pakem respondents. Median and IQR scores of the I-IES-R hyperarousal element for Cangkringan and Pakem respondents were 4 (3–7) and 4 (2–8), respectively; p =0.003.	Cangkringan respondents still live in fear of the eruption and are fearful of further eruptions: *That's the condition now. If there is a noisy sound in the evening I am frightened. I'm still frightened now, still scared [laughter].*—Tursina, adult respondent.

d. Adult respondents (aged 18 to 59 years) had higher scores of PTSD than the elderly respondents (60 years and above). Median 18, IQR (12–28) for adults and Median 12, IQR (8–18) for the elderly; p <0.001.	Three themes related to age emerged from the qualitative findings. <u>Hope and desire</u> *Young respondents were concerned about their responsibilities such as the future of their children.*—Muningsih, adult respondent. *For the elderly like me, we don't want to think much. For me, I will surrender to God. That's what I am thinking of. I only pray that God please give me, my children and my grandchildren health; for me that is enough.*—Jemima, elderly respondent. <u>Role and responsibility</u> *Young people felt more impact as they have a high responsibility towards their children and family members and financial responsibility for the family.*—Ponty, elderly respondent. *The elderly will live with their children, so automatically those who make a living are their children. That's why their minds are more relaxed.*—Muningsih, adult respondent. <u>Life experience and coping</u> *Well, the elderly have often experienced difficulties… in the old times they have experienced difficulties so they are ready, while the younger people have only experienced it this once. We have only been suffering this once [laughter], but the elderly have suffered before.*—Muningsih, adult respondent.

e. Women had a higher risk of PTSD than men. Median 17, IQR (12–26) for women and Median 13, IQR (8–19) for men; p <0.001.	Two themes emerged from the results: <u>Role and concern</u> *It is the women who take care of their children, and then they also have to work, and with the situation like now where they should earn a living, that's what they are thinking of.*—Kasima, adult respondent. *The woman will think of other things. If the man does something like earning a living he will give the money to the women, but he will not think the way the woman thinks. The woman will think of how to manage the money for all their needs...Well, what should I do, this will be used for school fees, for paying this and that. Then, they will think about children, about school, about giving money on a particular occasion, and about that kind of thing. But the man will not. The man will only think it is enough (if they work).*—Kemala, elderly respondent. <u>Emotional status and coping</u> *Well, maybe a woman's mind is narrower than that of a man. Their heart is smaller*.—Thursina, adult respondent. *When I'm out of house for buying rice, I usually get together with friends for chatting. Later, it [the sadness] can disappear. In this way, troubles in my mind also disappear slowly. The women rarely chat while getting together with their women friends, while it is common for men. I can meet friends in Prambanan or in Pakem, and then we talk to each other about our lives. In this way, later it [the sadness] disappears gradually*.—Yatiman, elderly respondent.

IQR: Inter Quartile Range

The results of the I-IES-R survey conducted in the quantitative phase indicate that respondents living in the areas most severely affected by the eruption (i.e., Cangkringan) had the highest levels of PTSD (as compared to respondents living in Pakem). The qualitative findings confirmed this result, as the interviews revealed symptoms such as shock, emotional disorders, prolonged grief and disruptions of social relationships experienced by family members or neighbours. Thus, residents of Cangkringan reported significant levels of psychosocial distress as a result of the 2010 Mount Merapi eruption.

Previous research on the impact of natural disasters reports significant levels of PTSD in survivors (Ali Farooq, Bhatti, & Kuroiwa, 2012; Chan et al., 2012; Naeem et al., 2011; Paranjothy et al., 2011; Xu & Liao, 2011; Zhou et al., 2013). This has been consistently observed across different types of natural disasters (Norris, Friedman et al., 2002; Galea et al., 2005; Neria et al., 2008; Warsini, West et al., 2014). As expected, the results of this study support the findings of previous studies on volcanic disaster; for example, PTSD has been reported among survivors of volcanic eruptions from Mount Unzen and Mount Miyake, Japan (Araki, Nakane, Ohta, & Kawasaki, 1998; Goto et al., 2006; Omori, 2012); Mount Ruapehu, New Zealand (Becker Smith, Johnston, & Munro, 2001; Ronan, 1997); Mount Pinatubo, Philippines (Howard, et al., 1999), Mount St Helen, USA (Shore, Tatum, & Vollmer, 1986) and Mount Eyjafjallajokull, Iceland (Carlsen et al., 2012). Given that this is the first study to investigate PTSD in the survivors of volcanic eruptions in Indonesia, the results are very important and serve as a basis for future research on disasters and mental health, particularly in relation to the survivors of volcanic eruptions.

The results of the survey also showed that the scores for the intrusion and hyperarousal element of the I-IES-R were higher for survivors living in disaster-prone areas than for those living in a less disaster-prone area. The results showed that two years after the Mount Merapi eruption, Cangkringan residents were still troubled by the memory of the 2010 eruption and still experienced feelings of anxiety.

This study does not discuss the responses associated with the avoidance item of the I-IES-R, as in the interviews the respondents did not mention any behaviours that reflected avoidance, such as the avoidance of anything that could remind them of the eruption, feelings of emptiness or depression, loss of interest in an activity that was once fun or difficulty in remembering something related to the disaster. Notably, avoidance behaviour appeared to be less dominant, as seen in the majority of Cangkringan residents.

The interviews revealed that two years after the eruption, respondents continued to have negative thoughts in relation to Mount Merapi, including fears that it might suddenly erupt. Of the 12 adult respondents interviewed, eight reported experiences of continuing trauma and fear related to the eruption; however, other respondents indicated that they were no longer frightened or stressed about the volcano. Some respondents revealed that they could recall the events of the night of the eruption in the form of visual imagery, a sense of heat or a specific smell. This occurred when something triggered their memory of the incident (e.g., talk or news about the eruption or the volcanic activity of Mount Merapi increasing). Some respondents also stated that they experienced difficulty sleeping, restlessness and tension if Mount Merapi had any increased activity. Both the survey and interview results clearly show that some respondents had chronic PTSD. This is consistent with the results of a longitudinal research conducted on the survivors of the Armero volcanic eruption in Colombia (Lima et al., 1993) where the emotional distress levels of survivors remained high or increased two years after the eruption and decreased after five years.

There are at least two main reasons why some three years after the volcanic eruption Cangkringan residents continue to experience PTSD (or chronic PTSD). First, they had experienced a severely traumatic event and prolonged distress associated with repeated stressors. As the qualitative results shows, a majority of the adult survivors remained at their houses the night of eruption due to a low level awareness of the need to evacuate or miscommunication. The experience of saving themselves and witnessing the death of others was very traumatic and difficult to forget. The results of the meta-analysis also showed that a life-threatening traumatic experience or perceived severity of trauma is the most powerful predictor of chronic PTSD (Brewin et al., 2000; Ozer et al., 2003). Norris, Friedman et al., (2002) found that severity of trauma was the most powerful predictor of PTSD in research of hurricane and flood’s survivors across three countries (the USA, Mexico and Poland).

Following the disaster, residents of Cangkringan experienced dangerous and harmful ongoing stressors. Compared to Pakem residents who only experienced the initial eruption stressor, Cangkringan residents experienced various repeated stressors after the eruption; for example, in the first four months after the eruption, there were at least four huge, life-threatening cold lava floods as well as frequent volcanic activity. Second, residents of Cangkringan also suffered a greater loss compared to Pakem residents; not only did they lose family members and their houses; they also lost their livelihood and neighbourhood. Additionally, Cangkringan residents had a greater proximal and distal exposure to the stressor (Bonano, Galea, Bucciarelli, & Vlahov, 2007). Proximal exposure is an event and its consequences experienced during the disaster phase; distal exposure occurs after the disaster (Bonanno et al., 2007).

The results of this study are consistent with Brewin's (2000) meta-analysis that showed that the factors felt during and after a trauma are more powerful in causing PTSD than other factors such as gender, age and race. In addition to social support, additional or ongoing stresses are among the most powerful post-trauma factors leading to PTSD and chronic PTSD.

The I-IES-R survey also generated other important information. According to the multivariate analysis, age, gender and home ownership status are factors that affected the I-IES-R scores. During the interviews, the researcher tried to explore the reasons for this; respondents were asked their opinion about differences in age and gender in relation to the impact of the eruption. Some respondents of Pakem did not own their homes (i.e., were renting); however, the issue of home ownership was not investigated, as the respondents in Cangkringan were all homeowners (i.e., not renting). Thus, a comparison could not be made.

The first factor found to influence survivors' levels of PTSD was age. The adult respondents (aged 18 to 59 years) felt the psychosocial impact of the eruption more strongly

than the elderly respondents (60 years and older). Three major themes were derived from the qualitative analysis to explain the survey results: hope and desire, role and responsibility, and life experiences and coping. These themes are interrelated despite their differences.

There are two sub-themes within the hope and desire theme; that is, hope and desire for the future and a readiness to die. All the adult respondents interviewed indicated that they have many hopes and desires for their lives, many things they wish to do and that many of their desires have not been fulfilled. They think deeply about the future of their family, how they will continue to live and where they will live. They also think about what will happen to their children, especially in relation to education; for example, whether their children will be able to continue their studies following the disaster and they will pay for this. Conversely, the hopes of the elderly respondents were simple, they wished to see their grandchildren healthy and happy. They did not have any ambitions any other than getting closer to God and preparing for death. They expressed feeling that they were already old, had experienced the ups and downs of life and that their achievements made them unafraid of death.

The second theme derived from the results was role and responsibility. The adult respondents held an important role in their families, both for their children and their elderly parents. Their primary role was as breadwinner and they were responsible for all the needs of their dependents. Post-disaster circumstances affected their livelihoods and made it increasingly difficult for them to fulfil their roles and responsibilities. Conversely, the elderly respondents thought that they had completed their role of providing for the family. Some elderly respondents were dependent on their children; however, others still worked with their spouse to meet their own needs. In any event, the burden of the elderly respondents had decreased significantly and they had become more relaxed.

The last theme derived from the results was life experience and coping. The volcanic eruption was the first bitter experience felt by many of the adult respondents and left them

shocked and confused about how they should adapt. They suffered a psychological blow as many properties they had developed in the area had suddenly disappeared and the government had not yet built any replacement buildings (except for housing). The adult respondents were unable to deal with these losses and unpleasant experiences. Conversely, the elderly respondents has experienced a number of unpleasant events during their lives such as disasters, war, plague and poverty and these events had taught them how to respond to losses and trials.

The adult respondents in this study were affected more significantly by the volcanic eruption and were at higher risk of PTSD than the elderly respondents due to issues related to the demands of their role in the family and the stressors they continued to experiences following the eruption. Similarly, Bonanno et al., (2007) found that the prevalence of chronic PTSD was threefold higher in adults than the elderly.

To summarise the results and meta-analyses of several studies (Kato et al., 1996; Brewin et al., 2000; Lazaratou et al., 2008; Cherry et al., 2010; Nomura et al., 2010), adults are more vulnerable to PTSD than the elderly for a variety of reasons. First, they are more exposed to traumatic experiences and suffer from prolonged distress after a disaster, such as loss of livelihood (Brewin et al., 2000). Second, their social role as an agent of change and breadwinner (Mosher & Danoff-Burg, 2006) also creates stress.

A previous paper on the I-IES-R survey results (Chapter 4, Warsini, Buettner et al., 2015a) debates the use of Eysenck's (1983) inoculation theory and Thompson, Norris and Hanacek's (1993) burden of perspective. The themes that emerged from the qualitative analysis (i.e., life experience and role and responsibility) support the application of both theories. Both theories have been used to compare the results the burden of disasters on the elderly and adults. These theories assert that the elderly cope better following disaster as they

have already experienced hardships in their life. Conversely, adults felt a greater impact following a disaster due to their family and social roles.

The study also showed that gender was another factor that contributed to the psychosocial impact experienced by the survivors of the 2010 Merapi eruption; women felt the psychosocial impact more deeply than men. Two major themes generated from the qualitative analysis to explain this are role and concern and emotional status and coping. In relation to the theme of role and concern, women experienced significant impact after the 2010 Mount Merapi eruption because of their status as housewives, workers on the family farm and sand miners. In Indonesia, similar to the women of Aceh who survived a tsunami, the women felt obliged to work to add to the family income (Pelupessy, Bretherton, & Ride, 2011). Following the eruption, the damaged land and paddy fields made this burden heavier for women, as they suffered losses to their livelihood. Research on flood survivors in Ghana and Bangladesh (Aboagye, 2012; Sultana & Thompson, 2008) found that women who lost their livelihoods as a result of a natural disaster had difficulty finding jobs afterwards because of their low level of education. Loss of livelihood is one of the predictors of PTSD (Bonano et al., 2007). Sultana (2010) stated that disasters are detrimental to women in terms of access to employment, acquiring different roles as a result of the disaster and the life stress caused following the disaster.

Amid uncertain post-disaster employment conditions, women also play an additional role as the caregiver for injured or ill family members. The demand of this social role increases their burden of life stressors (Tolin & Foa, 2006). Many studies have shown that women experience more chronic stress due to daily household roles and tasks than men (Lee, 2001; Matud, 2004; McDonough & Walters, 2001; Oman & King, 2000).

The women of Mount Merapi bear a heavy burden, as they not only take care of their families, but also help provide an income for the family. Conversely, the men of Mount

Merapi are able to focus on their primary role as breadwinner and their obligations are met when they give their earnings to their wives. The issue of whether the money earned is sufficient is not their concern.

The second theme is emotional status and coping. Studies have shown that women are more reactive to feeling fear and danger than men, both in laboratory experiments (Inslicht et al., 2013) and in general (Karanci, Alkan, Aksit, Sucuoglu, & Balta, 1999). Fear conditioning is a predictor of psychological distress (Norris, Foster & Weisshass, 2002). Several studies have found that women are more likely to report depression (Stein & Nyamathi, 1999; Tolin & Breslau, 2007), anxiety and somatic complaints (Tolin & Breslau, 2007) than men.

Tolin and Foa (2002) and Cromer and Smith (2010) have argued that women tend to see the world as a source of danger and feel guilty over the traumatic incidents they suffer. This negative cognition towards the external environment and self is an important factor affecting the severity of PTSD symptoms (Cromer & Smith, 2010). In addition, the idea that women are weaker and more vulnerable to trauma (Tolin & Foa, 2006), more sensitive (Crabtree, 2013) and more emotional than men (Compas et al., 1999) is believed not only by men, but also by some women.

6.2.2 Environmental distress as a result of environmental damage caused by the 2010 Mount Merapi eruption.

This mixed methods research examined the applicability of environmental distress and the concept of solastalgia in natural disaster situations using a volcanic eruption as an example. Previous studies on volcanic disasters provide strong evidence that volcanic eruptions can lead survivors to developing psychological distress. However, no previous evidence existed to suggest that volcanic eruptions lead to psychosocial distress due to the environmental destruction caused by these eruptions. The integrated results from the second research question are set out in Table 6.2.

Table 6.2

Comparison of Information from Survey and Interviews for Research Question 2

Quantitative	Qualitative
a. Respondents who lived in Cangkringan felt worse environmental distress than respondents who lived in Pakem. Mean and standard deviation score for Cangkringan and Pakem respondents were 15.8 ± 1.6 and 14.6 ± 1.3, respectively; p<0.001.	Respondents expressed various feelings such as misery, sadness, concern and fear due to the environmental degradation caused by the 2010 eruption. *Well, I find it very difficult...if want to go home, I have no house any more. I have nothing because all the livestock disappeared. When I see all those things, when we can get it fully recovered as it used to be*.—Waljinah, adult respondent. *Yes, of course, I feel so uncomfortable...Imagine...this is Banjarsari shelter, whenever we have something to do at the sub-district, the road to get there is so (terrible). That's why I feel so annoyed*.—Warseno, adult respondent. *I just feel sad. The market used to be so close, but now it's far and through a dusty road. The dust didn't use to [sic] be that (thick)*.—Muningsih, adult respondent.
b. Cangkringan respondents had a greater level of solastalgia than Pakem respondents. Mean and standard deviation score for Cangkringan and Pakem respondents were 33 ± 4.9 and 30.9 ± 4.0, respectively; p=0.001.	Most of respondents indicate that their love towards Mount Merapi remains the same as it was before the eruption. *It does not diminish my love for Merapi. Whether Merapi will recover or not, it is His [Allah's] will. Although Merapi is not recovered as usual, I remain grateful. If there is no longer [a disaster], I would stay tranquilly at my home*.¯Kemala, adult respondent. A small number of respondents (i.e., 4) reported that their love towards Mount Merapi has decreased. *A little bit reduced [the love]. In the past, this place was used to be made to a park, and others. Even the price of land here was used to be expensive. Land on the side of the roads might cost up to 500 [thousand IDR] per meter. Now who wants to buy it? Of course no one. Now people are afraid to buy the land here even though the price has gone down about half times...even more*.—Sri Ariyani, adult respondent.

	[Has] my love for Merapi [lessened]?, yes it does. I liken the environment around Merapi to a beautiful garden but it is now so barren and damaged. So, my love for the natural environment of Merapi has been kind of changed.—Warseno, adult respondent.
c. Factors affecting survivors' feelings of environmental distress are age, education level and employment status. The observed element score of I-EDS for adult, employed, and educated respondents was higher than that of elderly, unemployed and uneducated respondents. Mean and standard deviation score for adult and elderly respondents were 26.3 ± 2.7 and 25.2 ± 3.2, respectively; p=0.001. Mean and standard deviation score for employed and unemployed respondents were 26.0 ± 2.9 and 25.1 ± 3.2, respectively; p=0.013. Mean and standard deviation score for educated and uneducated respondents were 26.1 ± 2.8 and 24.9 ± 3.2, respectively; p=0.001.	Three themes explained this quantitative result: <u>Exposure</u> *Well, the working person must be out of the house, so that he knows [well] how is the surrounding, knows that place is like this, this place is like this. Maybe that's the reason*.—Sumawarni, adult respondent. *Only those who stay at home can get rid of dust, not going anywhere, suffering from the heat like this*.—Waljinah, adult respondent.
The impact element score of I-EDS of adult and educated respondents was higher than that of elderly and uneducated respondents. Mean and standard deviation score for adult and elderly respondents were 82.4 ± 9.4 and 76.2 ± 9.5, respectively; p<0.001.	<u>Disturbance</u> *Well, it's also because of the heavy machines…freight trucks cause traffic jams during the commute to work… it also damages the roads, and causes potholes. It slows them [people who travel] down, the commute becomes longer…and in the morning, although it is cold but whether or not they want to, they have to go to work early*.—Muningsih, adult respondent.

Mean and standard deviation score for educated and uneducated respondents were 80.8 ± 9.9 and 76.9 ± 9.4, respectively; p =0.001.	
The threat element score of I-EDS of adult and educated respondents were higher than that of elderly and uneducated respondents. Mean and standard deviation score for adult and elderly respondents were 29.2 ± 7.1 and 23.9 ± 6.6, respectively; p<0.001. Mean and standard deviation score for educated and uneducated respondents were 28.2 ± 6.8 and 23.5 ± 6.5, respectively; p<0.001.	<u>Knowledge and awareness</u> *Educated person must have a vast knowledge, right, so that he will think about the impacts. We know that very well. Educated persons sometimes try to find something they don't know. For example, what is the reason for this, how about tomorrow, it must be that way. So, they find themselves more alert.*—Sumawarni, adult respondent.

The results of the qualitative analysis showed that the feelings of respondents related to the environmental damage caused by the volcanic eruption. These feelings included being disturbed, horrified, concerned and sad. Many respondents were amazed by the environmental changes and wondered whether the environment would return to what it had been previously. Such feelings illustrate that the survivors of the volcanic eruption, particularly in Cangkringan, experienced emotional distress caused by environmental damage.

This study provides evidence to support the notion that environmental distress is not only applicable to man-made disasters, climate change and modernisation, but also to natural disasters. Large-scale eruptions cause environmental damage that can affect physical, psychological and economic health, this in turn can leads to a decrease in feelings love of and

a sense of belonging to the environment. Continuing to live in a damaged environment can lead to environmental distress being manifested in miserable, sad and stressful feelings.

Cox and Perry (2011) conducted a study in relation to environmental damage caused by natural disasters to identify the effect of social capital and place attachment on distress caused by environmental damage. Their research was conducted after the 2003 firestorm disaster in Canada. Quantitative instruments were not used; rather a qualitative approach was adopted. They found that some respondents felt a deep sadness seeing the environment where they lived turned into charcoal. Feelings of distress appeared when they returned to the damaged environment and tried to rebuild. This research did not gather any statistical data; however, the evidence of the qualitative findings was strong and indicated and identified the feelings of individuals in relation to environmental distress.

The current research is the first to investigate environmental distress in natural disasters using both a quantitative (i.e., the EDS survey instrument) and qualitative (i.e., interviews) approach; that is, a mixed methods approach. Previous climate change research by Cunsolo Willox et al., (2012) also used mixed methods, but did provide limited information about the survey results. Consequently, it was difficult to compare the results of this research with other studies on natural and other disasters.

In this study, some respondents, mainly adults, testified that their love for Mount Merapi had decreased as a result of the environmental damage. They thought that Mount Merapi was not as beautiful as it used to be and, additionally, the environmental damage made it difficult to earn a living to support their families. They were also concerned about the risk of volcanic eruptions in the future. This is evidence that some survivors of the Mount Merapi eruption felt solastalgia and feelings that the mountain where they lived no longer provided peace and supported their needs.

Solastalgia is a prominent concept in environmental distress feelings. It has three important tenements: feelings of losing peace and a decrease in a sense of belonging or love for the environment; feeling powerless to change and control the situation; and a loss of a comfortable or proper life in the neighbourhood (Albrecht, 2009; Tschakert & Tutu, 2010). Evidence of solastalgia in relation to the survivors of the Mount Merapi eruption can be seen in the results of the qualitative analysis (see Chapter 5). Several respondents admitted that their love of Merapi had been disrupted by the current situation. They reported that they could not do much and had 'given up' on restoring the environment. They also felt unable to control the situation because everything that happened was God's will.

This research is also the first to reveal the predictive factors of environmental distress. Previous researchers using the EDS (Cunsolo Willox et al., 2012; Higginbotham et al., 2007) did not compare the levels of community distress in relation to individual characteristics such as age, gender, education level and employment. Further research studies with different settings and populations are needed to examine the factors that affect the levels of environmental distress.

The results from the I-EDS survey concluded that age, education and employment status were three factors that affected survivors' feelings of environmental distress. In the context of this study, these three factors were interrelated. Respondents belonging to the adult age group (i.e., aged 18–59 years old) had usually gained some formal education (i.e., at least at primary school). Further, respondents who had an educational experience tended to have a wider range of alternative jobs than those who had never attended school. Thus, these three factors are discussed together. It should be noted that in this research, work is defined as any activity that generates money, even if the work is not permanent or there is no regular salary or income and certain standards are not met; for example, a young mother who worked on her own farm or as a sand miner in the river was categorised as being a worker.

The qualitative analysis of respondents' interviews generated at least two major themes that may explain the differences between the two groups in relation to environmental damage. The first theme is exposure and disturbance. Working and educated adults are more mobile than the elderly. This is due to their physical health, demand for work and ease of using available transportation. The high mobility of adults may expose this group to more environmental damage and this exposure may lead to adults feeling the negative impacts of the environmental damage more profoundly. The working adult group mostly complained about disruptions to their travel due to the road damage caused by the eruption and exacerbated by the high activity of trucks spreading volcanic dust and causing increased congestion. Working adults also felt that these disturbances affected their work and they needed more time to prepare for travel, more patience for the increased congestion and a greater awareness when driving due to the heavy machinery and trucks using the roads. They felt that these factors consumed their energy before and after their real work activities.

The situation in other groups was vastly different. The elderly, unemployed, and uneducated did not use highway facilities. Further, their declining physical health, lack of access to transportation and no longer working meant that they spent more time at home. This unemployed and uneducated group was also dominated by housewives who stayed at home to take care of children. Their routines revolved around the house and they were less exposed to the environmental damage and its negative impact. In addition, they had limited knowledge of the environmental damage, as their scope of travel is limited to the local neighbourhood in which they live. Unsurprisingly, they did not take the environmental damage into consideration.

The second theme is knowledge and awareness. Respondents in the group of working and educated adults thought more deeply about the risks that could arise from the environmental damage. Consequently, they raised their awareness and avoided such risks; for

example, they knew that the state of the damaged roads and the scattered dust could trigger an accident and cause respiratory problems. Thus, they drove more cautiously and used respiratory or surgical masks.

The damaged roads and dust did not worry the elderly respondents. Indeed, they tended to be apathetic about the risks that might arise from the environmental damage. This can be attributed to their level of knowledge, lack of information or sense of acceptance. The majority of elderly respondents did not consider environmental damage to be a problem for their lives, as they thought it was a part of God's determination which had to be accepted whether they liked it or not.

