Psychological preparedness for disaster of coastal communities: a systematic review

L S Palupi

1 Personality and Social Psychology Department, Faculty of Psychology, Universitas Airlangga, Surabaya, Indonesia
2 Health and Environmental Sustainability Research Group, Universitas Airlangga, Surabaya, Indonesia
3 Addiction Study Centre, Universitas Airlangga, Surabaya, Indonesia

e-mail: listyati.palupi@psikologi.unair.ac.id

Abstract. Indonesia has experienced numerous disasters for the past five years. Disasters not only happen in the urban area and rural area but also in the coastal area. Coastal communities are prone to a natural disaster such as tsunami. The tsunami not only causing infrastructure damage but also physical and psychological damage to the victims. Psychological preparedness could help to reduce the risk of the devastating impact of a disaster. However, there is not much research that investigates the topic. Aim of this study was to conduct a systematic review of articles that discuss about psychological preparedness for disaster of coastal communities. The research was done using meta-analysis method to assess studies that discuss about psychological preparedness for disaster of coastal communities. It is tried to identify the psychological preparedness for disaster of coastal community construct that existed and the measurement tools that were used. It is found that psychological preparedness for disaster of coastal communities was a construct that were not clearly defined. However, several researchers had tried to develop a tool to measure psychological preparedness for disaster in general. However, there are no study that is contextually bound to coastal communities.

1. Introduction

Natural disasters is inevitable natural phenomena that could occur in any part of the world. Natural disaster would be a catastrophic natural phenomenon when it struck an area that occupied by human. The UNISDR recorded 346 disasters happen around the world in 2015 and the most affected continent was Asia [1]. According to the report of the 2018 Review of Disaster Events, there were 281 natural disasters that killed a noteworthy number of individuals (10,733) and affected 60 million people across the world [2]. According to the report, nearly half of the total death in 2018 caused by disasters in Indonesia. According to the data recorded by the National Disaster Management Agency during a decade, Indonesia has experienced 24,630 disaster events that killed 14,791 people and caused 34,564,353 people leave their home [3].

Indonesia is identified as one of the world’s most prone areas of natural disasters since it is surrounded by three big tectonic plate which are Australia plate, pacific plate, and Eurasia plate. Indonesia geographical location has made the country prone to multiple hazards, including flooding, earthquakes, landslides, tsunami, volcano, and cyclone [4]. The National Disaster Management Agency of Indonesia has recorded that there were 11,274 disasters happen during 2015 until 2019 [5]. In this period, disaster was struck several island such as Sumatra, Java, Sulawesi, Nusa Tenggara Barat, Kalimantan, Riau, Bali, Maluku, and Papua [5]. Disaster not only happen in the mountain area but also
around the coast. Tsunami is one of disasters that often occur in coastal area. The deadly tsunami that has recently happen in Indonesia strike Sulawesi on September and followed by Sunda strait tsunami in December 2018. The news even stated that 2018 was a tumultuous year for Indonesia [6].

The tsunami in Indonesia is dangerous since it could bring a great damage. Several factors influence the magnitude impact of tsunami. The shape of the coastline, a combination of tectonic in the region, lack of early warning system and vulnerable communities make Indonesian tsunami especially perilous [7]. Indonesia geographical condition combine with societal factors and lack of disaster infrastructure support made the coastal communities become the most susceptible communities in the country.

Tsunami is one type of disaster that need a serious attention especially for the coastal communities. Since disasters not only could bring a devastated impact economically but also socially and psychologically. Infrastructure, houses, building, and industry damage are among negative impact of disaster for the economy. Economic damage that were calculated in 2015 alone are US$ 66.5 billion [1]. Number of displaced people that should leave their home and stay in shelter is one of the examples of social damage caused by disaster. Loosing family member because of disasters could cause trauma and stress for the survivors and in the long run these circumstances could impaired the disasters victims psychologically. Disasters can cause loss of life, injury and lead to the development of psychological problems [8]. Several research that focus on the psychological impact of disasters has found that disasters could make the survivor develop acute stress disorder, Post-traumatic Stress Disorder (PTSD) and also other psychological disorders [9].