A previous I-EDS paper (Warsini, Buettner et al., 2014a, see Chapter 4) adopted the primary appraisal approach of Lazarus's theory (1991) and briefly discussed why adults who were working and highly educated experienced psychological distress. Factors such as the duration and level of exposure to stressor and the role of adults as breadwinners were connected. This is consistent with the results and the themes from the qualitative analysis. However, the I-EDS paper did not address a survivor's knowledge and awareness of threats (hazards). This is one of the themes from the qualitative findings.

According to Reser (2007), the perspective of stress due to environmental damage caused by natural disasters can also be understood by using the psychological stress to trauma standpoint. One theory used to explain environmental distress is Lazarus's (1991) model of the coping process. This model is based on a theory of psychological stress originally developed by Lazarus in 1966. It has been the subject of repeated developments and improvements (Krohne, 2001). Using this model, a researcher can explain all the predictive factors of environmental distress (e.g., age, status of employment and education level) obtained through the quantitative and qualitative analyses.

The stressor in this research was environmental damage. Under this model, an individual experiences the stressor and the first process of assessment occurs (i.e., primary appraisal). Two processes occur in this phase: (i) individuals assess the significance of the stressor or the situation for themselves; and (ii) individuals classify the stressor as already harming (i.e., loss/harm), potentially threatening or challenging/ unimportant (Lazarus & Folkman, 1984; Sincero, 2012). In classifying the stressor, the following three primary components of assessment are considered: relevance of purpose, fitness for purpose and the type of ego involved (Krohne, 2001).

In this research, adult and the elderly respondents had different primary assessments of the impact of the volcanic eruption and environmental damage. Adult respondents perceived stressor harms that could potentially threaten their survival; however, the elderly did not feel the existence of a threat or felt it less. For individuals who do not feel any threat, the assessment process stops and stress is not experienced. The theme of the qualitative findings that explain this stage is exposure and disturbance.

If, however, the stress assessment process continues to the secondary assessment (appraisal) stage, individuals assess their ability to cope with the stressors using the coping strategies they have (Krohne, 2001). There are three components in the secondary assessment: (i) who is responsible for an action; (ii) the extent of their expectations to cope with stress; and (iii) potential coping skills. These components are a parameter of whether or not stress occurs and, if so, the level of stress present. At this level, one subgroup of adult respondents met the criteria of the secondary assessment component. Adults who worked and had a better educational background experienced worse psychological distress as a result of environmental damage. This is because such adults are considered socially able to take action to repair the damage and have higher expectations, but have not had any previous experience

of coping or dealing with these problems. The qualitative theme found in this research is knowledge and awareness.

Knowledge and awareness are factors that can affect an individual's response to a threat that is potentially harmful and causes stress. According to Lazarus and Smith (1988), knowledge and appraisal are forms of cognition. Knowledge can affect the evaluations an individual makes. An individual may know of the existence of hazards through a variety of ways (e.g., education, mass media and other people). The knowledge of a threat from environmental damage (e.g., flying dust, damaged roads, barren agricultural land containing much gravel) is then clarified or discussed in social relationships (Reser, 2007). Given the aforementioned description, it is clear that a group with considerable knowledge and deep awareness is young individuals with better educational backgrounds.

The results of the I-EDS survey also supported the hypothesis that levels of solastalgia are influenced by place attachment. The value of both variables had a negative correlation; however, the final interpretation indicated a positive (parallel) association. Such that, higher place attachment scores were correlated with lower solastalgia scores. However, as the interpretation of solastalgia contrasts with the value, the correct interpretation of this correlation is as follows: the higher one's place attachment to the environment, the higher the level of their perceived solastalgia. In this research, respondents living in the most area most severely damaged by the volcanic eruption (i.e., Cangkringan) had a lower sense of place attachment due to the volcanic eruption and environmental changes. Consequently, their solastalgia levels were also strong. Conversely, respondents living in the area least severely damaged by the 2010 Mount Merapi volcanic eruption, but most frequently damaged by the previous eruptions (i.e., Pakem) had a higher sense of place attachment and worse feelings of solastalgia.

If both place attachment and solastalgia variables are combined with the impact variable, it can be concluded that there is a correlation between damage impact, place attachment and solastalgia. The greater the negative impact perceived due to environmental damage, the lower the level of place attachment and the higher the level of solastalgia.

There is no standard parameter to compare the level of environmental distress in this research with the results of previous studies (Higginbotham et al., 2007; Cunsolo Willox et al., 2012); however, it can be concluded from these research findings that the degree of distress experienced by the survivors of the Mount Merapi volcanic eruption is different to that experienced by respondents in other research studies. Further, the degree of distress and feelings of solastalgia experienced by survivors of natural disasters is less than that experienced by survivors of the mining industry, drought, climate change and the impact of uncontrolled development. The argument proposed to explain these differences relates to the factors that affect the severity of environmental distress and solastalgia, including: (i) benefit from the damage experienced; (ii) decrease in social networks; (iii) expectations; (iv) self-evaluation of the ability to adapt and control the situation; and (v) human acceptance levels in relation to types of environmental damage.

In this research, respondents identified benefits of the volcanic eruption such as future soil fertility and subsequent environmental damage (i.e., the sand). This is consistent with Grattan and Torrence's (2010) description of the benefits of a volcanic eruption. However, in previous non-natural disaster research, researchers have been unable to identify the advantages (i.e., benefits) perceived by respondents as a result of changes or environmental damage. A majority of these research studies have addressed the environmental damage caused by climate change and the mining industry and related disadvantages such negative physical and psychological health (Connor, Albrecht, Higginbotham, Freeman, & Smith,

2004; Cunsolo Willox et al., 2012; Higginbotham et al., 2007; Jardine et al., 2007) and economic impacts (Cunsolo Willox et al., 2012; Fraser et al., 2005).

Research on farmers living in dry farmland due to high salinity (Jardine et al., 2007) and individuals experiencing climate change in Canada (Cunsolo Willox et al., 2012, 2013) indicated a common result; that is, a decrease in social networks was found among respondents due to damage to public facilities and many residents decided to move when they were no longer able to adapt to the damaged environment. According to Fraser et al. (2005), a decrease in social networks can affect a community's mental health status. These findings contrast with this the results of Cox and Perry's (2011) research. In fact, respondents in Cox & Perry (2011) study reported an increase in social relationships as a result of disaster.

There is also a striking difference in research results on natural disasters in other settings in relation to the expectations of individuals, inability to adapt and ability to control the situation. Researchers investigating feelings of environmental distress due to climate change (Cunsolo Willox et al., 2012, 2013; Tschakert & Tutu, 2010), the mining industry (Connor et al., 2004; Fraser et al., 2005; Higginbotham et al., 2007), barren agricultural land due to high salinity (Jardine et al., 2007; Speldewinde Cook, Davies, & Weinstein, 2009; Van Haaften, Zhenrong, & Van de Vijver, 2004) and uncontrolled development or modernisation (Van Haaften & Van de Vijver, 1996, 1999, 2003) concluded that respondents experienced an inability to cope with environmental change and felt frustrated with life in their communities. Feelings of hopelessness and an inability to improve or restore the environment were reflected by the decisions of respondents to move or migrate to other places (this can be seen as coping through avoidance). Moving is a strategy to mitigate such feelings when individuals feel no hope of surviving in an uncertain situation and that the environment on which they previously depended can no longer support them and provide safety or security.

In Cox and Perry's (2011) study, respondents expressed optimism that the environment would recover and may even be better than it had been previously. They still believed that the environment in which they lived could sustain them. The coping strategies adopted by respondents in both studies (Warsini, Buettner et al 2014a; Cox & Perry, 2011) to reduce the negative impacts they experienced due to environment changes can be classified as adaptive (Lazarus, 1993).

Respondents in studies on natural disasters and other settings (Connor et al., 2004; Higginbotham et al., 2007; Cunsolo Willox et al., 2012) noted their inability to control the situation. However, in research on natural disasters, respondents expressed a belief that there would be a time when the damage naturally stopped. Conversely, respondents in other settings (e.g., climate change, modernisation and the mining industry) noted that the damage would be progressive unless some fundamental and massive action was undertaken.

The level of public acceptance for environmental damage caused by natural and non-natural disasters might also influence levels of environmental distress. If considered in relation to the types of hazard, volcanoes are natural hazard, drought and climate change are meteorological hazards and industrial pollution is a technological hazard (UNISDR, 2002, 2004). Generally, public anger at environmental damage caused by natural hazards (e.g., volcanic eruptions, earthquakes and tsunamis) is lower because these are seen as unpreventable, acts of God. However, individuals have a different acceptance of disasters caused by other hazards if human carelessness is a contributing factor (Reser, 2007). Experts believe that climate change is occurring as a result of a natural processes, human activity and lifestyle (UNISDR, 2002; 2004). When environmental damage occurs because of technological hazards, individuals tend to respond with rage and non-acceptance, as these disasters are often preventable, caused by human mistakes, impact on nature and can cause harm. Future research should use the same instrument to compare differences in the level of

psychological distress of individuals in relation to environmental damage caused by natural disasters and in other settings.

6.2.3 A survivor's experience of living in Merapi.

The qualitative research findings of this study considered the experience of respondents living on Mount Merapi at the time of the eruption. It was found that these villagers had a very close connection with Mount Merapi, as it was their birthplace. This bond also extended to the people they lived with and the local community. Moreover, Mount Merapi has magnificent scenery and abundant natural resources that supported their livelihood. These results were similar to findings of Christia (2012), who investigated the lived experience of survivors in another city (i.e., Magelang). Evidence from both studies indicates that individuals who live in the Merapi area share a strong sense of place, a close relationship with the community and a high dependency on the environment.

When displaced by the volcanic eruption, respondents felt separated from their homes and wanted to return to the mountain and their communities to rebuild their lives, regardless of the impact of the eruption. Survivors of the 2010 Mount Merapi eruption from Krinjing also experienced this phenomenon (Christia, 2012); they reported feelings of alienation and boredom when they had to live in a refugee camp. Despite the availability of basic goods supplied by the local government to refugee shelters, the survivors insisted on going back to their homes to continue their daily activities. In fact, as there was no significant damage to their village, they returned to the village of their own accord only two days after the eruption.

Residents of Cangkringan tried to rebuild their lives that were devastated by the eruption and strengthened their relationship with Merapi soon after they returned to their villages. However, subsequent multiple adversities, such as mudflow flood disasters, environmental destruction and living difficulties after the eruption, worsened their distress and challenged their love for Mount Merapi. In time, they reconnected with the mountain,

viewed the disaster positively and learnt some lessons from the event. Similar findings were also reported in other studies (Christia, 2012; Subandi, Achmad, Kurniati, Febri, 2014). The integrated results correlated with the lived experience research question are set out in the following table.

Table 6.3

Comparison of Information from Surveys and Interviews for Research Question 3

Quantitative	Qualitative
a. Respondents from Cangkringan had a lower sense of place attachment than respondents from Pakem due to the eruption and its environmental degradation. Mean and standard deviation score for Cangkringan and Pakem respondents were 39.7 ± 3.1 and 40.5 ± 3.0 respectively; p=0.014.	Respondents voiced a very strong connection to and love for the Mount Merapi. *I'm also happy because this is an inherited land from my father and then my grandmother, so to leave it is difficult to do. It's been ingrained you know, [since] my parents and I were born here*.—Mariam, adult respondent.
b. Cangkringan respondents had a higher risk of PTSD and worse environmental distress than Pakem respondents, Median and IQR scores of I-IES-R for Cangkringan and Pakem respondents were 17 (11–29) and 13 (8–19), respectively; p<0.001. Mean and standard deviation score of I-EDS for Cangkringan and Pakem respondents were 15.8 ± 1.6 and 14.6 ± 1.3, respectively; p <0.001.	The majority of respondents felt resilient about the 2010 Mount Merapi volcanic eruption and its environmental degradation for three reasons: place attachment, social bonding and support, and spirituality. <u>Place attachment</u> *I have told you before sister, because this is the place where I was born, here is my home, if I have to move, where I should move? I am accustomed to it. I feel calm now, just calm down. In every four years whether it is big or small, Merapi will work [erupt], it has to work*.— Yatiman, elderly respondent.

	Social bonding and support (Social capital) Respondents reported that they did not feel too sad as their neighbours shared the same fate with them. *When I saw my neighbours' houses on my right or left, they were devastated, therefore I didn't feel sad. All suffered from it.*—Kasima, elderly respondent. *It wasn't me alone who faced this; all my friends [neighbours] did. Let it be, that's the Greatest (God's) will.*—Kalista, adult respondent. Respondents reported that they had some help from their neighbours; their neighbours became their support system. *Yes, they only my neighbour [sic]…when I went back from refugee camp, I've been asked to stay here [neighbour's house]. "You stay here grandma, don't flee again. If your [new] house is being built, you can move to the east [to the new house]"*.—Kemala, elderly respondent. *If we live closer with our neighbours, we feel so happy….Anyhow, it feels like they are our family*.—Kasima, elderly respondent.
	Spirituality *The one who changed this [situation, environment] isn't human...therefore we just complied with it...It is not humans who did this but God who has Merapi did. That's why we only have to comply with it. It is very hard, very very hard…the only thing we can do is just move away, just move somewhere else*. —Jemima, elderly respondent.

The quantitative results reveal that the level of place attachment felt by Cangkringan respondent was significantly lower than that of Pakem respondents. This is understandable given that the survey data were collected some two years after the eruption and its impact was still being experienced by the Cangkringan respondents. Unlike residents of Cangkringan, residents of Pakem did not feel any impact from the 2010 volcanic eruption; thus, it is natural that residents of Cangkringan would feel a lower level of bonding with Mount Merapi. Their

relationship or love of Merapi was tested as a result of their losses, the environmental damage and the increasing challenges of continuing life post eruption.

Notably, the findings of the qualitative research differ to the survey results. The interviews were conducted some seven months after the survey when Cangkringan respondents indicated that their bond with Mount Merapi remained strong. It appears that however eruption impacted on them; it did not reduce their love for Mount Merapi.

The integrated results indicate that the Cangkringan respondents were at a higher risk of PTSD and emotional distress than Pakem respondents. However, the interviews showed that in general the respondents were strong in facing the results of the volcanic eruption and environmental damage. The majority of respondents were able to deal with the event well, without experiencing stress and even took positive lessons from the experience. In the literature, this ability to overcome hardship is called resilience (Oxford Dictionaries, 2014). Resilience has different definitions across different disciplines. However, in this research, resilience was applied in the context of trauma or disaster and defined as the ability of an individual or community to adapt to threatening circumstances or suffering and to recover quickly using all the skills and resources they have (Paton & Johnston, 2001).

Previously, resilience has been referred to as bouncing back; however, this term is no longer used and has been replaced with the expression bouncing forward (Paton & Johnston, 2001; Ride & Betherton, 2011). An individual or community that experiences a traumatic event (in this case a disaster) cannot return to their previous circumstances. Bouncing forward refers to the ability of survivors to adapt to a circumstance better than their previous circumstance.

Resilience is not the same as recovery and resistance. Recovery means to recover or return to the original state (i.e., before trauma) (Bonanno et al., 2007; Crabtree, 2013; Maguire & Hagan, 2007). Conversely, resistance implies a static condition or the absence of

changes in the capacity of an individual to encounter difficulty before and after the disaster (Norris, Tracy, & Galea, 2009). The condition of resilient individuals shortly after the trauma could be worse than before the trauma, but these individuals will eventually recover quickly and even adapt better afterwards.

Resilience can be present in a small (individual) or larger (societal) context (Ride & Betherton, 2011). A resilient community does not mean a group of resilient individuals as described above (Ride & Betherton, 2011); however, there is a process of networking within the community that can be used as tools to adapt (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008). Aguirre (2006) argued that the following are signs of a resilient community: ability to anticipate problems before a disaster occurs, recovering from the shock of a disaster occurring, being innovative in responding to disasters and taking lessons from what occurred.

In this research, the reasons why survivors were individually and collectively resilient in facing the traumatic event were identified. Place attachment, social bonding and support and also spirituality affect an individual's level of resilience. Additionally, community resilience in this research was influenced by social capital. Social capital is a factor that affects the community's resilience and includes a sense of community, place attachment, community participation, network structure and social support (Norris et al., 2008). Social capital is a broader concept that consists of social bonding, social support and social networks. The results of this research showed that Mount Merapi residents had good social capital in relation the 2010 volcanic and thus were resilient.

During the interviews, some respondents stated that they were resilient in the face of the disaster and tried to continue living in their damaged village because of their love for the village. They realised that the eruption was not the mountain's fault and putting blame on the mountain was unwise. Like any relationship, there were good times and bad times. Living in

harmony with Mount Merapi was the best choice they could make. When Mount Merapi was sleeping, they could live comfortably on the mountain; however, when the activity of Mount Merapi increased, they had to be fully alert and cooperative to evacuate to a safe place and return when the situation was safe.

Several researchers have argued that place attachment is one of the factors that makes survivors immediately rise from adversity and protects them from a state of psychological stress. In research on Hurricane Katrina survivors in the Ninth Ward (New Orleans, USA), Chamlee-Wright and Storr (2009) found that although the residents experienced disasters repeatedly that damaged their houses, they still persevered and rebuilt their neighbourhood. This is consistent with research conducted in Australia on the survivors of flooding due to climate change (Boon, 2014) and bushfires (Cox & Holmes, 2000; Cox & Perry, 2011); their love of the environment in which they lived was an important factor in enabling them to endure, survive and be resilient to disasters.

Place attachment can make an individual resilient in encountering post-disaster stressors because it not only influences affective (feelings and responses), but also drives behaviours and action. Place attachment is a feeling of love for the environment where one lives that increases one's commitment to continue living there and is realised by rebuilding the neighbourhood (Dekel & Tuval-Mashiach, 2012; Scannel & Gifford, 2010).

Factors related to available social bonding and support also led to Cangkringan respondents recovering swiftly post disaster. As described in the interviews, the residents of Mount Merapi had a very close relationship with the surrounding environment and community. This strong bond is one of the sources of support for the residents of Mount Merapi that helped them to manage their grief for the loss suffered in the eruption. Realising that they were not the only one who experienced the disaster and that they had the support of their community made it easier for them to accept the loss and adapt more quickly to the

situation. Social bonding is a sense of mutual trust and belonging between members of the community; it also includes mutual concern and shared values (Perkins & Long, 2002). Often referred to as a sense of community, social bonding has been proved to be a factor that affects the levels of resilience in violence survivors (Ahmed, Seedat, Van Niekerk, & Bulbulia, 2004) and flood survivors (Boon, 2014).

Even during the emergency response phase, considerable assistance flowed, including food, clothing, health care and other services. This helped respondents greatly, especially when they were living in refugee camps. This assistance was also evident during the reconstruction phase, when many people from different areas worked together to rebuild the houses of the Merapi people. These individuals had never met before and had no kinship or friendship; however, when disaster struck, they responsively provided their assistance to the survivors. This proves that social support in the Merapi community is very strong.

The research of Besser and Neria (2012) and Binder, Baker, Mayer and O'Donnell (2014) showed that following trauma, poor social support is one of the causes of PTSD. However, many studies have shown that providing good social support to individuals and communities can reduce the risk of PTSD in survivors of terrorism (Bonanno, Galea, Bucciarelli, & Vlahov., 2006), war (King, King, Fairbank, Keane, & Adams, 1998), violence (Ahmed et al., 2004) and earthquakes (Ali et al., 2012; Altindag & Ozen, 2005; Ehring, Razik, & Emmelkamp, 2011; Naeem et al., 2011; Pérez-Sales, Cervellon, Vazquez, Vidales, & Gaborit, 2005). In meta-analyses and reviews conducted by Brewin et al. (2000), Ozer et al. (2003), and Norris et al. (2009), social support was found to be a very strong determinant of PTSD development or resilience following traumatic events. By definition, social support is a mutually beneficial relationship between members of society, in which people feel loved, cared for and able to obtain real help to improve their closeness to the existing social system (Hobfoll & Stokes, 1988). Based on this definition, Norris, Murphy, Kaniasty, Perilla, and

Ortis (2001) developed three components of social support: received support, perceived support and social closeness. Received social support is further divided into: emotional, informational and material support (Bonanno, Brewin, Kaniasty, & La Greca, 2010; Kaniasty & Norris, 2000).

Lepore, Evans, and Schneider. (1991) investigated the role of social support in reducing psychological distress. Social support can be a factor that lowers stress (i.e., a moderator), as well as a mediator of the occurrence of psychological distress and chronic stress (Lepore et al., 1991). The research of Lepore et al. (1991) also showed that in the acute phase (i.e., two months after the trauma) social support can be seen as a coping resource coming from within a stable individual or environment that directly affects states of stress, but (if influenced by other factors) can also be turned into something more dynamic that mediates the further psychological distress in the chronic phase (i.e., within 8 months of the trauma).

Social network is a proven factor that influences the occurrence of PTSD and resilience within the scope of the wider community. Research on American Samoan citizens who experienced a tsunami (Binder et al., 2014) and snow storm survivors in Kashmir (Margoob Khan, Firdosi, Sheikh, & Shaukat, 2006) showed that PTSD developed because of the poor level of social networks in the emergency response period and post-disaster recovery. Comparatively, survivors who had a good social network rose and recovered faster from the impact of disasters (Aboagye, 2012). The current study demonstrated that good relationships existed between fellow residents of Mount Merapi, local and central governments and non-government organisations, who all worked together to address the impact of the eruption in the recovery and rehabilitation phase. In summary, there is evidence that Merapi people have a strong social capital as they have a strong social bonding, social support and social network which enable them to recover swiftly from the eruption impacts.

Finally, due to their spirituality residents of Mount Merapi were also resilient in accepting the disaster and immediately living a positive life. As a Muslim-majority society, they believed that the disaster was a test from God to His servants, that passing this test would lift their honour higher and that they had to accept the destiny appointed by God and enthusiastically live their lives, despite the bitterness. They also believed that there is a blessing in disguise in all miseries and that rejecting God's destiny is a vanity, as is despair (in Islam, despair is prohibited).

A similar feeling of spirituality was found in other research conducted on Mount Merapi residents (Christia, 2012; Subandi et al., 2014). As a result of experiencing the 2010 Mount Merapi volcanic eruption, respondents felt closer to God and became more religious and sincere. After experiencing various events (such as the eruption and cold lava floods) and witnessing the environmental damage caused by the disaster, respondents realised that the power of humans was nothing compared to the power of God. This made them aware of the God who creates, maintains and manages everything and pushed them to carry out God's command by worshipping Him and performing good deeds for fellow human beings.

Spirituality is often equated with religiosity; however, while these are two different terminologies, both are coping resources used by individuals to address the life issues (Mattis & Watson, 2008). Religiosity is the obedience of individuals to something that is believed and displayed in religious practice behaviours that aim to worship God (Mattis & Watson, 2008). Spirituality is a broader concept of a belief in something that has greater strength, relationships with fellow creatures of God and nature and gives dimensions in interpreting something. A profound finding of this research was the ability of individuals to grasp the significance or wisdom of a disaster; this reflected their level of spirituality.

Spirituality and religiosity are sources of resilience; both are sources for individual coping and driving forces to help others (Banerjee & Pyles, 2004). When a person

experiences a traumatic event in their life, their level of spirituality and religiosity directs them to understand what really happened and the wisdom behind the event can strengthen them to continue to survive, not despair and achieve a better life (Pargament, 1997).

Several studies have proven that spirituality is a factor that affects resilience in students (Haddadi & Besharat, 2010) and discriminated African American women in the USA (Banerjee & Pyles, 2004). Some meta-analyses (Ano & Vanconcelles, 2005; Koenig, 2009; Smith, McCullough & Poll, 2003) and disaster research results have also shown that positive religiosity coping affects resilience levels (Fernando & Hebert, 2011; Rajkumar, Premkumar, & Tharyan, 2008). Comparatively, negative religiosity coping (i.e., feelings of being punished and ignored by God) is associated with more severe levels of PTSD. This has been evidenced in the research on earthquake survivors in Pakistan (Feder et al., 2013) and Italy (Stratta et al., 2013).

Hopelessness has been found to be a characteristic of individuals who develop PTSD (Peres, Moreira-Almeida, Nasello, & Koenig, 2007). Conversely, hopefulness is a characteristic tendency towards improvement. Hopefulness has been found to be a source of strength in the female survivors of tsunami and Hurricane Katrina (Fernando & Herbert, 2011). Hope and the purpose of life are elements of spirituality coping. In this research, the survivors of the eruption reflected the elements of spirituality.

6.3 Chapter Summary

This chapter has presented and discussed the integrated results of this mixed methods research. The results showed that the quantitative and qualitative studies were well connected. Some of the qualitative findings provided further clarification and explanation for the quantitative results. Further, the findings about lived experience provided insight into how individuals cope with psychosocial environmental distress resulting from a volcanic eruption.

Chapter 7 concludes the thesis. It identifies the strengths and limitations of the research and outlines a series of recommendations for policy, practice, education and further research.

Chapter 7: Conclusion and Recommendations

7.1 Introduction

This chapter presents the conclusion, strengths and limitations of the study and proposes recommendations from the research. An assessment of the validity of this mixed methods research is provided and the chapter concludes with a note of self-reflection in relation to the experiences of conducting a research study such as this.

The study: (i) investigated the psychosocial impacts of the 2010 Mount Merapi eruption; (ii) measured the level of environmental distress of survivors as a result of living in an environment damaged by the eruption; and (iii) explored the experience of residents living near a highly active volcano and in an environment damaged by a volcanic eruption.

The results showed that surviving a volcanic eruption leads to a high level of psychosocial distress with many individuals in the most affected community displaying significant levels of PTSD. In addition, there was a high incidence of environmental distress among the individuals living closest to the environmental disaster area created by the volcanic eruption. The PTSD experienced by survivors varied with age, gender and home ownership status. The qualitative findings linked to predictive factors revealed the following themes: (i) hope and desire; (ii) role and responsibility; and (iii) life experiences and coping. In relation to gender, themes included: (i) role and concern; and (ii) emotional status and coping. Factors that affected survivors' level of environmental distress, age, education level and employment status were linked to the following themes: (i) exposure; (ii) disturbance; and (iii) knowledge and awareness. Three themes emerged from the phenomenological analysis of interviews to understand the experience of surviving a volcanic eruption: (i) connectivity; (ii) dislocation; and (iii) reconnection. These themes reflected lived experiences of respondents who felt emotionally close to a volcanic mountain.

7.2 Recommendations

Several recommendations are proposed that address education, research, practice and policy.

7.2.1 Education.

Accurate and relevant information in relation to the psychosocial impacts of volcanic eruptions is needed for health care providers, especially nurses, to ensure that adequate knowledge exists for the provision of timely assistance to survivors of future volcanic eruptions. Incorporating educational disaster modules into nursing and health related curricula would address specific hazards in environments, such as volcanic eruptions, and equip students with the ability and skills needed to provide both physical treatment and psychological support. Educational institutions have an opportunity to be pioneers in psychosocial disaster care and play a vital role in the dissemination of information in relation to disaster risks and health education to prevent the psychological impacts of disasters.

7.2.2 Practice.

This research showed that various psychosocial problems may be experienced by survivors of a volcanic eruption from the pre-eruption (i.e., increasing volcanic activity) phase to several years after the eruption. Thus, rapid, specific and precise handling of treatment based assessments must be performed to prevent and address the various issues that arise at each phase of the disaster.

Survivors must be provided with mental health care based on comprehensive and valid assessment results. Mental health care providers and students must be trained on how to screen for psychological health disorders post disaster, especially PTSD, using valid and simple instruments.

Social rehabilitation activities are also necessary to enhance the health status of the individuals post eruption. These activities can be performed by using an approach that

combines the three resilient factors of individuals; that is, place attachment, social support and bonding as well as spirituality which are adjusted to the unique values of each society (i.e., local wisdom).

The psychosocial impacts of disasters not only arise directly from the disaster (i.e., at the time of primary impact), but can also occur because of secondary effects. Thus, approaches that improve the ability of health care professionals (such as physicians, psychologists and nurses) to identify, prevent and overcome these problems must be developed.

7.2.3 Further research.

Further research needs to be conducted in different natural disasters settings and in areas prone to natural disasters. A similar research study that employs a baseline measurement is required to establish the significance of psychosocial impacts (i.e., PTSD and environmental distress) following natural disasters.

Further research is also needed to clarify the predictor factors that affect environmental distress feelings and the levels of environmental distress relating to different causes of environmental damage. Additional research is required to establish the correlation patterns of the EDS elements, especially, place attachment, solastalgia and the perceived impacts of environmental change. Further research aimed at developing the I-EDS tool in the context of other natural disasters should also be undertaken. Additionally, in-depth and continuous research needs to be conducted to determine the appropriate cut-off point that shows that an individual is experiencing psychological distress and solastalgia due to environmental change/degradation.

The Indonesian version of the IES-R instrument also needs to be improved in future research, including an amendment to item number 13. Further research also needs to measure

the appropriate cut-off point of the I-IES-R so that the status of PTSD on the research population in Indonesia can be justified as a percentage or proportion value.

7.2.4 Policy.

Local and central governments should consider the relationship between sense of place and society in the future planning and building of temporary shelters and relocation area development policies for volcanic eruption survivors. Governments should select a location for safe temporary shelters that is not too far from Mount Merapi and establish refugee camps based on hamlets or villages. This would provide survivors with a sense of their previous environment and reduce feelings of isolation. Governments must also consider possible relocation places in terms of geographical location, available facilities and the social proximity of the community. Ideally, individuals should be relocated close to Mount Merapi, but at a safe distance from harm. Assigning accommodation on the basis of hamlets and equipping families with proper facilities is also vital for positive psychosocial outcomes.

Based on the results of this research, place attachment is a double-edged sword. It can serve as a motivating factor for individuals to be resilient; however, it also poses a significant risk that individuals may be reluctant to be evacuated and relocated. Thus, a multi-dimension approach is required to direct the sense of place attachment individuals feel in a positive and safe direction. This approach must consider not only community values (such as religious, social and cultural beliefs), but also the safety of the community and a harmonious relationship between the community and local government. Accordingly, this approach should be made by multi-disciplined group consisting of cultural observers, sociologists, spiritual leaders and representatives from the government and community.

The government also needs to pay more attention to the needs of their citizens, who mostly work as farmers and ranchers during the recovery period post disaster. The government and its related institutions need to invent farming technique modifications in

accordance with the condition of the land post eruption, so that farmers can still derive incomes from their farms. In addition, it is necessary to provide for individuals who were originally stock-farmers; thus, facilities of separated shared cattle sheds should be provided not far from the residential area. This is important as for farmers and stock-farmers their livelihood is something inherent in their self-identity.

It is also imperative that the national government, especially the Ministry of Health, develop strategies or programmes aimed at lowering the risk of women experiencing post-disaster psychosocial impacts, including health education programmes on stress management, training and capital assistance for self-employed individuals and the establishment of self-help groups (as a source of social support for problems encountered due to the disaster).

In relation to the impact of economic problems (i.e., housing and livelihood) on the post-disaster psychological condition of individuals, the government needs to provide programmes for survivors, such as funding assistance for children's education, medical expense subsidies, road improvement for accelerating economic flows and working capital loans. Such programmes will assist societies in making a quick, economic recovery.

7.3 Strengths of the Study

This research was the first to: (i) identify the psychosocial impacts (i.e., PTSD) that arose as result of the 2010 Mount Merapi eruption; (ii) test the concept of solastalgia on the survivors of natural disasters; and (iii) describe the lived experience of surviving Mount Merapi's volcanic eruption. Only one other study has considered the lived experience of Mount Merapi survivors (Christia, 2012). Christia (2012) conducted a study with the Krinjing society of Magelang Regency; however, the scope of Christia's study was narrow, as it only involved the residents of one village and only discussed the lived experience of survivors during and post eruption.

This research employed a sequential explanatory mixed methods approach. It has been shown that mixed methods produce stronger evidence and richer explanations than any one approach can offer (Creswell & Plano Clark, 2011). A good mixed methods research design must be able to stand-alone; this also makes it possible to publish research sections separately and meet the criteria for good research (Creswell & Plano Clark, 2007). The methods of this study met the standards required for rigorous research and incorporated all the steps recommended to ensure valid and reliable results. Before the survey was implemented, the instruments went through a process of translation (using the recommended approach) and were subjected to a series of pilot tests and test re-test psychometric evaluations. Very large samples and strong sampling methods were applied in the quantitative phase of the research; while in the qualitative research phase the interviewed respondents were assessed to ensure they met all the required characteristics (i.e., respondents had high and low scores of I-IES-R and I-EDS with different genders and age groups).

A number of significant articles were published as this research was conducted. These articles were submitted to high-impact, quality journals and received peer review. As a result, the research was critiqued and developed further as a result of these critiques. In addition, a number of conference presentations were delivered at professional associations. These too resulted in the research being further developed and refined.

7.4 Study Limitations

This research has some weaknesses, including in respect of the instruments used. The I-IES-R instrument used in this research was found to be a valid and reliable tool for detecting PTSD; however, the ‘gold standard’ for measuring PTSD remains a clinical examination performed by an expert using the DSM. As clinical examinations would not have been realistic in the current study, the I-IES-R was determined to be next best tool to measure PTSD. Notably, the IES-R is commonly used for that exact purpose.

There were no baseline measurements of I-EDS or I-IES-R. Thus, the researcher was unable to compare the survey results with previous results and could not conclude whether there were any significant differences in the survivors' psychosocial health status before or post eruption. In addition, in the absence of a cut of point for both measurement instruments, the researcher could not objectively state the results of respondents' experience of PTSD and environmental distress in proportion or percentage terms.

Survey data were collected two years after the eruption. Possible psychosocial impacts experienced by respondents were assumed to be lower than that of the results performed at an earlier date. In addition, there was a period seven months between the first and following data collection phases. During this period, respondents' conditions might have changed. However, given the richness of the interview data collected, the study appears to have captured the essence of the experiences.

As this research was applied in only one area of Indonesia, the generalisability of the results is affected. Thus, similar studies or studies in different natural disasters settings and in countries other than Indonesia are required.

7.5 Study Validity

Like other research methods, mixed methods research also has validity standards that must be met to ensure the quality of research produced. In addition to having to meet the standards of validity at each research phase (quantitative and qualitative) (Creswell & Plano Clark, 2011; Giddings & Grant, 2009), a high-quality mixed methods research must also meet specific validity standards for mixed methods research (Creswell & Plano Clark, 2011; Onwuegbuzie & Johnson, 2006). Several methods have been suggested to assess mixed methods research (Creswell & Plano Clark, 2011; Giddings & Grant, 2009; Teddlie & Tashakkori, 2003). In this study, the researcher utilised the comprehensive and detailed

validity standards developed by Onwuegbuzie and Johnson (2006) to assess the extent to which this research met the specified criteria (see Table 7.1).

Table 7.1

Types of Mixed Methods Legitimation by Onwuegbuzie and Johnson (2006, p. 57)

Legitimation type	**Description from current research (a sequential explanatory mixed methods study of the psychosocial and environmental distress resulting from the 2010 Mount Merapi eruption)**
Sample integration	• Samples in the qualitative phase of the research were obtained from respondents who had been involved in the quantitative phase. • For the qualitative research, efforts were made to find respondents who had diverse characteristics of age (i.e., adult and elderly), gender (i.e., male and female) as well as having diverse scores (i.e., high, low). This was done to minimise bias in drawing generalised conclusions and inferences and increase the possibility of population transferability. • The results of the quantitative research served as the basis for the development of the interview guide for the qualitative phase
Inside-outside	• In the research, the outsider idea was justified via a peer review strategy to test the accuracy of the analysis and interpretation of data. The researcher involved a colleague who had skills and experience in the process of qualitative research analysis and who was familiar with the topic in question to oversee the data collection and analysis phase. In addition, the researcher also involved other research team members (i.e., supervisors) to assure the accuracy of interpretations and conclusions. • The researcher did not, however, conduct member checking related analysis of results due to time and distance constraints.
Weakness minimisation	• The weakness of this research is the limitation that quantitative research has to explain a phenomenon; for example, the results of the multivariate analysis provided several predictive factors, but gave no explanation or answer as to why certain factors affect the psychosocial impact. Through the qualitative research, the researcher was able to address these issues. • The sample size in the qualitative phase of the research comprised of approximately 20 respondents; however, the technique of stratification in the sample selection and the saturation techniques in the data collection were considered sufficient to minimise any bias that might arise in the qualitative data. This weakness was also addressed by the strength of sampling conducted in the quantitative research.
Sequential	• In this research, a sequential explanatory design was deemed ideal

	to understand the particular issues and uncover the desired research objectives. The quantitative research aimed at identifying the existence and extent of a problem and testing variables related to the problem. Further, qualitative research was conducted to explore the identified problems.
Conversion	• The quantification of figures was not addressed in the qualitative phase; however, the researcher did attempt to weigh themes to justify the main theme that emerged from the results. This was done with care particularly for the predictor factors themes.
Mixing paradigm	• Since the beginning stage of the research, the researcher believed that a pragmatic approach was the most appropriate approach to answer the complex research questions of this research. The researcher also treated this research as a continuum; that is, the researcher tried to place herself within the paradigm. During the integration process, the researcher also continuously paid attention to the rules for combining the results of both research approaches.
Commensurability	• The study involved the collection of both quantitative and qualitative data. The researcher always referred to the rules on how to treat the data based on the requirements of each approach. To achieve commensurability during the process of integrating the results, the researcher also tried to keep checking the data in each process to produce valid and expected results.
Multiple validities	• In each process for both phases (i.e., quantitative and qualitative), the researcher paid attention to how to obtain valid results and to meet the validity criteria of the research; for example, for the quantitative components the researcher conducted both measurement validity and design validity. The researcher demonstrated that the integrated results successfully provided a clearer, more convincing and valid picture than if the research results were delivered separately. Through the integration process, the researcher realised the importance of the techniques for integrating and combining both results. The integrated results were at times contradictory; however, they aroused the curiosity of the researcher to find out the reasons for these differences.
Political	• One of the benefits of mixed methods research is that the integration of results produces clear, accurate and valid results that support the development of recommendations, some of which may hopefully help in resolving the identified research problems.

7.6 Self-reflection on the Past Two and a Half Years of Study and Research

The following notes were written as a self-evaluation and reflection about doing a doctoral course in an English-speaking country. This reflection is made solely to describe the

intellectual process and values of professionalism that developed throughout the process of study and research.

I have discovered that conducting research is many things: fun, challenging and draining at times for both body and mind. However, I have also found the process to be highly satisfying and I am now well equipped with the skills and knowledge required to conduct robust research.

Initially, my interest in statistics and mathematics meant I had a tendency to lean towards quantitative research and would thus avoid going out of my comfort zone into a qualitative world. Seeking approval to conduct a mixed methods study was very daunting; however, a PhD is designed to make us step out of our comfort zones and, following discussions with my principal supervisor, I was motivated because I realised that I would learn a lot from this research process.

During the quantitative phase of the research, I felt great enthusiasm and my knowledge and skills increased by conducting valid research that included the process of modifying, translating and testing instruments, calculating samples, sampling techniques and analysing data. Challenges emerged in the qualitative research phase (which began by conducting interviews, transcribing data and coding). I was fully aware that I came from outside the Merapi community, that I came from a different socioeconomic level to the respondents and that I had a poor command of the Javanese language. Preparing and practicing were vital if I were to succeed. I took steps such as practicing interviews, approaching respondents before the interviews were conducted and asking for help from research assistants who had a good command of Javanese. When transcribing the data, I trained myself to listen, write and understand simultaneously. This also taught me to have empathy for the work that qualitative researchers (including my future students) perform with such ease.

Personally, the most mind-draining and challenging experience of the qualitative process was coding; this took the most amount of time. It was very tiring and frustrating at times and yet a valuable experience. A moment of excitement came when I saw the unique answers that qualitative research produced; answers that could have been obtained from statistical testing.

My last challenge was to integrate the results of both research paradigms. However, this is where the essence of mixed methods research shines through and provides a complete and comprehensive explanation of the research phenomenon.

One obstacle that I feel I have not fully surpassed is English language skills. Perhaps, I am being hard on myself, but I do not feel that I have made the progress I would have liked in terms of writing and speaking in English. However, this only encourages me to prioritise my English language skills to support my capabilities as an educator and researcher in the future.

One of the professional values and skills that I have obtained from this process is the courage and spirit to publish in international journals. I have always encouraged and helped students to publish their research in national journals; yet, ironically, prior to this research, I never written a journal article for my own research. Previously, I did not believe that I was capable of writing and publishing such varied articles. Of course, all of this occurred thanks to the encouragement, support and cooperation of my supervisors. This process taught me the importance of perseverance and thoroughness when writing and, of course, patience and gave me confidence to face rejection from journal editors.

Profoundly and importantly, conducting this research has made me realise and truly understand what happened and was felt by the survivors of the Mount Merapi 2010 eruption. The idea for this research arose from my indignation at the attitudes and behaviours of the Merapi residents when the volcanic activity increased. The media covered their refusal to be

evacuated in a timely manner and their return to their houses even when the status of Mount Merapi remained dangerously high. What were they thinking? I felt they were wrong. In the course of this research process, I realised that their love of Mount Merapi is very deep. It is a love that not only makes them behave in ways that may endanger them, but also makes them survive the difficulties of losing everything. I am now able to understand their response and I hope that others can also understand and respect their values. It is only through understanding and working together that we can truly minimise some of the impacts of future eruptions.

7.7 Summary of Thesis

The objective of this research was to measure the psychosocial impacts experienced by individuals as a result of the 2010 volcanic eruption, explore the environmental damage caused by the eruption and the experience of the community during the eruption. This thesis elaborates on some of the psychosocial impacts arising from natural disasters as well as whether solastalgia can be triggered by damage to environments caused by a volcanic eruption. The thesis includes seven articles that explain the study protocol, the results of the validity measures, the reliability testing of the instruments used and the survey results.

The results of both the quantitative and qualitative research studies and the integration of both sets of research results was presented clearly and in detail. An in-depth discussion of the main findings of this research was also provided. Essentially, this research argues that individuals who live near Mount Merapi developed PTSD and environmental distress, but maintained a very strong relationship with the mountain. The results and discussion of the research revealed implications and recommendations for a range of stakeholders. This research contributes significantly to the development of science, as it considers the evidence for solastalgia in relation to environmental damage caused by natural disasters and makes us recognise the psychosocial impact of disasters both directly (from the eruption), and indirectly (from the environmental damage).

References

Aboagye, D. (2012). Living with familiar hazards: Flood experiences and human vulnerability in Accra, Ghana. *Articulo-Journal of Urban Research*. doi: 10.4000/articulo.2110

Abouzeid, M., Kelsall, H. L., Forbes, A. B., Sim, M. R., & Creamer, M. C. (2012). Posttraumatic stress disorder and hypertension in Australian veterans of the 1991 Gulf War. *Journal of Psychosomatic Research, 72*(1), 33–38. doi: 10.1016/j.jpsychores.2011.08.002

Action for the Rights of Children. (2009). Foundation module 7: Psychosocial support. *ARC Resources Pack*. Retrieved from http://www.arc-online.org

Aguirre, B. E. (2006). *On the concept of resilience*. Unpublished manuscript. University of Delaware, Disaster Research Center. Newark, United States. Retrieved from http://dspace.udel.edu/bitstream/handle/19716/2517/PP%20356%20DSpace%20Ready.pdf?sequence=1

Ahmed, R., Seedat, M., Van Niekerk, A., & Bulbulia, S. (2004). Discerning community resilience in disadvantaged communities in the context of violence and injury prevention. *South African Journal of Psychology, 34*(3), p. 386–408. doi: 10.1177/008124630403400304

Albrecht, G. (2005). 'Solastalgia': A new concept in health and identity. *Philosophy Activism Nature, 3*, 41–55. doi: 10.1080/10398560701701288

Albrecht, G. (2009). *Soliphilia: The antidote to Solastalgia*. Retrieved from http://healthearth.blogspot.com.au/2009/02/soliphilia.html

Albrecht, G., Sartore, G. M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., Pollard, G. (2007). Solastalgia: The distress caused by environmental change.

Australasian Psychiatry, *15* (Supplement), S95–S98. doi: 10.1080/10398560701701288

Ali, M., Farooq, N., Bhatti, M. A., & Kuroiwa, C. (2012). Assessment of prevalence and determinants of posttraumatic stress disorder in survivors of earthquake in Pakistan using Davidson Trauma Scale. *Journal of Affective disorders, 136,* 238–243. doi: 10.1016/j.jad.2011.12.023

Altindag, A., & Ozen, S. (2005). One-year follow-up study of posttraumatic stress disorder among earthquake survivors in Turkey. *Comprehensive Psychiatry*, *46*(5), 328–333. doi: 10.1016/j.comppsych.2005.01.005

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV*. Washington DC: American Psychiatric Association.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. Arlington: American Psychiatric Association.

American Psychiatric Association. (2014a). Highlights of changes from DSM-IV-TR to DSM-5. *American Psychiatric Association: DSM-5 Development.* Retrieved from http://www.dsm5.org/Documents/changes%20from%20dsm-iv-tr%20to%20dsm-5.pdf

American Psychiatric Association. (2014b). Posttraumatic Stress Disorder. *American Psychiatric Association: DSM-5 development.* Retrieved from http://www.dsm5.org/Documents/PTSD%20Fact%20Sheet.pdf

Ano, G. G., & Vasconcelles, E. B. (2005). Religious coping and psychological adjustment to stress: A meta-analysis. *Journal of Clinical Psychology, 61*(4), 461–480. doi: 10.1002/jclp.20049

Araki, K. I., Nakane, Y., Ohta, Y., & Kawasaki, N. (1998). The nature of psychiatric problems among disaster victims. *Psychiatry and Clinical Neurosciences, 52*, S317–S319.

Asian Disaster Reduction Center. (2014). *Disaster information: Indonesia*. Retrieved from http://www.adrc.asia/view_en.php?Style=List&Lang=en&DatabaseContent=en&ID=&NationCode=ALL&Frame=no

Australian Centre for Posttraumatic Mental Health. (2014). *Posttraumatic stress disorder*. Retrieved from http://www.acpmh.unimelb.edu.au/trauma/ptsd.html

Badan Nasional Penanggulangan Bencana & Badan Perencanaan Pembangunan Nasional. (2011). *Rencana aksi rehabilitasi dan rekonstruksi wilayah pascabencana erupsi Gunung Merapi di Provinsi D.I Yogyakarta dan Provinsi Jawa Tengah tahun 2011–2013*.

Badan Nasional Penanggulangan Bencana. (2012). *Baseline kegunungapian Indonesia*. Badan Nasional Penanggulangan Bencana

Banerjee, M. M., & Pyles, L. (2004). Spirituality: A source of resilience for African American women in the era of welfare reform. *Journal of Ethnic and Cultural Diversity in Social Work, 13*(2), 45–70. doi: 10.1300/J051v13n02_03

Baxter, P. J. (2011). Volcanoes and human health. *Encyclopedia of Environmental Health, 672-680.* Retrieved from http://www.sciencedirect.com/science/module/topic/9780124095489/Concept-000042?_si=1&_ct=25

Bazeley, P. (2002). Issues in mixing qualitative and quantitative approaches to research. In R. Buber, J. Gadner, & L. Richards (Eds.), *Applying quantitative methods to marketing management research* (pp. 141–156). Basingstoke, UK: Plagrave Macmillan. Retrieved from http://www.researchsupport.com.au/MMIssues.pdf

Bazeley, P. (2009). Analysing mixed methods research. In S. Andrew, & E. J. Halcomb (Eds.), *Mixed methods research for nursing and health sciences* (pp. 84–118). Oxford: Wiley-Blackwell.

Beck, J. G., Grant, D. M., Read, J. P., Clapp, J. D., Coffey, S. F., Miller, L. M., & Palyo, S. A. (2008). The impact of event scale-revised: Psychometric properties in a sample of motor vehicle accident survivors. *Journal Anxiety Disorder, 22*(2), 187–198. doi: 10.1016/j.janxdis.2007.02.007

Becker, J., Smith, R., Johnston, D., & Munro, A. (2001). Effects of the 1995–1996 Ruapehu eruptions on communities in central North Island, New Zealand, and people's perceptions of volcanic hazards after the event. *Australasian Journal of Disaster and Trauma Studies, 1*. Retrieved from http://www.massey.ac.nz/~trauma/issues/2001-1/becker.htm

Berwick, D. (2005). Broadening the view of evidence-based medicine. *Quality and Safety in Health Care, 14*(5), 315–316. Retrieved from http://br9xy4lf5w.scholar.serialssolutions.com/?sid=google&auinit=DM&aulast=Berwick&atitle=Broadening+the+view+of+evidence-based+medicine&id=pmid:16195561 doi:10.1136/qshc.2005.015669

Besser, A., & Neria, Y. (2012). When home isn't a safe haven: Insecure attachment orientations, perceived social support, and PTSD symptoms among Israeli evacuees under missile threat. *Psychological Trauma: Theory, Research, Practice, and Policy, 4*(1), 34–46. doi: 10.1037/a0017835

Billig, M. (2006). Is my home my castle? Place attachment, risk perception, and religious faith. *Environment and Behavior, 38*(2), 248–265. doi: 10.1177/0013916505277608

Binder, S. B., Baker, C. K., Mayer, J., & O'Donnell, C. R. (2014). Resilience and recovery in American Samoa: A case study of the 2009 South Pacific Tsunami. *Journal of Community Psychology, 42*(7), 799–822. doi: 10.1002/jcop.21654

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & La Greca, A. M. (2010). Weighing the costs of disaster consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest, 11*(1), 1–49. doi: 10.1177/1529100610387086

Bonanno, G. A., Galea, S., Bucciarelli, A., & Vlahov, D. (2006). Psychological resilience after disaster New York City in the aftermath of the September 11th terrorist attack. *Psychological Science, 17*(3), 181–186. doi: 10.1111/j.1467-9280.2006.01682.x

Bonanno, G. A., Galea, S., Bucciarelli, A., & Vlahov, D. (2007). What predicts psychological resilience after disaster? The role of demographics, resources, and life stress. *Journal of Consulting and Clinical Psychology, 75*(5), 671–682. doi: 10.1037/0022-006X.75.5.671

Boon, H. J. (2014). Disaster resilience in a flood-impacted rural Australian town. *Natural Hazards, 71*(1), 683–701. doi: 10.1007/s11069-013-0935-0

Brannen, J., & Halcomb, E. J. (2009). Data collection in mixed methods research. In S. Andrew, & E. J. Halcomb (Eds.), *Mixed methods research for nursing and health sciences* (pp. 67–83). Oxford: Wiley-Blackwell.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The 1996 Detroit area survey of trauma. *Archives of General Psychiatry, 55*(7), 626–632. doi: 10.1001/archpsyc.55.7.626

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology, 68*(5), 748–766. doi: 10.1037//0022-006X.68.5.748

Brown, B. B., Altman, I., & Werner, C. (2012). Place attachment. *International Encyclopedia of Housing and Home*, 183–188. doi: 10.1016/B978-0-08-047163-1.00543-9

Cameron, R. (2009). A sequential mixed model research design: Design, analytical and display issues. *International Journal of Multiple Research Approaches, 3*(2), 140–152. doi: 10.5172/mra.3.2.140

Carlsen, H. K., Gislason, T., Benediktsdottir, B., Kolbeinsson, T. B., Hauksdottir, A., Thorsteinsson, T., & Briem, H. (2012). A survey of early health effects of the Eyjafjallajökull 2010 eruption in Iceland: A population-based study. *BMJ Open, 2*(2), 1-9. doi: 10.1136/bmjopen-2011-000343

Carpenter, C. (2010). Phenomenology and rehabilitation research. In P. Liamputtong (Ed.), *Research methods in health: Foundations for evidence-based practice* (pp. 123–140). Victoria, Australia: Oxford University Press.