The psychological effect of disaster not only experienced by children, but also adults, and older adults. Research on impact of disasters for children has found that there are several psychological problem that arises after a disasters event such as avoidance, angry, behavioral changes, physical complaints, regression and PTSD [10,11,12,13,14,15]. In several investigations, a similar psychological impacts of disasters also found in early and late adolescents, adult, and older adult [13,15,16,17,18,19,20]. Research also indicates that earlier substance abuse problems may relapse or be exacerbated as a consequences of being exposed to a disaster [21].

There has been a great deal effort to tackle psychological issues that occur in related to disasters context and there have been several interventions that are develop to reduce this problem [22,23,24,25]. Nevertheless, the research is only focus on preventing the psychopathology symptoms to be emerged or to treat the symptoms. Although it is acknowledged that technical preparation or physical preparedness is not enough to help individual to cope with disasters successfully, however most of disaster research only focus on technically preparing individual prior to disasters exposure. While many disaster preparedness programs are in place, these mostly involve advice on how to prepare physically, often neglecting the psychological aspects of disaster preparedness [26]. According to Zulch, researchers are giving a less attention for psychologically preparing individual to face disasters. There seems to be an absence of psychological preparedness in disaster preparedness theory and practice [27].

Psychologically preparing the individual to successfully manage a disaster situation or disaster impact, and to cope with psychological distress resulted from disaster is vital to reduce the destructive effect of disaster on people wellbeing. Preparing individuals psychologically for a disaster impact has the potential to decrease the psychological impact of disasters [26]. Psychological preparedness prior to disaster may enable individuals to anticipate and identify their feelings, and to manage their emotional responses, resulting in the engagement of better coping mechanisms [27]. Psychological preparedness aspects to be integrated have to be tailored to different natural hazards, regional requirements and challenges, as well as available resources. In addition, these aspects must be culturally appropriate and pay special attention to marginalized or disadvantaged groups to provide guidance on capacity building to better cope with a disaster. Therefore, individuals and communities need to prepare psychologically for confronting a disaster especially individual that live-in disaster-prone areas such as the people live in the coastal area. Therefore, research is needed to identify the psychological preparedness for disasters especially that are contextually related to coastal communities. The main concern involved in the psychological preparedness for disasters investigations is the lack of context-bound tools to evaluate this important issue based on a clear conceptual definition [28]. It seems that a study on psychological
preparedness for disasters may be even more significant for the coastal communities in order to increase their awareness and reducing the risk of disasters. Because of the abovementioned reasons, therefore, this paper set out to identify the construct of psychological preparedness for disaster in the coastal community’s context and the measurement tools that are available. This assessment was done by a thorough review and summary of the available studies which provided a considerable background and amplified the gaps in knowledge about psychological preparedness for disasters especially that are contextually linked with coastal communities.

2. Methodology

2.1 Eligibility Criteria and Search Strategies
Preferred Reporting Item for Systematic Reviews and Meta-analyses (PRISMA) standard were used to conduct this systematic review research [29]. However, the protocol has not yet registered. A literature search was conducted in May 2019 to identify peer-reviewed, English-language literature and Bahasa-language literature providing evidence of psychological preparedness for disaster for the coastal communities. An extensive collection of search methods in the literature review from various research databases that are available in Universitas Airlangga library collection has been used. Beside of that, exploration of the potential article using Google Scholars search engine was also conducted. A specific text as a keyword was used and no result was found then a broader text which is “psychological preparedness for disaster” was used as a keyword. Most of the articles could be found in Google Scholars (6 citations), Science Direct (1 citations), Scopus (1 citations), JSTOR (zero citations), Emerald Insight (zero citations), Springerlink (zero citations), Proquest (zero citations), and EBSCO (zero citations). The search yielded around 8 articles. In the final analysis, after evaluation of all documents, 8 full text sources were selected. Figure 1 indicates the search strategy and process. The main limitation of the review was that only English language and Bahasa documents that were included. Therefore, some of the related studies which are not in English and Bahasa were lost.

2.2 Inclusion Criteria
Papers that described the concept of psychological preparedness for disaster for the coastal communities have been included. Articles published between 2009 and 2019 were systematically reviewed.

2.3 Exclusion Criteria
A specific term was utilized as the keyword. Therefore, there were no papers that were excluded from the systematic review.