Carr, E. C. (2008). Understanding inadequate pain management in the clinical setting: The value of the sequential explanatory mixed method study. *Journal of Clinical Nursing, 18*(1), 124–131. doi: 10.1111/j.1365-2702.2008.02428 j.1467-9280.2006.01682.x

Chamlee-Wright, E., & Storr, V. H. (2009). ‘There’s no place like New Orleans’: Sense of place and community recovery in the Ninth Ward after Hurricane Katrina. *Journal of Urban Affairs, 31*(5), 615–634. doi: 10.1111/j.1467-9906.2009.00479.x

Chan, C. L. W., Wang, C. W., Ho, A. H. Y., Qu, Z. Y., Wang, X. Y., Ran, M.-S., Zhang, X. L. (2012). Symptoms of posttraumatic stress disorder and depression among bereaved and non-bereaved survivors following the 2008 Sichuan earthquake. *Journal of Anxiety Disorders, 26*(6), 673–679. doi: 10.1007/s00520-005-0775-x.

Cherry, K.E., Galea, S., Su, L.J., Welsh, D.A., Jawzinski, S.M., Silva, J.L., Erwin, M.J. (2010). Cognitive and psychosocial consequences of Hurricanes Katrina and Rita among middle-aged, older, and oldest-old adults in the Louisiana Healthy Aging Study (LHAS). *Journal of Applied Social Psychology*, *40*(10), 2463-2487. doi: 10.1111/j.1559-1816.2010.00666.x

Chilcoat, H. D., & Breslau, N. (1998). Investigation of causal pathways between PTSD and drug use disorders. *Addictive Behaviors, 23*(6), 827–840. doi: 10.1016/S0306-4603(98)00069-0

Christia, M. (2012). *Experiences of people affected Merapi eruption in 2010: A qualitative study conducted in Krinjing village Indonesia.* (Master of Philosophy), University of Oslo, Oslo, Norway. Retrieved from http://urn.nb.no/URN:NBN:no-31356

Christianson, S., & Marren, J. (2008). The impact of event scale-revised (IES-R). *Try This: Best Practices in Nursing Care to Older Adults. 19*. Retrieved from http://consultgerirn.com/uploads/File/trythis/try_this_19.pdf

Committee on Recognition and Alleviation of Distress in Laboratory Animals National Research Council of the National Academies. (2008). *Recognition and Alleviation of Distress in Laboratory Animals.* Retrieved from http://www.nap.edu/catalog/11931/recognition-and-alleviation-of-distress-in-laboratory-animals

Compas, B. E., Stoll, M. F., Thomsen, A. H., Oppedisano, G., Epping-Jordan, J. E., & Krag, D. N. (1999). Adjustment to breast cancer: age-related differences in coping and emotional distress. *Breast Cancer Research and Treatment, 54*(3), 195–203. doi: 10.1023/A:1006164928474

Connor, L., Albrecht, G., Higginbotham, N., Freeman, S., & Smith, W. (2004). Environmental change and human health in upper Hunter communities of New South

Wales, Australia. *EcoHealth, 1*(Supplement 2), 47–58. doi:10.1007/s10393-004-0053-2

Cox, H., & Holmes, C. (2000). Loss, healing, and the power of place. *Human Studies, 23*(1), 63–78. doi: 10.1023/A:1005566612706

Cox, R. S., & Perry, K-M. E. (2011). Like a fish out of water: Reconsidering disaster recovery and the role of place and social capital in community disaster resilience. *American Journal of Community Psychology, 48*(3–4), 395–411. doi: 10.1007/s10464-011-9427-0

Crabtree, A. (2013). Questioning psychosocial resilience after flooding and the consequences for disaster risk reduction. *Social Indicators Research, 113*(2), 711–728. doi: 10.1007/s11205-013-0297-8

Creamer, M., & O'Donnell, M. (2002). Post-traumatic stress disorder. *Current Opinion in Psychiatry, 15*(2), 163–168. Retrieved from http://br9xy4lf5w.scholar.serialssolutions.com/?sid=google&auinit=M&aulast=Creamer&atitle=Post-traumatic+stress+disorder&title=Current+opinion+in+psychiatry&volume=15&issue=2&date=2002&spage=163&issn=0951-7367

Creamer, M., Bell, R., & Failla, S. (2003). Psychometric properties of the impact of event scale-revised. *Behaviour Research and Therapy Journal, 41*(12). doi: 10.1016/j.brat.2003.07.010

Creamer, M., Burgess, P., & McFarlane, A. C. (2001). Post-traumatic stress disorder: Findings from the Australian National survey of mental health and well-being. *Psychological Medicine, 31*(7), 1237–1247. doi: 10.1017/S0033291701004287

Creswell, J. W. (2012). *Achieving integration in mixed methods designs: an overview*. Paper presented at the Workshop 'Using mixed methods to optimize dissemination and

implementation of health interventions', Natcher Conference Center, NIH Campus, Bethesda, MD. Retrieved from http://obssr.od.nih.gov/scientific_areas/methodology/mixed_methods_workshop2012/documents/0130%20Challenges%20of%20Integrating%20Qualitative%20and%20Quantitative%20Data%20Part2_Creswell.pdf

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). California: Sage.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. California: Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). California: Sage Publications.

Cromer, L. D., & Smyth, J. M. (2010). Making meaning of trauma: Trauma exposure doesn't tell the whole story. *Journal of Contemporary Psychotherapy, 40*(2), 65–72. doi: 10.1007/s10879-009-9130-8

Cunsolo Willox, A., Harper, S. L., Edge, V. L., Landman, K., Houle, K., & Ford, J. D. (2013). The land enriches the soul: On climatic and environmental change, affect, and emotional health and well-being in Rigolet, Nunatsiavut, Canada. *Emotion, Space and Society, 6*, 14–24. doi: 10.1016/j.emospa.2011.08.005

Cunsolo Willox, A., Harper, S. L., Ford, J. D., Landman, K., Houle, K., & Edge, V. L. (2012). 'From this place and of this place': Climate change, sense of place, and health in Nunatsiavut, Canada. *Social Science and Medicine, 75*(3), 538–547. doi: 10.1016/j.socscimed.2012.03.043

de Jong, J. T. V. M., Komproe, I. H., Ommeren, M. V., El Masri, M., Araya, M., Khaled, N., & Somasundaram, D. (2001). Lifetime events and posttraumatic stress disorder in

four post conflict settings. *The Journal of American Medical Association, 286*(5), 555–562. doi: 10.1001/jama.286.5.555.

Dekel, R., & Tuval-Mashiach, R. (2012). Multiple losses of social resources following collective trauma: The case of the forced relocation from Gush Katif. *Psychological Trauma: Theory, Research, Practice, and Policy, 4*(1), 56-65. doi: 10.1037/a0019912

Department of Economic and Social Affairs Population Division, United Nation. (2013). *World population ageing 2013*. New York: United Nations.

Division of Mental Health, World Health Organization. (1992). *Psychosocial consequences of disasters: Prevention and management.* Retrieved from http://apps.who.int/iris/bitstream/10665/58986/1/WHO_MNH_PSF_91.3_REV.1.pdf

Donatelle, R. J. (2005). *Health: The basics* (6th ed.). Pennsylvania: Pearson/Benjamin Cummings.

Dove, M. R. (2008). Perception of volcanic eruption as agent of change on Merapi volcano, Central Java. *Journal of Volcanology and Geothermal Research, 172*(3), 329–337. doi: 10.1016/j.jvolgeores.2007.12.037

Drew, C. J., Hardman, M. L., & Hosp, J. L. (2007). *Designing and conducting research in education*. Thousand Oaks, California: Sage.

Ehring, T., Razik, S., & Emmelkamp, P. M. (2011). Prevalence and predictors of posttraumatic stress disorder, anxiety, depression, and burnout in Pakistani earthquake recovery workers. *Psychiatry Research, 185*(1-2), 161–166. doi: 10.1016/j.psychres.2009.10.018

Evans, G. W., & Cohen, S. (1987). Environmental stress. In D. Stokols, & I. Altman (Eds.), *Handbook of Environmental Psychology* (Vol. 1, pp. 571–610). New York: John Wiley and Sons.

Eysenck, H. J. (1983). Stress, disease, and personality: The ‘inoculation effect’. In C. L Cooper (Ed.), *Stress research: Issues for the eighties* (pp. 121–146). New York: John Wiley.

Feder, A., Ahmad, S., Lee, E. J., Morgan, J. E., Singh, R., Smith, B. W., & Charney, D. S. (2013). Coping and PTSD symptoms in Pakistani earthquake survivors: Purpose in life, religious coping and social support. *Journal of Affective Disorders, 147*(1–3), 156–163. doi: 10.1016/j.jad.2012.10.027

Feldman, J. N., & Tilling, R. I. (2011). Volcanic eruptions, hazards, and mitigation In P. S. Auerbach (Ed.), *Wilderness medicine* (6th ed.). Philadelphia: Mosby Elsevier. Retrieved from http://jcu.summon.serialssolutions.com/link/0/eLvHCXMwQ4wAIJcHxoTLA0tzY0tdI_AtBYi9c0hlvZsoQ7Kba4izhy6s0ojPTUkG7VPMKQE1SIvjQSv2gY6JNzSND8vPAbosMznetagUsjgk3iOxCrSNKR7YQY_3zYQcYJGfB1WZD5M25_ubd1So4Iaf3Mq7m-YprQu8DAA8V0kZ

Fernando, D. M., & Hebert, B. B. (2011). Resiliency and recovery: Lessons from the Asian Tsunami and Hurricane Katrina. *Journal of Multicultural Counseling and Development, 39*(1), 2–13. doi: 10.1002/j.2161-1912.2011.tb00135.x

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs: Principles and practices. *Health Services Research, 48*(6), 2134–2156. doi: 10.1111/1475-6773.12117

First, M. B., Frances, A., & Pincus, H. A. (2004). *DSM-IV-TR guidebook: The essential companion to the diagnostic statistical manual of mental disorders, fourth edition, text revision.* Arlington, VA: American Psychiatric Publishing Inc.

Fraser, C., Jackson, H., Judd, F., Komiti, A., Robins, G., Murray, G., & Hodgins, G. (2005). Changing places: The impact of rural restructuring on mental health in Australia. *Health and Place, 11*(2), 157–171. doi: 10.1016/j.healthplace.2004.03.003

Friedman, M. J., Resick, P. A., & Keane, T. M. (2007). PTSD: Twenty five years of progress and challenges. In M. J. Friedman, T. M. Keane, & P. A. Resick (Eds.), *Handbook of PTSD: Science and practice* (pp. 3–15). New York: Guilford Press.

Galea, S., Ahern, J., Resnick, H., Kilpatrick, D., Bucuvalas, M., Gold, J., & Vlahov, D. (2002). Psychological sequelae of the September 11 terrorist attacks in New York city. *The New England Journal of Medicine, 346*(13), 982–987. doi: 10.1056/NEJMsa013404

Galea, S., Nandi, A., & Vlahov, D. (2005). The epidemiology of post-traumatic stress disorder after disasters. *Epidemiologic Reviews, 27*(1), 78–91. doi: 10.1093/epirev/mxi003

Gibbs, G. R. (2007). *Analyzing qualitative data*. London: Sage.

Giddings, L., & Grant, B. (2009). From rigour to trustworthiness: Validating mixed methods. In S. Andrew, & E. J. Halcomb (Eds.), *Mixed methods research for nursing and health sciences* (pp. 119–134). Oxford: Wiley-Blackwell.

Giuliani, M. V. (2003). Theory of attachment and place attachment. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories for environmental issues*. Hants: Ashgate Publishing Limited.

Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Hillsdale, N. J. : Lawrence Erlbaum Associates.

Goto, T., Wilson, J. P., Kahana, B., & Slane, S. (2006). The Miyake Island volcano disaster in Japan: Loss, uncertainty, and relocation as predictors of PTSD and depression.

Journal of Applied Social Psychology, 36(8), 2001–2026. doi: 10.1111/j.0021-9029.2006.00091.x

Grant, M., Stewart, S., & Ritchie, E. (2008). Disaster psychiatry. In T. A. Stern, J. F. Rosenbaum, M. Fava, J. Biederman, & S. L. Rauch (Eds.), *Massachusetts General Hospital comprehensive clinical psychiatry*. Philadelphia: Mosby Elsevier.

Grattan, J., & Torrence, R. (2010). Beyond gloom and doom: The long-term consequences of volcanic disasters. In J. Grattan, & R. Torrence (Eds.), *Living under the shadow: Cultural impacts of volcanic eruptions* (1st ed., pp. 1–18). California: Left Coast Press. Retrieved from http://site.ebrary.com/id/10386153?ppg=12.

Grbich, C. (Ed.). (2013). *Phenomenology*. California: Sage.

Greene, J. C., & Caracelli, V. J. (1997). Defining and describing the paradigm issue in mixed-method evaluation. *New Directions for Evaluation, 1997*(74), 5–17. doi:10.1002/ev.1068

Grendell, R. N. (2011). Mental and emotional responses to medical illness. In K. M. Fortinash, & P. A. Holoday Worret (Eds.), *Psychiatric Mental Health Nursing* (5th ed., pp. 660–676). St Louis: Elsevier.

Haddadi, P., & Besharat, M. A. (2010). Resilience, vulnerability and mental health. *Procedia-Social and Behavioral Sciences, 5*, 639–642. doi: 10.1016/j.sbspro.2010.07.157

Halcomb, E. J., & Davidson, P. M. (2006). Is verbatim transcription of interview data always necessary? *Applied Nursing Research, 19*(1), 38–42. doi: 10.1016/j.apnr.2005.06.001

Halcomb, E. J., Andrew, S., & Brannen, J. (2009). Introduction to mixed methods research for nursing and the health sciences. In S. Andrew, & E. J. Halcomb (Eds.), *Mixed methods research for nursing and health sciences* (pp. 3–12). Oxford: Wiley-Blackwell.

Happel, B., Cowin, L., Roper, C., Lakeman, R., & Cox, L. (2013). *Introducing mental health nursing: A service user-oriented approach* (2nd ed.). Sydney: Allen and Unwin.

Hatcher, L. (1994). *A step by step approach to using the SAS system for factor analysis and structural equation modeling*. Cary, N. C.: SAS Institute Inc.

Hay, R. (1998). Sense of place in developmental context. *Journal of Environmental Psychology, 18*(1), 5–29. doi: 10.1006/jevp.1997.0060

Hesse-Biber, S. N. (2010). *Mixed methods research: Merging theory with practice*. New York: Guilford Press.

Hidalgo, M. C., & Hernandez, B. (2001). Place attachment: Conceptual and empirical questions. *Journal of Environmental Psychology, 21*(3), 273–281. doi: 10.1006/jevp.2001.0221

Higginbotham, N., Connor, L., Albrecht, G., Freeman, S., & Agho, K. (2007). Validation of an environmental distress scale. *EcoHealth, 3,* 245–254. doi: 10.1007/s10393-006-0069-x

Hobfoll, S. E., & Stokes, J. P. (1988). The process and mechanics of social support. In S. Duck, D. F. Hay, S. E. Hobfoll, W. Ickes, & B. M. Montgomery (Eds.), *The handbook of personal relationships: Theory, research and interventions* (pp. 497–517). Oxford: John Wiley and Sons.

Hoffman, S. (2009). Preparing for disaster: Protecting the most vulnerable in emergencies. *UC Davis Law Review, 42*(5), 1491–1547.

Horowitz, M., Wilner, N., & Alvarev, W. (1979). Impact of event scale: A measure of subjective stress. *Psychomatic Medicine, 41*(3), 209–218.

Howard, W. T., Loberiza, F. R., Pfohl, B. M., Thorne, P. S., Magpantay, R. L., & Woolson, R. F. (1999). Initial results, reliability, and validity of a mental health survey of Mount Pinatubo disaster victims. *The Journal of Nervous and Mental Disease,*

187(11), 661–672. Retrieved from http://br9xy4lf5w.scholar.serialssolutions.com/?sid=google&auinit=WT&aulast=Howard&atitle=Initial+results,+reliability,+and+validity+of+a+mental+health+survey+of+Mount+Pinatubo+disaster+victims&title=Journal+of+nervous+and+mental+disease&volume=187&issue=11&date=1999&spage=661&issn=0022-3018

Hultzman, R. (2014). *What is psychological distress?* Retrieved from http://education-portal.com/academy/lesson/what-is-psychological-distress-definition-lesson-quiz.html#lesson

Hunt, N., & Tyrell, S. (2004). *Stratified sampling*. Retrieved from http://www.coventry.ac.uk/ec/~nhunt/meths/strati.html

Huppert, J. D., Moser, J. S., Gershuny, B. S., Riggs, D. S., Spokas, M., Filip, J., & Foa, E. B. (2005). The relationship between obsessive compulsive and posttraumatic stress symptoms in clinical and non clinical samples. *Journal of Anxiety Disorders, 19,* 127–136. doi: 10.1016/j.janxdis.2004.01.001

Inslicht, S. S., Metzler, T. J., Garcia, N. M., Pineles, S. L., Milad, M. R., Orr, S. P., & Neylan, T. C. (2013). Sex differences in fear conditioning in posttraumatic stress disorder. *Journal of Psychiatric Research, 47*(1), 64–71. doi: 10.1016/j.jpsychires.2012.08.027

International Federation of Red Cross and Red Crescent Societies. (2013). *World disasters report: Focus on technology and the future of humanitarian action*. Retrieved from http://worlddisastersreport.org/en/data/index.html

Irmansyah, I., Dharmono, S., Maramis, A., & Minas, H. (2010). Determinants of psychological morbidity in survivors of the earthquake and tsunami in Aceh and Nias. *International Journal of Mental Health Systems, 4, 1-10.* doi: 10.1146/annurev.clinpsy.2.022305.095305

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods, 18*(1), 3–20. doi: 10.1177/1525822X05282260

Jaffe, J., Segal, J., & Domke, L. F. (2005). *Emotional and psychological trauma: causes, symptoms, effects, and treatment*. Retrieved from http://www.helpguide.org/mental/emotional_psychological_trauma.htm

James, W. (2004). *Pragmatism: A new name for some old ways of thinking.* (Original work published in 1907). Retrieved from http://www.gutenberg.org/files/5116/5116-h/5116-h.htm

Jardine, A., Speldewinde, P., Carver, S., & Weinstein, P. (2007). Dryland salinity and ecosystem distress syndrome: human health implications. *EcoHealth, 4*(1), 10–17. doi: 10.1007/s10393-006-0078-9

Johnson, B., & Turner, L. A. (2003). Data collection strategies in mixed methods research. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 671–701). Thousand Oaks, California: Sage.

Jorgensen, B. S., & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology, 21*(3), 233–248. doi: 10.1006/jevp.2001.0226

Juliani, A., Bronto, W., Ribut, L., & Hamidin. (2011). *Kajian kerusakan bangunan akibat erupsi Gunungapi Merapi tahun 2010 di Kabupaten Sleman.* Paper presented at the Seminar nasional pengembangan kawasan Merapi: Aspek kebencanaan dan pengembangan masyarakat pasca bencana, FTSP UII, Jogjakarta.

Kaniasty, K., & Norris, F. H. (2000). Help-seeking comfort and receiving social support: The role of ethnicity and context of need. *American Journal of Community Psychology, 28*(4), 545–581. doi: 10.1023/A:1005192616058

Karanci, N. A., Alkan, N., Aksit, B., Sucuoglu, H., & Balta, E. (1999). Gender differences in psychological distress, coping, social support and related variables following the 1995 Dinal (Turkey) earthquake. *North American Journal of Psychology, 1*(2), 189–204. Retrieved from http://www.ssri.hawaii.edu/research/GDWwebsite/pdf/Karanci%20et%20al%2099.pdf

Kato, H., Asukai, N., Miyake, Y., Minakawa, K., Nishiyama, A. (1996). Post-traumatic symptoms among younger and elderly evacuees in the early stages following the 1995 Hanshin-Awaji earthquake in Japan. *Acta Psychiatrica Scandinavica, 93*(6), 477-481. doi: 10.1111/j.1600-0447.1996.tb10680.x

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*(12), 1048–1060. doi: 10.1001/archpsyc.1995.03950240066012

King, D. W., Orazem, R. J., Lauterbach, D., King, L. A., & Hebenstreit, C. L. (2009). Factor structure of posttraumatic stress disorder as measured by the Impact of Event Scale–Revised: stability across cultures and time. *Psychological Trauma: Theory, Research, Practice, and Policy Journal, 1*(3), 173–187. doi: 10.1037/a0016990

King, L. A., King, D. W., Fairbank, J. A., Keane, T. M., & Adams, G. A. (1998). Resilience–recovery factors in post-traumatic stress disorder among female and male Vietnam veterans: Hardiness, postwar social support, and additional stressful life events. *Journal of Personality and Social Psychology, 74*(2), 420-434.

Koenig, H. G. (2009). Research on religion, spirituality, and mental health: A review. *Canadian Journal of Psychiatry, 54*(5), 283–291. Retrieved from http://br9xy4lf5w.scholar.serialssolutions.com/?sid=google&auinit=HG&aulast=Koenig&atitle=Research+on+religion,+spirituality,+and+mental+health:+a+review&title

=Canadian+journal+of+psychiatry&volume=54&issue=5&date=2009&spage=283&issn=0706-7437

Kofoed, L., Friedman, M. J., & Peck, R. (1993). Alcoholism and drug abuse in patients with PTSD. *Psychiatric Quarterly Journal, 64*(2), 151–171. doi: 10.1007/BF01065867

Kolves, K., Kolves, K. E., & De Leo, D. (2013). Natural disasters and suicidal behaviours: A systematic literature review. *Journal of Affective Disorders, 146*(1), 1–14. doi: 10.1016/j.jad.2012.07.037

Krohne, H. (2001). Stress and coping theories. *The International Encyclopedia of the Social and Behavioral Sciences, 22*, 15163–15170. doi: 10.1016/B0-08-043076-7/03817-1

Kroll, T., & Neri, M. (2009). Designs for mixed methods research. In S. Andrew, & E. J. Halcomb (Eds.), *Mixed methods research for nursing and health sciences* (pp. 31–49). Oxford: Wiley-Blackwell.

Kyle, G., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behavior, 37*(2), 153–177. doi: 10.1177/0013916504269654

Kyle, G., Graefe, A., Manning, R., & Bacon, J. (2004). Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *Journal of Environmental Psychology, 24*(2), 213–225. doi: 10.1016/j.jenvp.2003.12.006

Lai, P. H., & Kreuter, U. P. (2012). Examining the direct and indirect effects of environmental change and place attachment on land management decisions in the Hill Country of Texas, USA. *Landscape and Urban Planning, 104*(3), 320–328. doi: 10.1016/j.landurbplan.2011.11.007

Lambert, V. A., & Lambert, C. E. (2013). Qualitative descriptive research: An acceptable design. *Pacific Rim International Journal of Nursing Research, 16*(4), 255–256.

Lazaratou, H., Paparrigopoulos, T., Galanos, G., Psarros, C., Dikeos, D., Soldatos, C. (2008). The psychological impact of a catastrophic earthquake: a retrospective study 50 years after the event. *Journal of Nervous & Mental Disease, 196*(4), 340-344. doi: 10.1097/NMD.0b013e31816a62c6.

Lazarus, R. S. (1991). Cognition and motivation in emotion. *American Psychologist, 46*(4), 352–367. doi: 10.1037/0003-066X.46.4.352

Lazarus, R. S. (1993). From psychological stress to the emotions: A history of changing outlooks. *Annual Review of Psychology, 44*(1), 1–22.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York: Springer Publishing Company.

Lazarus, R. S., & Smith, C. A. (1988). Knowledge and appraisal in the cognition-emotion relationship. *Cognition and Emotion, 2*(4), 281–300. doi: 10.1080/02699938808412701

Lee, C. (2001). Experiences of family caregiving among older Australian women. *Journal of Health Psychology, 6*(4), 393–404. doi: 10.1177/135910530100600403

Leon, G. R. (2004). Overview of the psychosocial impact of disasters. *Prehospital and Disaster Medicine, 19*(1), 4–9.

Lepore, S. J., Evans, G. W., & Schneider, M. L. (1991). Dynamic role of social support in the link between chronic stress and psychological distress. *Journal of Personality and Social Psychology, 61*(6), 899–909. doi: 10.1037/0022-3514.61.6.899

Liamputtong, P. (2009). Qualitative data analysis: Conceptual and practical considerations. *Health Promotion Journal of Australia, 20*(2), 133–139. Retrieved from http://www.halo.each.com.au/health-promotion/images/uploads/HPJA_-_Qual_Data_Analysis.pdf

Liamputtong, P., & Serry, T. (2010). Making sense of qualitative data. In P. Liamputtong (Ed.), *Research methods in health: Foundations for evidence-based practice* (pp. 369–400). Victoria, Australia: Oxford University Press.

Lima, B. R., Pai, S., Toledo, V., Caris, L., Haro, J. M., Lozano, J., & Santacruz, H. (1993). Emotional distress in disaster victims: a follow-up study. *The Journal of Nervous and Mental Disease, 181*(6), 388–393. Retrieved from http://br9xy4lf5w.scholar.serialssolutions.com/?sid=google&auinit=BR&aulast=Lima&atitle=Emotional+distress+in+disaster+victims:+a+follow-up+study.&title=Journal+of+nervous+and+mental+disease&volume=181&issue=6&date=1993&spage=388&issn=0022-3018

Lingard, L., Albert, M., & Levinson, W. (2008). Grounded theory, mixed methods, and action research. *BMJ, 337,* 459–461. doi: 10.1136/bmj.39602.690162.47

Maguire, B., & Hagan, P. (2007). Disasters and communities: understanding social resilience. *The Australian Journal of Emergency Management, 22*(2), 16–20. Retrieved from https://www.em.gov.au/Documents/vol22no2DisastersandCommunities.pdf

Malachowski, A. R. (2010). *Introducing the new pragmatism: The new pragmatism* (1st ed.). Durham, UK: Acumen. Retrieved from http://site.ebrary.com/id/10553861?ppg=16.

Margoob, M. A., Khan, A. Y., Firdosi, M. M., Sheikh, A., & Shaukat, T. (2006). One year longitudinal study of snowstorm disaster survivors in Kashmir. *JK Practitioner, 13* (Supplement 1), s29–s38. Retrieved from http://medind.nic.in/jab/t06/s1/jabt06s1p29.pdf

Martikainen, P., Bartley, M., & Lahelma, E. (2002). Psychosocial determinants of health in social epidemiology. *International Journal of Epidemiology, 31*(6), 1091–1093. doi: 10.1093/ije/31.6.1091

Matsubayashi, T., Sawada, Y., & Ueda, M. (2013). Natural disasters and suicide: Evidence from Japan. *Social Science and Medicine, 82*, 126–133. doi: 10.1016/j.socscimed.2012.12.021

Mattis, J., & Watson, C. (2008). Religiosity and spirituality. In H. A. Neville, B. M. Tynes, & S. O. Utsey (Eds.), *Handbook of African American psychology* (1st ed., pp. 91–102). California: Sage.

Matud, M. P. (2004). Gender differences in stress and coping styles. *Personality and Individual Differences, 37*(7), 1401–1415. doi: 10.1016/j.paid.2004.01.010

Mazumdar, S., & Mazumdar, S. (2004). Religion and place attachment: A study of sacred places. *Journal of Environmental Psychology, 24*(3), 385–397. doi: 10.1016/j.jenvp.2004.08.005

McDonough, P., & Walters, V. (2001). Gender and health: Reassessing patterns and explanations. *Social Science and Medicine, 52*(4), 547–559. doi: 10.1016/S0277-9536(00)00159-3

Merriam-Webster's Collegiate Dictionary. (ed.) (2014).

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Fransisco: Jossey-Bass.

Moran-Ellis, J., Alexander, V. D., Cronin, A., Dickinson, M., Fielding, J., Sleney, J., & Thomas, H. (2006). Triangulation and integration: Process, claims and implications. *Qualitative Research, 6*(1), 45–59. doi: 10.1177/1468794106058870

Mosher, C. E., & Danoff-Burg, S. (2006). A review of age differences in psychological adjustment to breast cancer. *Journal of Psychosocial Oncology, 23*(2–3), 101–114. doi: 10.1300/J077v23n02_07

Murphy, L. (2012). *Cultural perspectives on mental health and disaster of women affected by the 2010 Mt. Merapi eruption.* (Graduate Program in Social Work), The Ohio State

University, Ohio. Retrieved from https://etd.ohiolink.edu/view.cgi?acc_num=osu1337367938

Musa, R., Draman, S., Jeffrey, S., Jeffrey, I., Abdullah, N., Halim, N. A. M., & Sidi, H. (2013). Post-tsunami psychological impact among survivors in Aceh and West Sumatra, Indonesia. *Comprehensive Psychiatry, 55*(Supplement 1), S13–S16. doi: 10.1016/j.comppsych.2012.12.002

Mystakidou, K., Tsilika, E., & Parpa, E. (2007). Psychometric properties of the impact of event scale in Greek cancer patients. *Journal of Pain and Symptom Management, 33*(4), 454–461. doi: 10.1016/j.jpainsymman.2006.09.023

Naeem, F., Ayub, M., Masood, K., Gul, H., Khalid, M., Farrrukh, A., & Chaudhry, H. R. (2011). Prevalence and psychosocial risk factors of PTSD: 18 months after Kashmir earthquake in Pakistan. *Journal of Affective Disorders, 130*, 268–274. doi: 10.1016/j.jad.2010.10.035

National Health and Medical Research Council. (2007). *National statement on ethical conduct in human research*. Retrieved from https://www.nhmrc.gov.au/guidelines-publications/e72

Neria, Y., Nandi, A., & Galea, S. (2008). Post-traumatic stress disorder following disasters: A systematic reviews. *Psychological Medicine Journal, 38*, 467–480. doi: 10.1017/S0033291707001353

Nomura, A., Honda, S., Hayakama, H., Amarasinghe, S., Aoyagi, K. (2010). Post-Traumatic Stress Disorder Among Senior Victims of Tsunami-Affected Areas in Southern Sri Lanka. *Acta Medica Nagasakiensia*, *55*(1), 41-46.

Norris, F. H., & Slone, L. B. (2007). The epidemiology of trauma and PTSD. In M. J. Friedman, T. M. Keane, & P. A. Resick (Eds.), *Handbook of PTSD: Science and practice*. New York: Guilford Press.

Norris, F. H., Foster, J. D., & Weisshass, D. L. (2002). The epidemiology of sex differences in PTSD across developmental, societal, and research context. In R. Kimmerling, P. Ouimette, & J. Wolfe (Eds.), *Gender and PTSD* (pp. 3–42). New York: Guilford Press.

Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. an empirical review of the empirical literature, 1981-2001. *Psychiatry, 65*(3), 207-239. doi: 10.1521/psyc.65.3.207.20173

Norris, F. H., Murphy, A. D., Kaniasty, K., Perilla, J. L., & Ortis, D. C. (2001). Post disaster social support in the United States and Mexico: Conceptual and contextual considerations. *Hispanic Journal of Behavioral Sciences, 23*(4), 469–497. doi: 10.1177/0739986301234008

Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology, 41*(1–2), 127–150. doi: 10.1007/s10464-007-9156-6

Norris, F. H., Tracy, M., & Galea, S. (2009). Looking for resilience: Understanding the longitudinal trajectories of responses to stress. *Social Science and Medicine, 68*(12), 2190–2198. doi: 10.1016/j.socscimed.2009.03.043

O'Cathain, A., Murphy, E., & Nicholl, J. (2010). Three techniques for integrating data in mixed methods studies. *BMJ, 341*, 1147–1150. doi: 10.1136/bmj.c4587

O'Toole, B. I., & Catts, S. V. (2008). Trauma, PTSD, and physical health: An epidemiological study of Australian Vietnam veterans. *Journal of Psychosomatic Research, 64*(1), 33–40. doi: 10.1016/j.jpsychores.2007.07.006

Oman, R. F., & King, A. C. (2000). The effect of life events and exercise program format on the adoption and maintenance of exercise behavior. *Health Psychology, 19*(6), 605–612. doi: 10.1037/0278-6133.19.6.605

Omori, T. (2012). The recurring natural disaster and the problem of PTSD among older adults: Research on the residents in Tsubota District after nine years from the eruption of Miyake Island's Oyama in 2000. *Yokohama Journal of Social Sciences, 17*(3), 63–72. Retrieved from http://kamome.lib.ynu.ac.jp/dspace/bitstream/10131/8227/1/4-Omori.pdf

Onwuegbuzie, A. J., & Johnson, R. B. (2006). The validity issue in mixed research. *Research in the Schools, 13*(1), 48–63. Retrieved from http://carbon.videolectures.net/v005/e1/4gi2nosqk7a4u3rhmb6f4yl2huqff7a5.pdf

Oxford Dictionaries. (ed.) (2014).

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*(1), 52–73. doi: 10.1037/0033-2909.129.1.52

Panagioti, M., Gooding, P., & Tarrier, N. (2009). Post-traumatic stress disorder and suicidal behavior: A narrative review. *Clinical Psychology Review, 29*(6), 471–482. doi: 10.1016/j.cpr.2009.05.001

Paranjothy, S., Gallacher, J., Amlot, R., Rubin, G. J., Page, L., Baxter, T., & Palmer, S. R. (2011). Psychosocial impact of the summer 2007 floods in England. *BMC Public Health, 11*(145), 1–8. doi: 10.1186/1471-2458-11-145

Pargament, K. I. (1997). *The psychology of religion and coping: Theory, practice and research*. New York: The Guilford Press.

Paton, D., & Johnston, D. (2001). Disasters and communities: vulnerability, resilience and preparedness. *Disaster Prevention and Management, 10*(4), 270–277. Retrieved from http://dx.doi.org/10.1108/EUM0000000005930r

Pelupessy, D., Bretherton, D., & Ride, A. (2011). Indonesia. In D. Bretherton, & A. Ride (Eds.), *Community resilience in natural disasters*. New York: Palgrave Macmillan.

Pemerintah Kabupaten Sleman. (2010). *Update data korban bencana erupsi Gunung Merapi 2010*. Retrieved from http://www.slemankab.go.id/category/update-data-korban-bencana-erupsi-gunung-merapi-2010

Pemerintah Kabupaten Sleman. (2014). *Profil daerah: letak dan luas wilayah*. Retrieved from http://www.slemankab.go.id/profil-kabupaten-sleman/geografi/letak-dan-luas-wilayah

Peres, J. F., Moreira-Almeida, A., Nasello, A. G., & Koenig, H. G. (2007). Spirituality and resilience in trauma victims. *Journal of Religion and Health, 46*(3), 343–350. doi: 10.1007/s10943-006-9103-0

Pérez-Sales, P., Cervellon, P., Vazquez, C., Vidales, D., & Gaborit, M. (2005). Post-traumatic factors and resilience: The role of shelter management and survivors' attitudes after the earthquakes in El Salvador (2001). *Journal of Community and Applied Social Psychology, 15*(5), 368–382. doi: 10.1002/casp.827

Perkins, D. D., & Long, D. A. (2002). Neighborhood sense of community and social capital. In A. T. Fisher, C. C. Sonn, & B. J. Bishop (Eds.), *Psychological sense of community: Research, applications, and implications* (pp. 291–318). New York: Kluwer Academic Plenum Publishers.

Plano Clark, V. L., Creswell, J. W., Green, D. O., & Shope, R. J. (2013). Mixing quantitative and qualitative approaches: An introduction to emergent mixed methods research. In

S. N. Hesse-Biber, & P. Leavy (Eds.), *Handbook of emergent methods*. New York: Guilford Publications.

Priest, H. (2002). An approach to the phenomenological analysis of data. *Nurse Researcher, 10*(2), 50–63. doi: 10.7748/nr2003.01.10.2.50.c5888

Rajkumar, A. P., Premkumar, T. S., & Tharyan, P. (2008). Coping with the Asian tsunami: Perspectives from Tamil Nadu, India on the determinants of resilience in the face of adversity. *Social Science and Medicine, 67*(5), 844–853. doi: 10.1016/j.socscimed.2008.05.014

Rallis, S. F., & Rossman, G. B. (2003). Mixed methods in evaluation context: A pragmatic framework. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 491–512). Thousand Oak, California: Sage.

Reser, J. P. (2007). The experience of natural disasters: Psychological perspectives and understandings. In J. Stoltman, J. Lidstone, & L. Dechano (Eds.), *International Perspectives on Natural Disasters: Occurrence, Mitigation, and Consequences* (pp. 369–384). Dordrecht: Kluwer Academic Publishers.

Ride, A., & Bretherton, D. (2011). Introduction. In D. Bretherton, & A. Ride (Eds.), *Community resilience in natural disasters*. New York: Palgrave Macmillan.

Ridner, S. H. (2004). Psychological distress: Concept analysis. *Journal of Advance Nursing, 45*(5), 536–545. doi: 10.1046/j.1365-2648.2003.02938.x/pdf

Ronan, K. R. (1997). The effects of a ‘benign’ disaster: Symptoms of post-traumatic stress in children following a series of volcanic eruptions. *Australian Journal of Disaster and Trauma Studies, 1*. Retrieved from http://www.massey.ac.nz/~trauma/issues/1997-1/ronan1.htm

Sagala, S. A. H. (2009). *System analysis of social resilience against volcanic risks: Case studies of Mt Merapi, Indonesian and Mt. Sakurajima Japan.* (Doctor of

Engineering), Kyoto University, Kyoto. Retrieved from http://repository.kulib.kyoto-u.ac.jp/dspace/bitstream/2433/88040/1/D_Sagala_Saut-Aritua-Hasiholan.pdf

Saldana, J. (2009). *The coding manual for qualitative researchers*. London: Sage.

Sandelowski, M. (1995). Qualitative analysis: What it is and how to begin. *Research in Nursing and Health, 18*(4), 371–375. doi: 10.1002/nur.4770180411

Sandelowski, M. (2000). Focus on research methods-whatever happened to qualitative description? *Research in Nursing and Health, 23*(4), 334–340. Retrieved from http://www.wou.edu/~mcgladm/Quantitative%20Methods/optional%20stuff/qualitative%20description.pdf

Sareen, J., Cox, B. J., Stein, M. B., Afifi, T. O., Fleet, C., & Asmundson, G. J. (2007). Physical and mental comorbidity, disability, and suicidal behavior associated with posttraumatic stress disorder in a large community sample. *Psychosomatic Medicine, 69*(3), 242–248. doi: 10.1097/PSY.0b013e31803146d8

Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology, 30*(1), 1–10. doi: 10.1016/j.jenvp.2009.09.006

Schnurr, P. P., Spiro III, A., & Paris, A. H. (2000). Physician-diagnosed medical disorders in relation to PTSD symptoms in older male military veterans. *Health Psychology, 19*(1), 91–97 . doi: 10.1037/0278-6133.19.1.91

Schofield, M. (2004). Sampling in quantitative research. In V. Minichiello, G. Sullivan, K. Greenwood, & R. Axford (Eds.), *Handbook of research methods for nursing and health sciences* (2nd ed., pp. 176–209). French Forest, NSW: Pearson Education Australia.

Shields, P. M. (1998). Pragmatism as philosophy of science: A tool for public administration. *Research in Public Administration, 4*, 195–225. Retrieved from https://digital.library.txstate.edu/bitstream/handle/10877/3954/fulltext.pdf

Shinfuku, N. (2002). Disaster mental health: Lessons learned from the Hanshin Awaji earthquake. *World Psychiatry Journal, 1*(3), 158–159. Retrieved from http://br9xy4lf5w.scholar.serialssolutions.com/?sid=google&auinit=N&aulast=Shinfuku&atitle=Disaster+mental+health:+lessons+learned+from+the+Hanshin+Awaji+earthquake&id=pmid:16946841

Shore, J. H., Tatum, E. L., & Vollmer, W. M. (1986). Evaluation of mental effects of disaster, Mount St. Helens eruption. *American Journal of Public Health, 76*(Supplement), 76–83. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1651694/

Simkin, T. & Siebert, L. (1994). *Volcanoes of the world.* Tucson, Arizona: Geoscience press for the Smithsonian Institution.

Sincero, S. M. (2012). *Stress and cognitive appraisal by Lazarus and Folkman*. Retrieved from https://explorable.com/stress-and-cognitive-appraisal

Smith, T. B., McCullough, M. E., & Poll, J. (2003). Religiousness and depression: Evidence for a main effect and the moderating influence of stressful life events. *Psychological Bulletin, 129*(4), 614–636. doi: 10.1037/0033-2909.129.4.614

Speldewinde, P. C., Cook, A., Davies, P., & Weinstein, P. (2009). A relationship between environmental degradation and mental health in rural Western Australia. *Health and Place, 15*(3), 880–887. doi: 10.1016/j.healthplace.2009.02.011

Stein, J. A., & Nyamathi, A. (1999). Gender differences in relationships among stress, coping, and health risk behaviors in impoverished, minority populations. *Personality and Individual Differences, 26*(1), 141–157. doi: 10.1016/S0191-8869(98)00104-4

Stratta, P., Capanna, C., Riccardi, I., Perugi, G., Toni, C., Dell'Osso, L., & Rossi, A. (2013). Spirituality and religiosity in the aftermath of a natural catastrophe in Italy. *Journal of Religion and Health, 52*(3), 1029–1037. doi: 10.1007/s10943-012-9591-z

Subandi, M. A., Achmad, T., Kurniati, H., & Febri, R. (2014). Spirituality, gratitude, hope and post-traumatic growth among the survivors of the 2010 eruption of Mount Merapi in Java, Indonesia. *Australian Journal of Disaster and Trauma Studies, 18*(1), 19–26. Retrieved from http://trauma.massey.ac.nz/issues/2014-1/AJDTS_18-1_Subandi.pdf

Sultana, F. (2010). Living in hazardous waterscapes: Gendered vulnerabilities and experiences of floods and disasters. *Environmental Hazards, 9*(1), 43–53. doi: 10.3763/ehaz.2010.SI02

Sultana, P., & Thompson, P. (2008). Gender and local floodplain management institutions: A case study from Bangladesh. *Journal of International Development, 20*(1), 53–68. doi: 10.1002/jid.1427

Sundram, S., Karim, M., Ladridoignacio, L., Maramis, A., Mufti, K., Nagaraja, D., & Yizhuang, Z. (2008). Psychosocial responses to disaster: An Asian perspective. *Asian Journal of Psychiatry, 1*(1), 7–14. doi: 10.1016/j.ajp.2008.07.004

Surono, Jousset, P., Pallister, J., Boichu, M., Buongiorno, M. F., Budisantoso, A., & Lavigne, F. (2012). The 2010 explosive eruption of Java's Merapi volcano—a '100-year' event. *Journal of Volcanology and Geothermal Research, 241-242*, 121–135. doi: 10.1016/j.jvolgeores.2012.06.018

Sveen, J., Low, A., Dyster-Aas, J., Ekselius, L., Willebrand, M., & Gerdin, B. (2010). Validation of a Swedish version of the impact of event scale-revised (IES-R) in patients with burns. *Journal of Anxiety Disorders, 24*(6), 618–622. doi: 10.1016/j.janxdis.2010.03.021

Tang, C. S. (2006). Positive and negative post disaster psychological adjustment among adult survivors of the Southeast Asian earthquake–tsunami. *Journal of Psychosomatic Research, 61*, 699–705. doi: 10.1016/j.jpsychores.2006.07.014

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. *Journal of Nervous and Mental Disease, 195*(1), 54–59. doi: 10.1097/01.nmd.0000242971.84798.bc

Tashakkori, A., & Teddlie, C. (1998a). Data collection strategies and research procedures. In A. Tashakkori, & C. Teddlie (Eds.), *Mixed methodology: Combining qualitative and quantitative approaches* (Vol. 46, pp. 95–111). Thousand Oaks, California: Sage.

Tashakkori, A., & Teddlie, C. (1998b). Introduction to mixed method and mixed model studies in the social and behavioral sciences. In A. Tashakkori & C. Teddlie (Eds.), *Mixed methodology: Combining qualitative and quantitative approaches* (Vol. 46, pp. 3–19). Thousand Oaks, California: Sage.

Tashakkori, A., & Teddlie, C. (2003). The past and future of mixed methods research: From data triangulation to mixed model designs. In A. Tashakkori ,& C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 671–701).

Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 3–50).

Thompson, M. P., Norris, F. H., & Hanacek, B. (1993). Age differences in the psychological consequences of Hurricane Hugo. *Psychology and Aging Journal, 8*(4), 606–616. doi: 10.1037/0882-7974.8.4.606

Tolin, D. F., & Breslau, N. (2007). Sex differences in risk of PTSD. *PTSD Research Quarterly, 18*(2), 1–8. doi: 10.1037/0033-2909.132.6.959

Tolin, D. F., & Foa, E. B. (2002). Gender and PTSD: A cognitive model. In R. Kimmerling, P. Ouimette, & J. Wolfe (Eds.), *Gender and PTSD* (pp. 76–97). New York: Guilford Press.

Tolin, D. F., & Foa, E. B. (2006). Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. *Psychological Bulletin, 132*(6), 959–992. doi: 10.1037/0033-2909.132.6.959

Triola, M. F. (Ed.). (2009). *Essentials of statistics* (Fourth ed.). New York: Addison Wesley.

Tschakert, P., & Tutu, R. (2010). Solastalgia: Environmentally induced distress and migration among Africa's poor due to climate change. In T. Afifi, & J. Jager (Eds.), Environment, forced migration and social vulnerability (pp. 57–69). Heidelberg: Springer.

Tull, M. (2014). *PTSD Rates*. Retrieved from http://ptsd.about.com/od/prevalence/a/prevalence.htm

United Nations of International Strategy for Disaster Reduction. (2002). *Living with risk: A global review of disaster reduction initiatives: Preliminary version.* Retrieved from http://www.mona.uwi.edu/cardin/virtual_library/docs/1220/1220.pdf

United Nations of International Strategy for Disaster Reduction. (2004). *Living with risk: A global review of disaster reduction initiatives* Vol. 1. Retrieved from http://www.unisdr.org/files/657_lwr1.pdf

Usher, K., & Jackson, D. (2014). Phenomenology. In J. Mills, & M. Birks (Eds.), *Qualitative methodology: A practical guide* (pp. 181–197). London: Sage.

Van Haaften, E. H., & Van de Vijver, F. J. (1996). Psychological consequences of environmental degradation. *Journal of Health Psychology, 1*(4), 411–429. doi: 10.1177/135910539600100401

Van Haaften, E. H., & Van de Vijver, F. J. (1999). Dealing with extreme environmental degradation: stress and marginalization of Sahel dwellers. *Social Psychiatry and Psychiatric Epidemiology, 34*(7), 376–382. doi: 10.1007/s001270050158

Van Haaften, E. H., & Van de Vijver, F. J. (2003). Human resilience and *International Journal of Sustainable Development and World Ecology, 10*(2), 85–99. doi: 10.1080/13504500309469788

Van Haaften, E. H., Zhenrong, Y., & Van de Vijver, F. J. (2004). Human resilience in a degrading environment: A case study in China. *Asian Journal of Social Psychology, 7*(2), 205–219. doi: 10.1111/j.1467-839x.2004.00142.x

Vogt, D. S., King, D. W., & King, L. A. (2007). Risk pathways for PTSD: Making sense of the literature. In M. J. Friedman, T. M. Keane, & P. A. Resick (Eds.), *Handbook of PTSD: Science and practice*. New York: Guilford Press.