2.4 Selection of Articles and Analysis
There are several steps that are used to select appropriate articles and to analyze them. The first step is evaluating the article based on their titles. After it is ensured that the title is relevant to the purposes, then the next thing is to put a closer look upon their abstracts to eliminate the articles which did not meet the inclusion criteria. As a result, from this second step there were no articles that are omitted from the research. The aims were to analyze the psychological preparedness for disasters of coastal community construct that had been written, how it was conceptualized in the literature and how it was being measured.

2.5 Data Extraction and Management
Data on authors, year of publication, method, targeted stakeholder, study setting, study focus, and assessment tools used were extracted by the author. Results from the selected papers were extracted and gathered in a summary. The papers were grouped by subject, and fields were determined once the data were completely collected. All papers were appraised using the PRISMA guideline.
3. Results

Articles that were found relevant through the search strategy were 8 articles. After further review of papers and abstracts there were no articles that was excluded from the research. The concentrations of these research works were mostly on how psychological preparedness for disaster of coastal community is being described and conceptualized in the literature and how they were measured. In the last phase, 8 articles or all of the articles were analyzed, as indicated in Figure 1.

![Figure 1. The search strategy and process](image)

A summary of the lineaments of the papers involved in this study were provided in Table 1 and Table 2. From the selected original articles, 6 of the documents (75%) provide a psychological preparedness
definition, however there were none of the articles (0%) that provide a definition which are contextually bound to coastal community.

Table 1. Definition of psychological preparedness

| Psychological Preparedness Definition | References                                                                 | %  | N  |
|---------------------------------------|---------------------------------------------------------------------------|----|----|
| General                               | (Malkina-Pykh & Pykh, 2013), (Every, McLennan, Reynolds, & Trigg, 2019), (Rohmi, 2016), (Zulch, 2019), (Boylan, 2016) | 71 | 5  |
| Specific context                      | (Every et al., 2019), (Malkina-Pykh & Pykh, 2013), (Boylan, 2016)          | 0  | 0  |
| Not available                         | (Suhaimi, 2016)                                                           | 14 | 1  |

Table 2. Subject of the study

| Subject of the Study                 | References                                                                 | %  | N  |
|--------------------------------------|---------------------------------------------------------------------------|----|----|
| General                              | (Sanger & Indra Nurpatria, 2019), (Rohmi, 2016), (Suhaimi, 2016)          | 43 | 3  |
| Not specified                        | (Boylan, 2016), (Zulch, 2019), (Malkina-Pykh & Pykh, 2013), (Boylan, 2016) | 43 | 3  |
| House holder                         | (Every et al., 2019)                                                      | 14 | 1  |
| Coastal Communities                  | NA                                                                        | 0  | 0  |

Six (6) of the articles (75%) were discussing about measurement tool that were used to quantify the psychological preparedness for disaster. Unfortunately, it could not be found any article (0%) that discuss about the measurement of the psychological preparedness for disaster that are specified in the coastal community context. The summary of the measurement topics that have been deployed from the articles could be seen in Table 3 and Table 4.

Table 3. Measurement tool

| Measurement Tool                      | References                                                                 | %  | N  |
|---------------------------------------|---------------------------------------------------------------------------|----|----|
| General                               | (Every, McLennan, Reynolds, & Trigg, 2019), (Zulch, 2019), (Boylan, 2016) | 33 | 2  |
| Specific                              | (Rohmi, 2016), (Every, McLennan, Reynolds, & Trigg, 2019), (Sanger & Indra Nurpatria, 2019), (Malkina-Pykh & Pykh, 2013), (Boylan, 2016) | 67 | 4  |
| Not Available                         | (Suhaimi, 2016)                                                           | 17 | 1  |

Table 4. Measurement context

| Measurement Context                  | References                                                                 | %  | N  |
|--------------------------------------|---------------------------------------------------------------------------|----|----|
| General                              | (Zulch, 2019), (Every, McLennan, Reynolds, & Trigg, 2019), (Boylan, 2016) | 33 | 2  |
| Flood                                | (Rohmi, 2016), (Suhaimi, 2016)                                            | 33 | 2  |
| Earthquake                           | (Malkina-Pykh & Pykh, 2013), (Boylan, 2016)                                 | 33 | 2  |
In addition it is also identified the disasters that are specifically discussed in the articles. From 8 articles that were analyzed, there were 2 articles (25%) that are particular focus on flood, 1 article (12.5%) in weather disaster, 1 article (12.5%) discuss about volcanic eruptions, 1 article (12.5%) was examining in the context of climate change disasters. The rest or 3 other articles (37.5%) do not specifically focus on any disaster. The summary of this feature could be found in Table 5.