Warsini, S., Buettner, P., Mills, J., West, C., & Usher, K. (2014a). The psychosocial impact of the environmental damage caused by the MT Merapi eruption on survivors in Indonesia. *EcoHealth*, 1–11. Retrieved from http://link.springer.com/article/10.1007%2Fs10393-014-0937-8 doi:10.1007/s10393-014-0937-8

Warsini, S., Buettner, P., Mills, J., West, C., & Usher, K. (2014b). Translation, cultural adaptation and psychometric testing of the environmental distress scale with Indonesian survivors of a volcanic eruption. *Disaster Medicine and Public Health Preparedness, 8*(3), 229–238. doi: 10.1017/dmp.2014.45

Warsini, S., Buettner, P., Mills, J., West, C., & Usher, K. (2015a). Post-traumatic stress disorder among survivors two years after the 2010 Mount Merapi volcano eruption: A survey study. *Nursing and Health Sciences*, 17, 173-180. doi:10.1111/nhs.12152

Warsini, S., Buettner, P., Mills, J., West, C., & Usher, K. (2015b). Psychometric evaluation of the Indonesian version of the impact of event scale revised. *Journal of Psychiatric and Mental Health Nursing, 22, 251-259.* doi: 10.1111/jpm.12194

Warsini, S., Mills, J., & Usher, K. (2014). Solastalgia: Living with the Environmental Damage Caused by Natural Disasters. *Prehospital and Disaster Medicine, 29*(1), 87–90.

Warsini, S., Usher, K., Buettner, P., Mills, J., West, C. (2014). Psychosocial and environmental distress resulting from a volcanic eruption: Study protocol, *Collegian: The Australian Journal of Nursing Practice, Scholarship and Research.* In press.

Warsini, S., West, C., Mills, J., & Usher, K. (2014). The psychosocial impact of natural disasters among adult survivors: An integrative review. *Issues in Mental Health Nursing*, *35*(6), 420–436. doi: 10.3109/01612840.2013.875085

Weiss, D. S., & Marmar, C. R. (1997). The Impact of Event Scale-Revised. In J. P. Wilson, & T. M. Keane (Eds.), *Assessing Psychological Trauma and PTSD* (pp. 399–411). New York: The Guilford Press.

Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science, 49*(6), 830–840. Retrieved from http://www.fs.fed.us/rm/value/docs/psychometric_place_attachment_measurement.pdf

World Health Organization. (2014). Vulnerable groups. *Environmental Health in Emergencies.* Retrieved from http://www.who.int/environmental_health_emergencies/vulnerable_groups/en/

World Medical Association. (2001). Ethical principles for medical research involving human subject. *Bulletin of the World Health Organization, 79*(4), 373–374.

World Medical Association. (2013). World Medical Association declaration of Helsinki: Ethical principles for medical research involving human subjects. *Journal of the American Medical Association, 310*(20), 2191–2194. doi: 10.1001/jama.2013.281053

Wu, K. K., & Chan, S. K. (2004). Psychometric properties of the Chinese version of the impact of event scale-revised. *Hong Kong Journal Psychiatry, 14*(4), 2–8. doi: 10.1007/s00127-003-0611-x

Xu, J., & Liao, Q. (2011). Prevalence and predictors of posttraumatic growth among adult survivors one year following 2008 Sichuan earthquake. *Journal of Affective disorders, 133*(1-2), 274–280. doi: 10.1016/j.jad.2010.03.021

Zhou, X., Kang, L., Sun, X., Song, H., Mao, W., Huang, X., & Li, J. (2013). Prevalence and risk factors of PTSD among adult survivors six months after the Wenchuan Earthquake. *Comprehensive Psychiatry*, *54*, 493–499. doi: 10.1016/j.comppsych.2012.12.010

List of Appendices

JAMES COOK UNIVERSITY AUSTRALIA

James Cook University

Townsville Qld. 4811 Australia

Tina Langford, Manager, Research Ethics & Grants

Research Services Ph: 47815011; Fax: 47815521

email: ethics@jcu.edu.au

Human Research Ethics Committee

APPROVAL FOR RESEARCH OR TEACHING INVOLVING HUMAN SUBJECTS

Application ID

H4902

This administrative form has been removed

MINISTRY OF EDUCATION AND CULTURE
FACULTY OF MEDICINE GADJAH MADA UNIVERSITY
MEDICAL AND HEALTH RESEARCH ETHICS COMMITTEE (MHREC)

ETHICS COMMITTEE APPROVAL

This administrative form
has been removed

PEMERINTAH PROVINSI DAERAH ISTIMEWA YOGYAKARTA
SEKRETARIAT DAERAH
Kompleks Kepatihan, Danurejan, Telepon (0274) 562811 - 562814 (Hunting)
YOGYAKARTA 55213

This administrative form
has been removed

PEMERINTAH KABUPATEN SLEMAN
BADAN PERENCANAAN PEMBANGUNAN DAERAH
Jalan Parasamya Nomor 1 Beran, Tridadi, Sleman, Yogyakarta 55511
Telepon (0274) 868800, Faksimilie (0274) 868800
Website: slemankab.go.id, E-mail : bappeda@slemankab.go.id

This administrative form
has been removed

PEMERINTAH KABUPATEN SLEMAN
BADAN PERENCANAAN PEMBANGUNAN DAERAH
Jalan Parasamya Nomor 1 Beran, Tridadi, Sleman, Yogyakarta 55511
Telepon (0274) 868800, Faksimilie (0274) 868800
Website: slemankab.go.id, E-mail : bappeda@slemankab.go.id

This administrative form
has been removed

PEMERINTAH KABUPATEN SLEMAN
BADAN PERENCANAAN PEMBANGUNAN DAERAH
Jalan Parasamya Nomor 1 Beran, Tridadi, Sleman, Yogyakarta 55511
Telepon (0274) 868800, Faksimilie (0274) 868800
Website: slemankab.go.id, E-mail : bappeda@slemankab.go.id

This administrative form
has been removed

PEMERINTAH KABUPATEN SLEMAN
BADAN PERENCANAAN PEMBANGUNAN DAERAH
Jalan Parasamya Nomor 1 Beran, Tridadi, Sleman, Yogyakarta 55511
Telepon (0274) 868800, Faksimilie (0274) 868800
Website: slemankab.go.id, E-mail : bappeda@slemankab.go.id

This administrative form
has been removed

INFORMATION SHEET for SURVEY

PROJECT TITLE: **What is the impact of environmental change caused by the eruption of Merapi volcano on the psychosocial health of the community: a mixed methods study**

You are invited to take part in a research project about the psychosocial impact of the eruption of the Merapi volcano in 2010 on residents in Yogyakarta, Indonesia. This research will be conducted to improve current understanding of the psychosocial impact of volcanic eruptions, particularly the impact of the event and the environmental distress experienced by those who continue to live in the damaged environment. Sri Warsini is the principal investigator conducting the study. Professor Kim Usher and A/Professor Jane Mills are supervising the research, which will contribute towards a PhD degree in the School of Nursing, Midwifery and Nutrition, James Cook University.

Your experiences and feelings about the impact of the Merapi eruption are important and I would like to invite you to join this research. If you agree to be involved in the study, you will be asked to fill in a survey questionnaire. I am also interested in interviewing people at a later stage; if you are interested in volunteering to be interviewed please indicate your interest on the survey questionnaire. The survey questionnaire will take about 40 minutes to complete. If you need assistance to complete the form, it can be arranged. The completion of the survey is voluntary and completion of the survey and signature on the consent form attached to the survey will be taken to mean you agree to participate.

Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

Your responses and contact details will be strictly confidential. The data from the study will be used in research publications and reports. You will not be identified in any way in these publications.

If you have any questions about the study, please contact Sri Warsini or Professor Kim Usher.

Some people may find filling out this survey distressing. If you do, we have a local mental health counsellor available to support you; please find the details for the counsellor below. No charge will be taken for the counselling.

Principal Investigator:
Sri Warsini
School of Nursing and Midwifery
James Cook University
Phone JCU: +617 4042 1548
HP Australia: +61 432694505
HP Indonesia: +62 85643383065
Email: sri.warsini@my.jcu.edu.au

Supervisor Details:
Prof Kim Usher
School of Nursing, Midwifery and Nutrition
James Cook University
Phone: +617 4042 1391
Mobile: +61 408073427
Email: kim.usher@jcu.edu.au

Mental health counsellor:
Name: Puji Sutarjo, S.Kep.,Ns
Contact details: 08156876671

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

JAMES COOK UNIVERSITY
AUSTRALIA

LEMBAR INFORMASI untuk SURVEY

JUDUL PROYEK: **Pengaruh perubahan lingkungan yang disebabkan oleh erupsi Gunung Merapi pada kesehatan psikososial masyarakat: sebuah penelitian dengan metode gabungan**

Anda diminta untuk berperan serta dalam sebuah proyek penelitian mengenai dampak psikososial erupsi Gunung Merapi pada tahun 2010 pada penduduk Yogyakarta, Indonesia. Penelitian ini akan dilakukan untuk meningkatkan pemahaman akan dampak psikososial letusan gunung berapi saat ini, terutama dampak kejadian tersebut dan distress terhadap lingkungan yang dialami oleh mereka yang meneruskan tinggal di lingkungan yang telah rusak. Sri Warsini adalah peneliti utama yang melakukan penelitian ini. Professor Kim Usher dan A/Professor Jane Mills akan membimbing jalannya penelitian tersebut, yang akan memberikan kontribusi terhadap pendidikan Doktor pada Sekolah Keperawatan, Kebidanan dan Gizi, Universitas James Cook.

Pengalaman dan perasaan Anda terhadap dampak letusan Gunung Merapi merupakan hal yang penting dan saya ingin mengundang Anda untuk bergabung dalam penelitian ini. Jika Anda setuju untuk terlibat dalam penelitian ini, Anda akan diminta untuk mengisi sebuah kuesioner. Saya juga akan meminta beberapa orang yang setuju untuk melengkapi borang tersebut untuk diwawancarai pada tahap selanjutnya. Akan dibutuhkan waktu 60 menit untuk menyelesaikan survei tersebut. Jika Anda memerlukan bantuan untuk melengkapi borang tersebut, maka dapat diatur lebih lanjut. Melengkapi survei tersebut merupakan kegiatan sukarela dan survei yang telah lengkap dan tanda tangan pada lembar persetujuan terlampir akan diartikan sebagai kesediaan Anda untuk berpartisipasi.

Keterlibatan Anda dalam penelitian ini sepenuhnya bersifat sukarela dan Anda dapat berhenti terlibat dalam penelitian ini sewaktu-waktu tanpa penjelasan atau prasangka. Anda juga dapat menarik segala data yang belum diproses dari penelitian ini.

Tanggapan-tanggapan Anda dan segala macam rincian kontak akan dirahasiakan secara ketat. Data dari penelitian ini akan digunakan untuk publikasi dan laporan penelitian. Anda tidak akan diidentifikasi dalam bentuk apapun dalam publikasi-publikasi tersebut.

Jika Anda memiliki pertanyaan tentang penelitian ini, silakan hubungi **- Sri Warsini atau Professor Kim Usher.**

Peneliti Utama:
Sri Warsini
Sekolah Keperawatan dan Kebidanan
Universitas James Cook
Telepon UJC: +617 4042 1548
HP Australia: +61 432694505
HP Indonesia: +62 85643383065
Email: sri.warsini@my.jcu.edu.au

Pembimbing:
Nama: Prof Kim Usher
Sekolah: Sekolah Keperawatan, Kebidanan dan Gizi
Universitas James Cook
Telepon: +617 4042 1391
HP: +61 408073427
Email: kim.usher@jcu.edu.au

Jika Anda memiliki masalah apapun mengenai etika pelaksanaan penelitian, silakan hubungi:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Telp: (07) 4781 5011 (ethics@jcu.edu.au)

INFORMED CONSENT FORM-SURVEY

PRINCIPAL INVESTIGATOR	**Sri Warsini**
PROJECT TITLE:	**What is the impact of environmental change caused by the eruption of Merapi volcano on the psychosocial health of the community: a mixed methods study**
SCHOOL	**School of Nursing, Midwifery and Nutrition**

I understand the aim of this research study is to determine the psychosocial impact of volcano eruption on Merapi's Survivors**.** I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will completing a survey and I agree that the researcher may use the results as described in the information sheet. I understand that the completed form will have my name and details removed and replaced with a code known only to the researcher.

I acknowledge that:

- any risks and possible effects of participating in the survey have been explained to my satisfaction;

- taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided;

- that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

(Please tick to indicate consent)

I consent to complete the survey and have my data recorded	☐	**Yes**	☐	**No**
	☐	**Yes**	☐	**No**

Name: *(printed)*	
Signature:	**Date:**

JAMES COOK UNIVERSITY
AUSTRALIA

LEMBAR PERSETUJUAN – SURVEI

PENELITI UTAMA	**Sri Warsini**
JUDUL PROYEK:	**Pengaruh perubahan lingkungan yang disebabkan oleh erupsi Gunung Merapi pada kesehatan psikososial masyarakat: sebuah penelitian dengan metode gabungan**
SEKOLAH	**Sekolah Keperawatan, Kebidanan dan Gizi**

Saya mengerti tujuan penelitian ini adalah untuk mengetahui dampak psikososial erupsi gunung berapi pada korban Merapi yang selamat. Saya setuju untuk berpartisipasi dalam proyek ini, yang rinciannya telah dijelaskan pada saya, dan saya telah diberi lembar informasi tertulis untuk disimpan.

Saya mengerti bahwa partisipasi saya akan melengkapi sebuah survei dan saya setuju bahwa peneliti boleh menggunakan hasilnya seperti telah dijelaskan pada lembar informasi. Saya mengerti bahwa pada borang yang telah dilengkapi nama saya dan rincian yang lain akan dihilangkan dan digantikan dengan sebuah kode yang hanya diketahui oleh peneliti.

Saya menyatakan bahwa:
- segala bentuk resiko dan dampak yang mungkin terjadi karena berpartisipasi dalam survey telah dijelaskan dengan memuaskan;
- saya mengambil bagian dalam penelitian ini secara sukarela dan saya mengetahui bahwa saya dapat berhenti mengambil bagian dalam penelitian ini sewaktu-waktu tanpa penjelasan atau prasangka dan saya dapat menarik segala data yang telah saya berikan selama belum diproses;
- bahwa segala informasi yang saya berikan akan dirahasiakan dengan ketat dan bahwa tidak aka nada nama yang akan digunakan untuk mengidentifikasikan saya dengan penelitian ini tanpa seizin saya;

(Silakan beri tanda centang untuk menunjukkan

Saya setuju untuk melengkapi survei dan mempersilakan data saya direkam ☐ **Ya** ☐ **Tidak**

Nama: *(huruf cetak)*	
Tanda tangan:	**Tanggal:**

INFORMATION SHEET for INTERVIEW

PROJECT TITLE: **What is the impact of environmental change caused by the eruption of Merapi volcano on the psychosocial health of the community: a mixed methods study**

You are invited to take part in a research project about the psychosocial impact of the eruption of the Merapi volcano in 2010 on residents in Yogyakarta, Indonesia. This research will be conducted to improve current understanding of the psychosocial impact of volcanic eruptions, particularly the impact of the event and the environmental distress experienced by those who continue to live in the damaged environment. Sri Warsini is the principal investigator conducting the study. Professor Kim Usher and A/Professor Jane Mills are supervising the research, which will contribute towards a PhD degree in the School of Nursing, Midwifery and Nutrition, James Cook University.

Your experiences and feelings about the impact of the Merapi eruption are important and I would like to invite you to join this research. If you agree to be involved in the study, you will be invited to be interviewed. The interview, with your consent, will be audio-taped, and should only take approximately 1 hour of your time. The interview will be conducted at your house venue or a venue of your choice. The interview will ask questions about your experiences living near the Merapi mountain and your experiences after the eruption in 2010 that caused a lot of damage to the surrounding area. For example, you will be asked questions like: “Can you tell me how you feel about the changes to the environment?” and “Has the change to the environment changed the way you feel about living here?” and “Can you tell me how the eruption impacted on you-both mentally and physically?”

Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

Some people may become distressed talking about these experiences. If this happens you can call the person whose name is listed below. They know about the study and have agreed to be available for anyone who wants to discuss their feelings. No fee will be taken for counselling.

Your responses and contact details will be strictly confidential. The data from the study will be used in research publications and reports. You will not be identified in any way in these publications.

If you have any questions about the study, please contact **- Sri Warsini or Professor Kim Usher.**

Principal Investigator:
Sri Warsini
School of Nursing and Midwifery
James Cook University
Phone JCU: +617 4042 1548
HP Australia: +61 432694505
HP Indonesia: +62 85643383065
Email: sri.warsini@my.jcu.edu.au

Supervisor:
Name: Professor Kim Usher
School: Nursing, Midwifery & Nutrition
James Cook University
Phone: +617 4042 1391
Mobile: : +61 408073427
Email: kim.usher@jcu.edu.au

Mental Health Consellor:
Name: Puji Sutarjo
Phone:+62 8156876671

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

JAMES COOK UNIVERSITY
AUSTRALIA

LEMBAR INFORMASI untuk WAWANCARA

JUDUL PROYEK: **Pengaruh perubahan lingkungan yang disebabkan oleh erupsi Gunung Merapi pada kesehatan psikososial masyarakat: sebuah penelitian dengan metode gabungan**

Anda diminta untuk berperan serta dalam sebuah proyek penelitian mengenai dampak psikososial erupsi Gunung Merapi pada tahun 2010 pada penduduk Yogyakarta, Indonesia. Penelitian ini akan dilakukan untuk meningkatkan pemahaman akan dampak psikososial letusan gunung berapi saat ini, terutama dampak kejadian tersebut dan distress terhadap lingkungan yang dialami oleh mereka yang meneruskan tinggal di lingkungan yang telah rusak. Sri Warsini adalah peneliti utama yang melakukan penelitian ini. Professor Kim Usher dan A/Professor Jane Mills akan membimbing jalannya riset tersebut, yang akan memberikan kontribusi terhadap pendidikan Doktor pada Sekolah Keperawatan, Kebidanan dan Gizi, Universitas James Cook.

Pengalaman dan perasaan Anda terhadap dampak letusan Gunung Merapi merupakan hal yang penting dan saya ingin mengundang Anda untuk bergabung dalam penelitian ini. Jika Anda setuju untuk terlibat dalam penelitian ini, Anda akan diminta untuk diwawancarai. Wawancara tersebut, dengan izin Anda, akan direkam, dan hanya akan menyita kurang lebih 1 jam waktu Anda. Wawancara akan dilakukan di rumah Anda atau lokasi yang Anda pilih. Wawancara akan berisi pertanyaan mengenai pengalaman-pengalaman Anda tinggal di dekat Gunung Merapi dan pengalaman-pengalaman Anda setelah erupsi pada tahun 2010 yang menyebabkan banyak kerusakan pada area sekitarnya. Misalnya, Anda akan diberikan pertanyaan seperti: "Dapatkah Anda menceritakan pada saya bagaimana perasaan Anda mengenai perubahan-perubahan yang terjadi pada lingkungan?" dan "Apakah perubahan lingkungan telah merubah perasaan Anda tentang tinggal di sini?" dan "Dapatkan Anda menceritakan pada saya bagaimana erupsi tersebut mempengaruhi Anda—baik secara mental maupun fisik?"

Keterlibatan Anda dalam penelitian ini sepenuhnya bersifat sukarela dan Anda dapat berhenti terlibat dalam penelitian ini sewaktu-waktu tanpa penjelasan atau prasangka. Anda juga dapat menarik segala data yang belum diproses dari penelitian ini.

Sebagian orang mungkin menjadi tertekan karena membicarakan pengalaman-pengalaman ini. Jika hal ini terjadi, Anda dapat menelepon orang yang namanya tercantum di bawah. Beliau tahu tentang penelitian ini dan telah setuju menyediakan waktu untuk siapapun yang ingin membicarakan perasaan mereka.

Tanggapan-tanggapan Anda dan segala macam rincian kontak akan dirahasiakan secara ketat. Data dari penelitian ini akan digunakan untuk publikasi dan laporan penelitian. Anda tidak akan diidentifikasi dalam bentuk apapaun dalam publikasi-publikasi tersebut.

Jika Anda memiliki pertanyaan tentang penelitian ini, silakan hubungi **- Sri Warsini atau Professor Kim Usher.**

Peneliti Utama:
Sri Warsini
Sekolah Keperawatan dan Kebidanan
Universitas James Cook
Telepon UJC: +617 4042 1548
HP Australia: +61 432694505
HP Indonesia: +62 85643383065
Email: sri.warsini@my.jcu.edu.au
Konselor Kesehatan Jiwa
Nama: Puji Sutarjo
Telepon:+62 8156876671

Pembimbing:
Nama: Professor Kim Usher
Sekolah: Keperawatan, Kebidanan & Gizi
Universitas James Cook
Telepon: +617 4042 1391
HP: : +61 408073427
Email: kim.usher@jcu.edu.au

INFORMED CONSENT FORM-INTERVIEW

PRINCIPAL INVESTIGATOR	**Sri Warsini**
PROJECT TITLE:	**What is the impact of environmental change caused by the eruption of Merapi volcano on the psychosocial health of the community: a mixed methods study**
SCHOOL	**School of Nursing, Midwifery and Nutrition**

I understand the aim of this research study is to determine the psychosocial impact of volcano eruption on Merapi's Survivors**.** I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve an interview and I agree that the researcher may use the results as described in the information sheet. I understand that my name will not be included on any resulting documents and that all attempts to protect my anonymity will be taken.

I acknowledge that:

- any risks and possible effects of participating in the interview have been explained to my satisfaction;

- taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided;

- that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

(Please tick to indicate consent)

I consent to be interviewed	☐	**Yes**	☐	**No**
I consent for the interview to be audio taped	☐	**Yes**	☐	**No**

Name: *(printed)*	
Signature:	**Date:**

JAMES COOK UNIVERSITY
AUSTRALIA

LEMBAR PERSETUJUAN - WAWANCARA

PENELITI UTAMA:	**Sri Warsini**
JUDUL PROYEK:	**Pengaruh perubahan lingkungan yang disebabkan oleh erupsi Gunung Merapi pada kesehatan psikososial masyarakat: sebuah penelitian dengan metode gabungan**
SEKOLAH:	**Sekolah Keperawatan, Kebidanan dan Gizi**

Saya mengerti tujuan penelitian ini adalah untuk mengetahui dampak psikososial erupsi gunung berapi pada korban Merapi yang selamat. Saya setuju untuk berpartisipasi dalam proyek ini, yang rinciannya telah dijelaskan pada saya, dan saya telah diberi lembar informasi tertulis untuk disimpan.

Saya mengerti bahwa partisipasi saya akan meliputi sebuah wawancara dan saya setuju bahwa peneliti dapat menggunakan hasilnya seperti yang telah dijelaskan pada lembar informasi. Saya mengerti bahwa nama saya tidak akan dimasukkan dalam segala dokumen yang dihasilkan dan bahwa segala upaya akan diambil untuk melindungi anonimitas saya.

Saya menyatakan bahwa:

- segala bentuk resiko dan dampak yang mungkin terjadi karena berpartisipasi dalam wawancara telah dijelaskan dengan memuaskan;
- saya mengambil bagian dalam penelitian ini secara sukarela dan saya mengetahui bahwa saya dapat berhenti mengambil bagian dalam penelitian ini sewaktu-waktu tanpa penjelasan atau prasangka dan saya dapat menarik segala data yang telah saya berikan selama belum diproses;
- bahwa segala informasi yang saya berikan akan dirahasiakan dengan ketat dan bahwa tidak akan ada nama yang akan digunakan untuk mengidentifikasikan saya dengan penelitian ini tanpa seizin saya;

(Silakan beri tanda centang untuk menunjukkan persetujuan)

Saya setuju untuk diwawancarai	☐	**Ya**	☐	**Tidak**
Saya setuju bahwa wawancara akan direkam	☐	**Ya**	☐	**Tidak**

Nama: *(huruf cetak)*	
Tanda tangan:	**Tanggal:**

IMPACT OF EVENT SCALE REVISED

INSTRUCTIONS: Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to _____, which occurred on _____. How much were you distressed or bothered by these difficulties? Item Response Anchors are 0 = Not at all; 1 = A little bit; 2 = Moderately; 3 = Quite a bit; 4 = Extremely.

	0	1	2	3	4
1. Any reminder brought back feelings about it.					
2. I had trouble staying asleep.					
3. Other things kept making me think about it.					
4. I felt irritable and angry.					
5. I avoided letting myself get upset when I thought about it or was reminded of it.					
6. I thought about it when I didn't mean to.					
7. I felt as if it hadn't happened or wasn't real.					
8. I stayed away from reminders of it.					
9. Pictures about it popped into my mind.					
10. I was jumpy and easily startled.					
11. I tried not to think about it.					
12. I was aware that I still had a lot of feelings about it, but I didn't deal with them.					
13. My feelings about it were kind of numb.					
14. I found myself acting or feeling like I was back at that time.					
15. I had trouble falling asleep.					
16. I had waves of strong feelings about it.					
17. I tried to remove it from my memory.					
18. I had trouble concentrating.					
19. Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.					
20. I had dreams about it.					
21. I felt watchful and on-guard.					
22. I tried not to talk about it.					

ENVIRONMENTAL DISTRESS SCALE

A. Characteristic Data

Please tick the appropriate box or write in your answers in the space provided.
What is your name?

1. I am: male ☐ female ☐
2. What is your age? ……years. Date of birth ……..
3. Please list your main occupations in Merapi area
4. Where do you live?
5. How long have you personally lived in Merapi area?…….. years. (Since:)

6. In which hamlet and village before 2010Merapi eruption and now?

7. When did earlier generations of your family come to Merapi area (including wider family)?How many generation that your family already stayed in Merapi?
8. Are you a Javanese?
   No ☐ Yes, Original from Jogjakarta ☐
   Yes, Javaness (East & Central Java) ☐
   If yes, is your traditional heritage in the Merapi area?
   No ☐ Yes ☐
9. Are you living in a residence (or on a property) that was occupied by earlier generations of your family?
   No ☐ Yes ☐ Other ☐ (Please explain)…….
   If yes, approximately what year did your family first occupy the residence or property
10. Which of the following applies to you?

	Now	Before Merapi eruption's 2010
I own/am purchasing my residence		
I am renting my residence		
I stay with my family		

11. Do you have children living in Merapi area?No ☐ Yes ☐

12. Do you have grandchildren living in Merapi area?No ☐ Yes ☐

13. How many eruptions of Merapi have you experienced before last eruption on 2010?

Year	Any victims in family? Death or injured?	House damage? Or being relocated	Living in the shelter/Evacuated?

2006			
1997-1998			
1994			
1984-1991			
1980-1984			

14. As a result of LAST ERUPTION (2010)

a. Did you have to leave your house? If Yes, for how long?	
b. If you had to evacuate did you move to a temporary shelter/ refugee tent? If No, where do you move?	
c. Did you have any experience living in the shelter? How long have you been in the shelter?	
d. Did you have any experience to be relocated?	
e. Is there any member of your family died because of this eruption?	
f. Is there any member of your family injured because of this eruption?	
g. What kind of property that lost from this eruption?(farmland, cattle etc)	

B. Environmental issues

I. Feelings about Living in the Merapi Area

Below are statements about living in Merapi area. Please indicate whether you agree or disagree with each.

Please tick the appropriate box whether you Agree, Neither agree nor disagree or Not Agree

	Agree	Disagree	Neither agree nor disagree
1. I am proud of the heritage of this place.			
2. I would continue to live in this place even if I were given the opportunity to leave.			

3. My sense of who I am is linked to the environment where I live.			
4. I get comfort or peace of mind from this place.			
5. I feel I know every part of these area			
6. I feel a deep connection to this place.			
7. I would rather live somewhere different; this is not the place for me.			
8. I feel a sense of connection to the people of this place			
9. I feel I have a duty to maintain the land for future generations			
10. Because of the changes to this place, I would leave if I could			

II. Environmental Issues – Frequency and Threat

Have you ever personally observed or experienced the following environmental issues in the Merapi area? If Yes,please indicate how often and how threatening each of the following issues is to you and your family (if appropriate).

	Yes/No	**How often?** **1.Never** **2. Sometimes** **3. Always**	**How threatening** **1. No threat** **2. Moderate threat** **3. Strong threat**
1. Heritage destruction (historic buildings, villages, cemeteries or sacred sites/middens).			
2. Large-scale change to the natural landscape (dams, trees burned down, tourism site, rivers).			
3. Air pollution from mountain eruption (ash,dust)			
4. Noise from mountain			
5. Vibration or shaking from mountain			
6. Land subsidence (cracks or depressions in ground or water courses).			
7. Loss of native vegetation and animals due to environmental change			
8. Soil erosion in river-side			
9. Damage to houses, buildings, public facilities (mosque, bridges, roads, schools, traditional market)			
10. Pollution from frequent vehicle (truck).			
11. Visual pollution from haze, smog, ash from mountain			

12. Heavy vehicle movements, vibration or shaking (from truck)			
13. Noise from truck / vehicle			
14. Rivers or creeks are getting shallow or dry			
15. Pollution of drinking water (dams, water tanks, rivers).			
16. Visual air pollution from dust which stick on the roads			
17. Pollution of drinking water (dams, water tanks).			
18. Pollution of land			

IV. Felt Impact

Below are statements about the possible impacts of environmental change in the Merapi area. Please indicate whether you agree, neither agree nor disagree or disagree with each statement.

	agree	neither agree nor disagree	disagree,
1. Economic benefits after Merapi eruption (provide another job)			
2. Merapi eruption makes farm land become drought			
3. Cattle cannot have enough food			
4. I am unable to enjoy life as much as I'd like because of environmental problems/changes.			
5. I feel positive about environmental changes.			
6. Claims about sickness being caused by environmental pollution are exaggerated			
7. Living more closely with neighbour			
8. Feeling difficulty to breed the cattle (in separate area)			
9. Temperature is getting hotter			
10. Took more time to go anywhere (because roads and bridges are damage)			
11. People I know have become jobless because eruption			
12. I am upset at the destruction of heritage buildings and landmarks due to eruption.			
13. There is a lot of people loss their family house and facilities			
14. Government are genuinely helpful to build a new			
15. My ability to make a living has been negatively affected by environmental changes.			
16. I feel angry about degradation in my local environment.			

17. I am worried about risks to human health from nearby environmental pollution.			
18. I am concerned that future generations will not be able to enjoy the natural environment.			
19. I am worried that mental health problems will increase in my neighbourhood			
20. I am frustrated because I can't change the environment to become better.			
21. I am concerned environmental problems will cause illness to myself or my family.			
22. I am satisfied with the government's efforts to monitor environmental impacts in my land farm			
23. Environmental changes in my locality are decreasing the value of my home/property.			
24. People in this area feel frustrated because the government will banned them to stay in Merapi if another big eruption happened			
25. People I know have given up trying to preserve the environment because they feel powerless			
26. The overall impact of disaster in this area is depressing.			
27. There is a lot of asthma or other respiratory disease because of air pollution			
28. People I know have become accepted or grateful to whatever situation in Merapi			

III. Feelings About Changes in the Merapi Area

Do you agree or disagree with the following statements relating to change in your local environment in the Merapi area?

You may rate Strongly agree, Agree, Neither agree nor disagree , Disagree or Strongly disagree

	Strongly Agree	Agree	Neither Disagree nor Agree	Disagree	Strongly disagree
1. My sense of belonging to this place has been undermined by unwelcome change.					
2. I am sad that the only things that I see in the river is rock					

3. I am worried that aspects of this place that I value are being lost (e.g., beautiful scenery).					
4. I miss having the sense of peace and quiet I once enjoyed in this place.					
5. I am disappointed and sad of the way this area looks now.					
6. A farming lifestyle that depends on good land and water is being threatened by environmental change.					
7. Unique aspects of nature that made this place special are being lost forever.					
8. I am saddened when I look at degraded landscapes and everything is buried.					
9. The thought of government forced to leave this place upsets me.					
10. I feel good about the restoration of the environment (e.g.,rehabilitation).					

VII. Activities

Please indicate whether or not you have done any of the following activities in response to environmental concerns in the Merapi area.

	Yes	No
A. Nothing; I just stayed indoors to avoid air pollution		
B. I just talked to family, neighbours, friends or relatives about environmental concerns		
C. Sought information on environmental issues (e.g., from the		

newspaper, friends or institution).		
D. Contacted local government representatives about the environment		
E. Contacted public health (nurse, physician) about health problems due to environmental changes		
F. Written "letters to the editor" of a newspaper		
G. Joined a community group focussing on environmental concerns		
H. Attended a community meeting discussing environmental concerns.		
I. Modified my home to reduce the effects of pollution		

SKALA DAMPAK TERHADAP KEJADIAN

PETUNJUK: Di bawah ini merupakan daftar kesulitan yang biasa dialami orang setelah mengalami kejadian-kejadian yang membuat stress. Silakan **baca setiap pernyataan, dan kemudian pilih seberapa menyusahkan setiap kesulitan tersebut bagi Anda SELAMA TUJUH HARI TERAKHIR berkenaan dengan Letusan Merapi, yang terjadi pada Oktober 2010. Seberapa besar penderitaan dan gangguan yang Anda rasakan akibat kesulitan-kesulitan ini.**

Berilah nilai 0 = Tidak sama sekali; 1 = Sedikit; 2 = Sedang-sedang saja (cukup); 3 = Sedikit banyak; 4 = Sangat.

No	Pernyataan	0	1	2	3	4
1	Hal-hal yang mengingatkan saya pada peristiwa erupsi Merapi membuat saya merasakannya kembali					
2	Saya mengalami kesulitan untuk tidur nyenyak.					
3	Ada hal-hal yang terus membuat saya memikirkan kejadian tersebut					
4	Saya merasa mudah tersinggung dan marah					
5	Saya berusaha untuk tidak bersedih ketika memikirkan atau teringat akan peristiwa tersebut					
6	Saat saya tidak bermaksud untuk memikirkannya, kejadian tersebut malah terpikirkan					
7	Saya merasa seperti kejadian tersebut tidak pernah terjadi atau tidak nyata (masih tidak percaya)					
8	Saya berusaha menjauhi hal-hal yang dapat mengingatkan pada kejadian tersebut					
9	Gambaran atau bayangan tentang kejadian itu muncul di pikiran saya					
10	Saya gelisah dan mudah terkejut					
11	Saya mencoba untuk tidak memikirkan kejadian tersebut					
12	Saya sadar bahwa saya masih menyimpan banyak perasaan tentang kejadian tersebut, tetapi saya tidak memperdulikannya					
13	Saya sudah tidak memiliki perasaan apapun terhadap kejadian itu					
14	Saya menyadari diri saya bersikap seperti kembali pada masa tersebut.					
15	Saya mengalami kesulitan untuk tidur.					
16	Saya mengalami gelombang perasaan yang kuat (shock) mengenai kejadian tersebut (Jika ingat saya masih sedih atau bisa menangis)					
17	Saya mencoba menghapus kejadian tersebut dari ingatan saya.					
18	Saya mengalami kesulitan berkonsentrasi.					
19	Jika ingat kejadian tersebut menyebabkan saya mengalami reaksi fisik seperti berkeringat, kesulitan bernafas, rasa mual, atau jantung berdebar-debar					
20	Saya mengalami mimpi tentang kejadian tersebut.					
21	Saya merasa diri saya lebih waspada dan selalu berjaga-jaga					
22	Saya berusaha untuk tidak membicarakan kejadian tersebut					

SKALA DISTRESS TERHADAP LINGKUNGAN

A. Permasalahan Lingkungan

I. Perasaan Terkait dengan Tinggal di kawasan Merapi

Berikut adalah beberapa pernyataan tentang hidup di <u>daerah Merapi</u>. Berilah tanda jika Anda setuju atau tidak setuju dengan masing-masing pernyataan. Berilah tanda centang (✓) pada kotak yang sesuai apabila Anda Sangat setuju (SS), setuju (S), tidak setuju (TS), sangat tidak setuju (TS) atau ragu-ragu (tidak menjawab setuju atau tidak setuju)

Pernyataan	**SS**	**S**	**Ragu-ragu**	**TS**	**STS**
1. Saya merasa bersyukur atas kekayaan/keindahan alam yang ada di tempat ini					
2. Saya akan tetap tinggal di tempat ini meskipun saya diberi kesempatan untuk pindah.					
3. Saya merasa sangat memiliki lingkungan tempat saya tinggal.					
4. Saya mendapatkan kenyamanan dan ketenangan pikiran dari tempat ini.					
5. Saya merasa mengenal sekali wilayah ini.					
6. Saya memiliki ikatan batin dengan tempat ini.					
7. Saya lebih memilih tinggal di tempat lain; daerah ini bukan lagi tempat yang cocok bagi saya					
8. Saya memiliki hubungan yang dekat dengan orang-orang yang tinggal di sini (rasa senasib sepenanggungan)					
9. Saya merasa memiliki tanggung jawab untuk menjaga tanah ini untuk anak cucu saya					
10. Karena perubahan pada tempat ini, saya akan pindah jika bisa					

II. Permasalahan Lingkungan – Frekuensi dan Ancaman

Pernahkah Anda <u>mengamati atau mengalami sendiri</u> permasalahan lingkungan di bawah ini di area Merapi? S<u>eberapa sering</u> dan <u>seberapa besar ancaman bahaya</u> dari masing-masing masalah di bawah ini bagi Anda dan keluarga (sesuai kondisi anda).

Pernyataan	**Tdk(1) Ya (2)**	**Seberapa sering 1.Sekarang sudah tidak lagi 2. Kadang-kadang 3. Selalu (hampir setiap hari)**	**Seberapa mengancam 1.Tidak mengancam 2.Ancaman sedang 3.Sangat mengancam**
1. Kerusakan warisan leluhur (bangunan bersejarah, **dusun**, makam, atau situs suci peribadatan)			
2. Polusi udara akibat letusan (erupsi) gunung (abu, debu)			
3. Suara gemuruh yang berasal dari gunung			
4. Getaran atau goncangan yang berasal dari gunung			

Pernyataan	Tdk(1) Ya (2)	Seberapa sering 1.Sekarang sudah tidak lagi 2. Kadang-kadang 3. Selalu (hampir setiap hari)	Seberapa mengancam 1.Tidak mengancam 2.Ancaman sedang 3.Sangat mengancam
5. Erosi (pengikisan) tanah di tepi sungai atau jurang (longsor)			
6. Kerusakan pada rumah, bangunan, fasilitas umum (masjid, jembatan, jalan, sekolah, pasar tradisional)			
7. Polusi yang disebabkan oleh kendaraan yang hilir mudik (truk).			
8. Polusi visual (jarak pandang terganggu) karena kabut, asap-kabut, abu dari gunung			
9. Pergerakan, getaran atau goncangan kendaraan berat (karena truk)			
10. Suara bising dari truk / kendaraan			
11. Sungai atau anak sungai menjadi dangkal atau kering			
12. Polusi pada air minum (bendungan, tangki air, sungai)			
13. Polusi udara visual (jarak pandang) karena debu yang menempel di jalan			
14. Polusi pada air tanah.			
15. Polusi tanah			

III. Dampak yang Dirasakan

Di bawah ini adalah **pernyataan-pernyataan tentang <u>kemungkinan dampak</u> dari perubahan lingkungan di area Merapi**. Berilah tanda jika Anda sangat setuju (SS), setuju (S), ragu-ragu, tidak setuju (TS), atau sangat tidak setuju (STS) dengan masing-masing pernyataan.

Pernyataan	SS	S	Ragu-ragu	TS	STS
1. Setelah erupsi Merapi, lebih banyak manfaat/keuntungan yang didapat warga daripada kerugian (mendapat pekerjaan, bantuan rumah, dll)					
2. Akibat erupsi Merapi tanah pertanian menjadi kering					
3. Setelah erupsi, pakan ternak menjadi berkurang					
4. Saya tidak bisa menikmati hidup seperti yang saya inginkan karena perubahan/permasalahan lingkungan.					
5. Menurut saya, ada manfaat (dampak positif) dari perubahan/kerusakan lingkungan akibat erupsi Merapi					
6. Keluhan tentang penyakit yang disebabkan oleh perubahan lingkungan akibat Merapi banyak terjadi					
7. Saya memiliki hubungan yang lebih dekat dengan tetangga saya setelah erupsi					
8. Merasakan kesulitan mengembangbiakkan hewan ternak (contoh karena berada di tempat yang terpisah)					

Pernyataan	SS	S	Ragu-ragu	TS	STS
9. Suhu udara menjadi semakin panas					
10. Perlu waktu lebih lama untuk pergi ke mana-mana (karena jalan dan jembatan banyak yang rusak)					
11. Orang-orang yang saya kenal kehilangan pekerjaan karena erupsi Merapi					
12. Saya merasa sedih pada rusaknya bangunan-bangunan dan keadaan akibat erupsi					
13. (Akibat letusan Merapi) banyak orang yang kehilangan anggota keluarga mereka					
14. Pemerintah sangat membantu dalam pembangunan rumah dan fasilitas baru					
15. Pendapatan (penghasilan) saya menurun akibat dampak erupsi					
16. Saya merasa kecewa dengan rusaknya kondisi lingkungan sekitar saya akibat erupsi					
17. Saya khawatir bahwa generasi mendatang tidak akan bisa menikmati lingkungan Merapi yang alami					
18. Saya khawatir bahwa permasalahan kesehatan jiwa akan meningkat di lingkungan saya (stress akibat letusan Merapi)					
19. Saya merasa frustrasi karena saya tidak bisa mengubah lingkungan menjadi lebih baik.					
20. Saya khawatir bahwa permasalahan lingkungan akan menyebabkan penyakit pada diri saya sendiri atau keluarga saya.					
21. Saya merasa senang dengan usaha pemerintah untuk memantau dampak kerusakan lingkungan akibat erupsi di wilayah saya					
22. Perubahan lingkungan di daerah saya menurunkan nilai rumah/pekarangan saya.					
23. Masyarakat di area ini merasa kecewa (frustrasi) karena pemerintah akan melarang mereka tinggal di Merapi jika terjadi erupsi besar lagi					
24. Orang-orang yang saya kenal merasa tidak berdaya(mampu) dalam memperbaiki lingkungan yang rusak					
25. Dampak keseluruhan dari bencana di area ini menyedihkan					
26. Banyak yang terkena asma atau penyakit pernafasan lain karena polusi udara					
27. Saya (warga) telah menerima kejadian erupsi Merapi atau kerusakan yang disebabkan erupsi					

IV. Perasaan Mengenai Perubahan di Area Merapi

Apakah Anda setuju atau tidak setuju dengan pernyataan-pernyataan di bawah ini, mengenai perubahan di lingkungan asal Anda di area Merapi? Anda dapat memilih Sangat setuju, Setuju, Tidak dua-duanya (Ragu-ragu), Tidak setuju, atau Sangat tidak setuju

Pernyataan	Pilihan respon				
	SS	S	Ragu-ragu	TS	STS
1. Kecintaan saya pada Merapi berkurang karena erupsi atau perubahan lingkungan akibat erupsi					
2. Saya merasa sedih karena yang saya lihat Merapi tidak sehijau dulu lagi					
3. Saya khawatir bahwa aspek-aspek bernilai dari tempat ini telah hilang (e.g. kesuburan, keindahan)					
4. Saya merindukan rasa damai dan tenang yang dulu saya nikmati di tempat ini.					
5. Saya sedih dan kecewa melihat keadaan daerah ini sekarang.					
6. Gaya hidup bertani yang bergantung pada tanah dan pengairan yang baik terancam oleh perubahan lingkungan.					
7. Kerusakan lingkungan akibat erupsi membuat Merapi tidak nyaman untuk dihuni					
8. Saya menjadi sedih saat melihat lingkungan yang rusak dan segala sesuatunya sekarang hanya pasir dan batu					
9. Saya menjadi marah jika ingat paksaan pemerintah untuk meninggalkan tempat ini.					
10. Saya senang atas usaha perbaikan yang telah dilakukan setelah erupsi Merapi					

V. Aktivitas-aktivitas

Berilah tanda jika Anda pernah atau tidak pernah melakukan aktivitas di bawah ini sebagai respon kepada permasalahan lingkungan di area Merapi.

Aktifitas	Pernah (Ya)	Tidak Pernah (Tdk)
A. Berdiskusi/berbicara pada keluarga, para tetangga, teman atau kerabat tentang permasalahan lingkungan		
B. Mencari informasi tentang persoalan lingkungan (e.g., dari koran, dari teman atau dari institusi).		
C. Menghubungi perwakilan pemerintah daerah yang menangani lingkungan		
D. Menghubungi petugas kesehatan masyarakat (perawat, dokter) tentang permasalahan kesehatan akibat perubahan lingkungan		
E. Menulis “surat pembaca” di sebuah surat kabar.		
F. Bergabung dengan sebuah kelompok atau komunitas yang berfokus pada permasalahan lingkungan. **Sebutkan!**		
G. Menghadiri sebuah pertemuan masyarakat yang membahas permasalahan lingkungan		
H. Memodifikasi rumah saya untuk mengurangi dampak polusi. **Sebutkan!**		
I. Tidak melakukan apa-apa; Saya hanya tinggal di dalam rumah untuk menghindari polusi udara.		

This publication has been removed due to copyright restrictions

The psychosocial impact of the Mt Merapi volcano eruption on survivors in Indonesia.

JAMES COOK UNIVERSITY AUSTRALIA

PhD Candidate: Sri Warsini
Supervisors: Prof. Kim Usher, Assoc. Prof. Jane Mills & Dr. Caryn West
Special acknowledgements: Associate Professor Petra Buettner.
School of Nursing, Midwifery & Nutrition & Centre for Nursing & Midwifery Research

Aim: The aim of this cross sectional study was to determine the psychosocial impact of the 2010 Mt Merapi volcanic eruption on survivors.

In particular, the study compared the psychosocial impact for participants from the Cangkringan subdistrict who experienced the last eruption (2010), with participants from the Pakem sub district who experienced several eruptions prior to 2010. The Impact of Event Scale-Revised (IES-R) is used to measure the psychosocial impact.

Background: The Merapi mountain eruption in October 2010 was one of the largest natural disasters to occur in Indonesia for many years. The eruption resulted in many deaths and injuries, caused widespread destruction of farm land and villages, and disrupted social support services. Many of the survivors were required to relocate to shelters.

Sample: A systematic stratified sampling of 348 survivors in 2 sub districts participated in survey.

Table 1:PTSD subscale details as described by 348 survivors of the Mt Merapi eruption, Indonesia, October 2010.

Scale	Cangkringan (N=175) Median (IQR)	Pakem (N=173) Median (IQR)	p
IESR total score	17 (11-29)	13 (8-19)	<0.001
Intrusion score	5 (2-10)	3 (1-7)	<0.001
Avoidance score	8 (4-11)	5 (4-8)	<0.001
Hyper arousal score	4 (3-7)	4 (2-8)	0.003

Table 2: The regression analysis results

Characteristic	Coefficient	95% CI	p value
Age (elderly)	-0.013	-0.016, -0.009	<0.001
Gender (male)	-0.323	-0.446, -0.199	<0.001
Location (Cangkringan)	0.184	0.044, 0.325	0.010
House ownership (rent)	-0.732	-1.312, -0.151	0.014

Results: Multivariable findings showed a significant difference in the IES-R score between participants from the two districts (p=0.001) with Cangkringan district participants returning a higher IES-R score than Pakem participants (Median 17 and 13, IQR 11-29 & 8-19, respectively). Multivariable analysis found also that older people were scoring lower on the IESR scale (p< 0.001), as did male participants (p<0.001) and people who rented a house (p=0.014).

Discussion: Overall, the findings indicate that psychosocial distress was highest in the group who experienced the latest eruption compared to those who did not.

Relevance to clinical practice: Developing a better understanding of the psychosocial and environmental distress related to a natural disaster such as a volcanic eruption will assist nurses and other health professionals to develop interventions to ameliorate distress in the future.

Images of Mt Merapi accessed from Google Images, public content.

compassion and care IN A CHANGING WORLD

The 3rd Asia-Pacific International Conference on Qualitative Research in Nursing, Midwifery and Health

1st - 3rd October 2014
Newcastle City Hall,
Newcastle NSW Australia
www.icqrnmh.info

Hosted by

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

CONFERENCE PROGRAM

Gold Sponsors

Bronze Sponsor

FAU
CHRISTINE E. LYNN COLLEGE OF NURSING
Florida Atlantic University

Exhibitors

Laerdal
helping save lives

GS | GRADSCHOOL.EDU.AU

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

une University of New England

footprint .com.au
Life Long Learning.

Supporters

A5.2

The experience of living in the shadow of an active volcano in Indonesia

Sri Warsin[1], Kim Usher[2], Jane Mills[1] & Caryn West[1]

[1] School of Nursing, Midwifery & Nutrition, James Cook University, Australia
[2] School of Health, University of New England, Australia

Mount Merapi is one of the most active volcanoes both in Indonesia, and the world. The last eruption in 2010 inflicted heavy casualties on Cangkringan village. To date, there has been no research into the lived experience of living in the shadow of an active volano, a gap this study seeks to address. This study aims to describe the lived experiences of people living in the shadow of Mount Merapi. A phenomenological research design was employed with a total of 20 villagers of Cangkringan. Twenty participants were interviewed and the transcripts subjected to a phenomenological type analysis. The results demonstrate that villagers have a very close connection with Merapi because it is the place where they were born. Such a bond extends to the people with whom they live in their local community. Moreover, Merapi has magnificent scenery and abundant natural resources that support their livelihood. When displaced by the eruption, participants felt separated from their home. What they wanted was to return to the mountain where they live so as to rebuild their lives regardless of the impact of the eruption.