| Type of Disaster         | References                                     | %  | N |
|--------------------------|------------------------------------------------|----|---|
| Flood                    | (Rohmi, 2016), (Suhaimi, 2016)                 | 33 | 2 |
| Weather related disaster | (Zulch, 2019)                                  | 17 | 1 |
| Volcanic eruptions       | (Sanger & Indra Nurpatria, 2019)               | 17 | 1 |
| Climate change related disaster | (Malkina-Pykh & Pykh, 2013) | 17 | 1 |

The findings of this research show that although there were a limited number of published articles that were discussing about psychological preparedness for disaster but there were no study that focused on the psychological preparedness for disaster of coastal communities. Beside of that, from the documents, it is found that all of articles were not contextually bound with a certain targeted community. Therefore, it could not be found in all of the documents regarding the measurement that are contextually bound to coastal community.

4. Discussions
The main purpose of this review is to investigate the available concept and tools that discuss about psychological preparedness for disaster of coastal community and the measurement employed. The main study’s results also show that there are currently no clear and comprehensive concept of psychological preparedness for disaster of coastal community and related tools to evaluate it. This study conducted using a systematic review of published research on psychological preparedness for disaster and it is contributed to the development of psychological preparedness study specifically in the coastal community.

According to this research, it is suggested that natural disasters potentially give a destruction impact on wellbeing and mental health, with increased levels of PTSD, depression, anxiety, and use of psychotropic [14,30,31,32,33,34,35,36,37]. According to the above-mentioned studies, the long-term psychological effects of disasters on human life could not be solved only by providing financial and medical help only but the most crucial thing is to psychologically prepare the individuals to deal with the disasters [28].

Most researches show that disaster preparedness have been taken into consideration in many countries as an effort to reduce the risk of disaster. However, the available studies about psychological preparedness for disaster are limited, especially studies that contextually bound with coastal community prepared individuals to response a disaster situation appropriately.

A study conducted by Boylan found that the definition of psychological preparedness for disaster are diverse [38]. Roudini et al provide definition of psychological preparedness using a mental health point view as “… a state of awareness and expectation of an individual's psychological reactions to the disaster warning … mental health preparedness will significantly support the ability to identify particular stress-related emotions and thoughts … this also contains the perception, appraisal, and understanding of
threatening events and the risk communication” [28]. Zulch give more comprehensive definition of psychological preparedness by not only using the physical approach but also a psychological approach to define psychological preparedness for disaster. Zulch proposed definition is “a heightened state of awareness, anticipation, and readiness for: 1) the uncertainty and emotional arousal in expectation of the possible occurrence of the threat, 2) one's own psychological response to the unfolding threat situation, and 3) the ability to manage the demands of the situation” [26]. Boyland extend the definition provided by Zulch and applied it in Bushfire context. The psychological preparedness for disasters in bushfire context define as multidimensional construct … the multiple attributes are: 1) perceived control over one's coping ability; 2) perceived control over the environmental outcomes; 3) a general understanding of the risk context; and 4) proactive planning and preparing for the threat” [38]. The available definitions were based on Stress Inoculation Theory (SIT) [38]. Beside of that, this research also found that there is no definition of psychological preparedness for disasters that are specific intended to the coastal community.

In terms of measurement tools, several studies discussing about the development of measurement tool to identify psychological preparedness for disaster in general and in a specific context which is bushfire [8,38]. However, it could not be found a measurement tool that are specifically targeted to coastal community.

5. Conclusions
Through systematic review and analysis of the published articles which discussed about the psychological preparedness for disaster research, there are several notably findings as follows:
1. The available studies about psychological preparedness for disaster are limited.
2. None of the published article on the topic specifically discuss psychological preparedness for disaster related to coastal community.
3. The definition of psychological preparedness were varied.
4. Psychological preparedness for disaster of coastal community has not yet been defined.
5. The measurement tools that were used to measured psychological preparedness for disaster of coastal communities are not developed yet.
6. The measurement tools that are available were either in the general context or in a bushfire specific context.

Author Contribution
The articles were developed by the author herself and there is no other party that involved in the research.

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