ORIGINAL RESEARCH

Translation, Cultural Adaptation, and Psychometric Testing of the Environmental Distress Scale With Indonesian Survivors of a Volcanic Eruption

Sri Warsini, MMed; Petra Buettner, PhD; Jane Mills, PhD; Caryn West, PhD; Kim Usher, PhD

 DOI: 10.1017/dmp.2014.45

Journal of Psychiatric and Mental Health Nursing, 2015, **22**, 251–259

Psychometric evaluation of the Indonesian version of the Impact of Event Scale-Revised

S. WARSINI[1,2] BSN MMed, P. BUETTNER[3] PhD,
J. MILLS[4] RN PhD MN MED BN FACN,
C. WEST[5] PhD Grad Dip Ed (TT) Grad Cert Res Meth RN &
K. USHER[6] RN DipAppSc (Nsg) BA MNSt PhD FACN FACMHN

[1]PhD candidate, College of Healthcare Sciences, School of Nursing, Midwifery and Nutrition, James Cook University, Cairns, [3]Associate Professor, School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Townsville, Qld, [4]Professor, Centre for Nursing and Midwifery Research, James Cook University, Cairns, [5]Senior Lecturer, Deputy Director of WHO Collaborating Centre for Nursing and Midwifery Education and Research Capacity Building, James Cook University, Cairns, [6]Professor, School of Health, Armidale, University of New England, NSW, Australia, and [2]Lecturer, School of Nursing, Faculty of Medicine, Universitas Gadjah Mada, Yogyakarta, Indonesia

research seminar

You are invited to attend the

Confirmation Seminar by

Doctor of Philosophy candidate

Sri Warsini

Registered Nurse

Bachelor of Nursing
| University of Indonesia

Research Masters (Tropical Health)
| Gadjah Mada University (Indonesia)

When: 11:00 – 11:50 am
Monday 10 December 2012

Where: Townsville – 25-236 (videolink)
Cairns – A21.001

Panel: Prof Kim Usher
| Principal Advisor

A/Prof Jane Mills
| Co-Advisor

Dr Caryn West
| Associate Advisor

Prof Matthew Yau
| Research Student Monitor

JAMES COOK UNIVERSITY AUSTRALIA

School of Nursing, Midwifery & Nutrition

Dr Elizabeth Emmanuel, Postgraduate Liaison Officer
(Ph: 4042 1306 or Elizabeth.Emmanuel@jcu.edu.au)

The impact of the environmental change related to the eruption of the Merapi volcano on the psychosocial health of the community: A mixed methods study

The last Merapi mountain eruption in October 2010 was one of the largest natural disasters to occur in Indonesia during a three year period. This disaster not only caused people to experience multiple losses but also caused extensive environmental damage. Little is known about the psychosocial impact of volcanic eruptions or the impact of living in continual threat of a volcanic eruption. Further, little is known of the distress associated with the environmental damage that results from natural disasters.

The aim of this explanatory mixed methods research is to determine the impact of the volcanic eruption on the people who live nearby Merapi Mountain and the distress they experience as a result of the environmental damage resulting from the eruption.

Data collection will be conducted in two phases. In the first phase, data will be collected using a questionnaire containing two well-established measurement tools-the Environmental Distress Scale and the Impact of Event Scale- Revised. Initially both tools will be translated to Bahasa and Javanese and back translated to English and authenticated prior to psychometric testing with the Indonesian population. Three hundred participants will be drawn from five villages in Cangkringan sub-district. Data will be analysed using descriptive and inferential statistics with the aid of the Statistical Package for the Social Sciences (Version 20).

In the second phase of the study, in-depth interviews will be conducted, as a follow up of the first phase to understand more about the results and content analysis will be used to analyse the data.

JAMES COOK UNIVERSITY
AUSTRALIA

College of Healthcare Sciences
Nursing, Midwifery & Nutrition

You are invited to attend the

PRE-COMPLETION SEMINAR

by Doctor of Philosophy candidate

SRI WARSINI

Wednesday 15 October 2014
3:00 – 3:50 pm

CAIRNS - A21.001 | TOWNSVILLE - DA9.001

Psychosocial and environmental distress resulting from a volcanic eruption: A mixed methods study

ABSTRACT: Little is known about the psychosocial impact resulting from a volcano eruption. The aim of this study was to determine the psychosocial impact of the eruption of Mt Merapi in 2010 and the distress related to the environmental degradation caused by the eruption. A three-phase explanatory mixed method study was conducted. The first phase translated and tested the Impact of Events Scale-Revised and Environmental Distress Scale; the second phase involved 350 participants from Cangkringan and Pakem sub districts in a correlational survey; and the last phase of the study included in-depth interviews with 20 Cangkringan participants. The results indicate that survivors from Cangkringan have higher rates of Post Traumatic Stress Disorder (PTSD) and Environmental distress. PTSD problems experienced by survivors varies by age, gender and home ownership status and the factors that affect environmental distress are age, education level and employment status. The lived experience of survivors conveyed a very close connection with Mt Merapi.

SUPERVISORY PANEL

Primary Advisor - Professor Kim Usher
Co-Advisor - Associate Professor Jane Mills
Associate Advisor - Dr Caryn West
RSM - Associate Professor Alan Clough

Enquiries: A/Prof David Lindsay, Postgraduate Liaison Officer - Ph: (07) 4781 5319 or David.Lindsay@jcu.edu.au

ALL WELCOME

Evidence in Indonesian
Ya senang disana yang pertama memang kelahiran saya disitu lantas mata pencaharian saya ya bertani, maupun berkebun maupun beternak ditempat itu juga (Warseno). Senengnya sih, sini sudah tanah warisan ya mbak, bapak saya nenek saya gitu lho..jadi mau meninggalkan itu gimana gitu. Udah macam udah mendarah daging gitu lho, saya lahir disini, orang tua saya juga lahir disini (Mariam) Betah yo gimana sih mbak kan udah tempat tinggalnya (tertawa) (Sumawarni)
Disini tanahnya subur, terus airnya sih lancar tur jenih itu lho mbak..terus ya udara masih segar gitu lho (Mariam)
Sebelum erupsi kan mau ke sawah nanam apa kan bisa,nanam padi bisa apa apa bisa..kalau yang ga punya sawah kan ke tegal, di tegal bisa mau ambil kelapa, mau jual kayu bisa (Sri Ariyani) Lha dulu kan punya lahan lebar, punya ternak sapi juga, kambing juga ayam juga (Waljinah) Ya, sulit *kulo teng Ngancar niku nggih kulo wong tiyang mboten gadah, waune nggih wong kulo nyambute damel mung pados pasir dugi kali adem mriko, kadang kadang buruh mundut kelopo*.
Lingkungan juga sdh dibangun bersama sama dengan kegotong royongan warga (Warseno) Ya tetangga tetangganya juga cedak, sama baik-baik semua, tetangganya ga pernah bikin begini begini ga itu. jadinya kan rasanya betah (Kalista)
Hari H itu saya mulai sejak pukul setengah delapan (malam) itu jaga disini...itu setelah jam 11 itu ada guncangan yang lebih besar.. Bunyi dari merapi itu luar biasa setelah itu sudah tidak ada suara lagi. Nah saya kan itu berbaring disini. Belum sampai naik papan (tempat tidur) itu, anak saya yang di pengungsian pulang. Saya di *gugah* diajak pergi. Setelah jam 12 saya sudah sampai di Kalasan. Setelah saya sampai di Kalasan sini sudah habis. (saya) itu bisa melihat apa yang terjadi itu bisa melihat. Saya menyebrang sungai Gendol itu saya makai baju lengan panjang itu sudah merasa panas. Yang bisa dilihat hanya letusan bambu bambu itu kan merah merah, ada yang hitam . Setelah itu saya sampai jalan Cangkringan, Ngangkruk situ sudah ada abu kering (Sudarno) Pas kejadian (saya) baru dirumah..trus tau tau suami saya telpon (saya) disuruh bersiap siap. Ga ada setengah jam, paling lima menit lah lima menit (sudah) disuruh keluar dari rumah. Nah posisi keluar dari rumah kan nungguin keluarga yang lain sambil memutuskan kita mau pergi kemana... Nah waktu itu ibu saya dan keluarga saya itukan mau beli bensin di pojok situ. Tau tau posisi apa itu (awan panas) sudah sampai ke Banjarsari itu. Lha yang jualan bensin itu itu malah meninggal (jadi korban). Lha terus keluarga saya sudah terjebak disitu. Tapi untungnya masih

ada jalan yang situ. Terus saya sama om saya naik motor lewatnya jalur situ. Trus pas lewat situ, om saya sudah ga bisa nyabrang, sementara saya dan adik saya Alhamdulillah bisa. Saya melihat dari belakang sudah ga ada (om saya)...terus saya bingung mau kemana. Terus (saya) kembali lagi ke perempatan Banjarharjo..dari situ udah banyak yang *irit iritan* itu..udah kita ikuti ah ikut ikutan aja mau pergi kemana..kayak ga punya tujuan mau kemana itu lho...(risa)
Saya sudah (mengungsi) di daerah Klaten sana. Sudah jauh saya. Lha saya lihat dari Prambanan itu abunya, getarannya itu juga masih terasa kok. Suaranya itu terasa terdengar juga (Yatiman) Ya itu kalau malam itu mbak terdengar suara gemruduk itu di Prambanan aja terdengar. Langsung mikir rumah *koyo opo engko gek ngomahe keneng kepriye nggih mikir ngoten ra iso turu terusan mikir niku. Mengke anggere mikir niku wedi ra ajeng turu mikir niku mawon*(Kalista)
Ga nafsu makan itu di dalam pengungsian rasane mbok makan apa aja biarpun dikasih ga usah beli tapi rasanya kok ga enak kayak dirumah. Kalau dirumah sendiri itu rasanya walaupun makan ama daun papaya rasanya enak, kalau di pengungsian dikasih ama ayam, dikasih ama telor ning rasanya ga enak. Enak kalau di rumahnya sendiri.*Mengke anggere mikir Merapi niku wedi ra ajeng turu niku ra iso turu kelingan niku ngoten mikir niku mawon* (Kalista)
Kalau yang umur 50 kebawah kan kalau (siang) dipengungsian dulu toh pulang, niliki omah (kalau masih ada), terus balik ke sana (pengungsian) lagi niliki anak, pulang lagi (ke rumah) yang punya hewan kan ngurusi hewan yang masih hidup (Sri Ariyani) Ya, (jam) 12 siang itu (pengungsi) sudah kembali keatas lagi, ya mencari nafkah ya untuk keluarga..(Sudarno)
Sehabis merapi meletus itu kan tinggal di pengungsian, sehabis pulang dari pengungsian saya kembali ke rumah saya sendiri, itu ya disini setelah jam 12 ada agak mendung itu sama sama kembali ke pengungsian, jadi agak was was kalau ada lahar dari atas. Lha ini jalan ini dilewati (banjir) lahar dingin empat kali kok. Itu lewatnya dijalan ini perkiraan setelah 3 - 4 bulanan (Sudarno) Aku *yo omong* sambil *trocos*, Ya Allah bencana sampai kapan selesainya? Kalau kayak *lindu* Bantul kan cuma satu kali ya mbak..kalau ini kan enggak..sampai 4 bulan..*jan* aku merasa tertekan (Sri Ariyani)
Kulo gih sak jeke gih ngalami ngerti pisan niki tok kok mbak. Riyen namung banjir banjir gede mawon mboten ngasi ngelompati kali ne ngoten nek jaman riyen riyen niku. (Kalista) Sdh berapa kali terkena bencana merapi itu..sudah 3 kali ..tetapi tidak seperti yang kemarin itu...kalau dulu itu hanya air bah di jurang jurang itu..kalau hujan awu (tidak pernah).. (Guno)

Ya secara sepintas saya masih ingat walaupun sebelum erupsi saya masih punya ibu, punya kakak punya keponakan. Lha giliran sudah erupsi kan saya ga punya kakak, ga punya ibu ga punya keponakan. lha saya kan korbannya kan lima tho...memang saya akui tapi saya yo walaupun kalau langsung blas hilang itu di otak sini saya yo belum bisa gitu. Lha terus rumah saya kan juga *keledaran* (kena banjir lahar dingin) (Sri Ariyani)
Perbedaannya cari rumput dulu kan bisa gampang gitu lho, sak niki kan pun rodo angel nggih an (Thursina) Karena itu, kalau dulu bercocok tanamnya ke tanah langsung. Kalau sekarang kan bercampur ada pasir dan batu batu kecil itu tho. Sekarang juga tambah panas. Kalau panas begini tho, malah kadang ada yang mati. Jadi harus bawa air dari rumah untuk menyirami tanaman (Muningsih)
Saya itu sebelum erupsi tidak pernah saya itu suntik itu ndak pernah. Kalau sekarang *paribasan*e tiap bulan itu kalau merasakan bagaimana itu (keluhan penyakit) itu harus cepat cepat ke dokter. (Sudarno) Iya, lebih panas sekarang. Terus kalau punya anak sekarang jadi gampang sakit.. Iya ini anak saya satu bulan bisa dua kali (ke dokter). Kalau dulu jarang kok..paling 3 bulan baru pilek atau apa itu..sekarang ini tadi aja baru pulang dari puskesmas. (Muningsih)
Ya ada ada..itu bude saya di Jetis sumur sini..kan ingatannya beda..gitu lho ga seperti dulu..kadang kadang ki kalau ada rang itu takut (Waljinah)
Sekarang yang di shelter yang Banjarsari kan kalau mbak e nanti kesana kan kan udah pada seneng *tho ketoke*. Kan rumahnya bagus, punya ini punya itu. yg atas atas itu kan sekarang kan udah yang dulunya ga punya mobil sekarang punya mobil yang dulunya sepeda motor … dulu cuma satu sekarang punya dua motor. Yo kan walaupun pas itu pasir masih banyak banyaknya kan yo tho mbak..satu hari cari kan dapat banyak tho.. satu hari itu ga kurang, bersih itu 100 ribu itu ga kurang (Sri Ariyani).
Sekarang itu rasanya ya gimana dianggap tentram ya enggak, dianggap enggak ya tentram. . kalau gunungnya itu ga (menunjukkan aktifitasnya) ya saya rasa sudah tentram tapi kalauntar gunungnya itu mengebul atau abunya bertebar rasanya masih takut.. Kalau dulu itu belum (erupsi) itu yo pergi ke pasar, ke tegal ke mana mana rasasanya gimana pokoknya ga buru buru. Ga takut ini ga takut itu. Sekarang kalau di tegal itu sudah berapa jam aja teru itu kalau mendung kelihatannya mau hujan udah takut, (lalu) pulang gitu (Kalista) Ya ..dulu sejak tiba itu ya semuanya sedih..kan bagaimana besok, hidupnya, cari nafkahnya, cari hidup yang bagaimana seperti dulu bisa ga (Waljinah)

Oh ga (kalau)saya biasa biasa saja. Soalnya gunung itu sudah terbiasa (meletus). Setiap empat tahun harus bekerja entah besar entah kecil. Saya juga sudah diberi tahu (oleh) yang berwajib sudah dilatih bagaimana menjaga jaga..kalau akan ada bencana harusnya begini begini..dilatih, latihan (Yatiman)
Ya cuman gini aja sebelum erupsi kayak gini sesudah erupsi ya kayak gini..tapi ya sudah saya syukuri. Alhamdulillah lah..keluarga (inti) saya masih utuh, masih sehat walaupun saya kehilangan kakak, kakak tiri, ponakan, simbok (Sri Ariyani) tapi sekarang orang mikirnya gini kita cari uang tapi ga terlalu ngoyo (tertawa). Pemikirannya lain, kalau dulu kan misalnya yo buat istilahnya bangun rumah gede apa gimana..kayaknya sekarang ga sih.sekarang rumah biasa aja, ga kayak dulu(Sumawarni) kan sesungguhnya yang dapat membuat musibah,atau bencana itu kan dari alam, apakah manusia dapat mengendalikan kehendak alam? Kan tidak dapat..lha itu kan lantas membuat pikirannya jadi *nyeleh*(sabar)..jadi tidak ada dendam itu ga ada. Soalnya itu kan kejadian alam, kehendak Tuhan. (Warseno)
Kalau yang muda itu kan pikirannya masih panjang, buat besok besok..trus anaknya besok gimana. Kalau lansia kan sekarang sudah ikut sama anak, kan ya otomatis yang cari (makan) anak tho..kan pikirannya bisa lebih rileks gitu lho(Muningsih) Kan masih muda ya mbak, kalau masih muda itu banyak yang berangan angan, wah saya (mau) beli mobil, (mau) beli montor, kan hasilnya lebih melimpah. Kalau orang seperti saya ya mbak, kan saya sudah lemah kari mikir opo tho mbak..wong kari mikir panggilan (tertawa) (Muhammad) Karena ya yang masih dewasa kan ya kok seperti ini nanti bagaimana kelanjutannya hidup saya..kalau orang lansia seperti saya ya..saya sdh tua, anak saya sudah kawin semua, sudah mentas semua.. saya serahkan kepada Allah itu..itu kan kehendak Allah..(Yatiman) Nik wong tuwo niku pikirane pun ngoten nduk, lha aku ki arep mikir sing koyo opo.. nek iki kudune wis ngene aku ra enjoh nyegati terserah Gusti Allah kulo mek ngoten ning kulo paringono bagas waras sak anak putu kulo, kulo pun ayem punan (Jemima)
Ya gini, sebelum erupsi kan mau ke sawah nanam apa kan bisa, nanam padi bisa apa apa bisa..kalau yang ga punya sawah kan ke tegal, di tegal bisa mau ambil kelapa, mau jual kayu bisa..lha sekarang? Ga ada yang dijual ga bisa..mau ke lahan, lahan mana udah habis semua.. Lha kalau orang laki laki kan udah merasa cukup dengan begini aja.wis ben..kalau uwong wedok kan mikir sesok gimana aku ngurusi anak, aku sekarang ga bisa nanam ini disana .udah ga ada pemasukan, cuma ini.. (Sri Ariyani)

Nek wong wedok lak eneng opo opo dipikir, nek wong lanang bebas....nek wong wedok lak mengke ono opo opo dileboke hati (Jemima) Kalau saya anu cari beras, nanti berkumpul dengan teman teman ngobrol ngobrolkan nanti hilang..terus lain ngobrol dengan teman teman mengatakan apa adanya..lama lama kan hilang ga ada kesulitan apa apa di pikiran. Kalau perempuan kan ga ada yang ngobrol kumpul kumpul .. kalau laki laki biasa..nanti ketemu teman di Prambanan di Pakem ngobrol keadaannya bagaimana bagaimana, nanti kan itu hilang sedikit demi sedikit.(Yatiman)
Ya berkurang (cintanya)...kalau disini naik (hingga Merapi) kan dulu buat taman buat apa apa kan enak tho. disini naik tanah itu dulu mahal mbak. Pinggir jalan itu sampai 500 (ribu) per meter. Sekarang siapa yang mau? Nha iya tho, kan takut to mau beli sekarang ..udah jatuh separo harga..lebih.. (Sri Ariyani) Ya kalau kecintaan pada gunung ya..ya kalau dulu itu ya lingkungan merapi itu saya ibaratkan (seperti) taman yang merdu tapi sekarang jadi taman yang gersang tur rusak. Jadi kecintaan (pada) alam lingkungan gunung itu telah anu, telah berubah (Warseno) Ga..ga berubah.kan disini tempat lahirnya (Muningsih) Oh tetap cinta, biasa, biasa saja, karena semua itu sudah kehendak yang kuasa gitu..(Thursina) Mboten ngirangi kok, teseh tresnane..ajeng onten nopo mboten onten wong lagi dikersake (Gusti Allah)..nek ajeng mboten pulih nggih pun matur nuwun.. Lha mengke nek teseh pulih...lha nek mboten onten meleh (bencana) lak wis ayem tho neng griyo.. (Kemala)
Iya, ngeri ngeri inget jaman jaman erupsi kok jadi begitu,kalinya jadi begitu, rumah rumah ga ada terus dari situ kan kelihatan semua,ngeri rasanya. Saya kalau ke ladang jalannya rusak,ke pasar aja kalau sama dia(cucu) susahnya tu di jalan. Jalannya rusak, le petukan kaleh trek trek niku debune ndadak nutup nutupi ya susah (Kalista) Ya kalau sekarang yang saya lihat (debunya) ya..karena belum ada hujan itu bagi saya ya ga papa. kalau musim seperti ini dari dulu ya seperti ini, banyak debu, tanah kering tanaman layu itu biasa. Ya kalau lewat (jalan) sana banyak debu saya lewat sebelah timur sini, kalau akan kesana banyak trek saya nanti lewat yang anu nanti menunggu menunggu trek yang lewat itu kan ga ada debunya trus saya lewat..jadi ga ada masalah bagi saya (Yatiman)
Ya kalau yang punya pekerjaan itu kesana kemari kan mengganggu.. kelewatan wah kok dalane mbledug, koyone ganggu leh ku mlebu leh ku liwat. Kalau yang ga bekerja kan ga..bisa cari jalan lain..kalau yang pekerjaan keluar yang lain kan ga jalannya cuma itu(Yatiman) Ya otomatis mengganggu itu to mbak transportasi itu yang ke pasar, apa ke tempat bekerja gitu mbak, jalannya juga sering macet karena rusak (Puri)

Orang pendidikan kan yo berwawasan luas to mbak jadi mesti mikir dampaknya, juga pasti kita kadang mencari cari yang ga tahu. Misalnya ini alasannya kenapa, besok ini gimana pasti sudah gitu. Yo mesti pasti was wasnya itu lebih..

kalau orang yang ga berpendidikan kan alah meletus yo meletus nek wis yo wis gitu kan (Sumawarni)

Yo, kalau orang yang punya pendidikan itu kan otomatis ya pengalamannya itu agak luas. Lha kalau orang yang sebetulnya ga makan pendidikan sedikitpun itu kan tau nya hanya lingkungan (sekitarnya saja) (Warseno).

Question 5 (adult & elderly)

Nodes

Name	Sources	References	Created On	
- Adult's opinion	0	0	9/11/2013 12:05 PM	
- Reasons why adult suffered more	0	0	9/11/2013 11:26 AM	S
Experience dreadful situation on eruption day	1	1	9/11/2013 11:46 AM	S
Fear of following disaster	1	6	9/11/2013 11:28 AM	S
Feeling more difficult to perform the role	1	2	9/11/2013 11:49 AM	S
First eruption experience	1	1	9/11/2013 11:53 AM	S
Greater role and responsibility	1	4	9/11/2013 11:54 AM	S
Less able to accept the loss	1	3	9/11/2013 12:00 PM	S
- Long thought and desire	0	0	9/11/2013 11:50 AM	S
Thinking about life's continuation	1	6	9/11/2013 11:38 AM	S'
Thinking about the children	1	6	9/11/2013 11:26 AM	S'
Wish and hope for the long future	1	4	9/11/2013 11:26 AM	S'
Not ready to die yet	1	1	9/11/2013 11:27 AM	S
- Reasons why elderly suffered less	0	0	9/11/2013 11:27 AM	S
Fearless	1	3	9/11/2013 11:28 AM	S
Have been evacuated before eruption	1	3	9/11/2013 11:45 AM	S
Less aware due to body deterioration	1	1	9/11/2013 11:43 AM	S
- More experience	1	2	9/11/2013 11:30 AM	S
Had difficult life experience before	1	1	9/11/2013 11:52 AM	S'
More sincere	1	3	9/11/2013 12:01 PM	S
Nothing to lose	1	1	9/11/2013 11:57 AM	S
Role is accomplished or finished	1	2	9/11/2013 11:33 AM	S
Simple need or hope	1	2	9/11/2013 11:37 AM	S
Their basic necessities of life is on their children responsibilitie	1	3	9/11/2013 11:48 AM	S
- Elderly's opinion	0	0	9/11/2013 12:06 PM	
- Reasons why adult suffered more	0	0	9/11/2013 12:06 PM	S
A lot of desire	1	1	9/11/2013 2:12 PM	S
Difficulty in livelihood after eruption	1	1	9/11/2013 2:02 PM	S
Lack of experience	1	1	9/11/2013 2:09 PM	S
Still have many hopes of life	1	1	9/11/2013 2:10 PM	S
- Thinking or worry about many things	1	4	9/11/2013 1:46 PM	S
Children	1	3	9/11/2013 2:02 PM	S'
Future	1	1	9/11/2013 2:08 PM	S'
- Reasons why elderly suffered less	0	0	9/11/2013 12:06 PM	S
- More experienced	0	0	9/11/2013 2:05 PM	S
Eruption experience	1	2	9/11/2013 2:06 PM	S'
Feeling difficulty in life before	1	2	9/11/2013 2:05 PM	S'
Role is accomplished	1	5	9/11/2013 2:01 PM	S
Simple need or hope	1	7	9/11/2013 1:45 PM	S
Spiritual belief	1	6	9/11/2013 1:44 PM	S
- OTHERS CODE	0	0	18/11/2013 2:24 PM	
Elderly is more vulnerable during eruption	1	2	9/11/2013 11:42 AM	S
In term of evacuation there is no difference according the age	1	1	9/11/2013 11:31 AM	S
Wrong stigma about Merapi eruption	1	2	9/11/2013 11:45 AM	S