



## Original Article

## The impact of serving in disaster relief among volunteers in Malaysia

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## ABSTRACT

**Purpose:** Malaysian disaster relief volunteers have a long and proud history of participating in relief missions within and outside the country. Despite of a plethora of researches into the various areas of disaster relief, there has been a little scholarly activity looking into the experiences of the medical volunteers worldwide and even less research on the experiences of the relief volunteers in Malaysia. Therefore, the purpose of this study is to identify the effect of disaster relief works on volunteers in Malaysia.

**Methods:** This is a non-experimental cross-sectional design study, which was conducted using survey questionnaire to examine the incidence of burnout, posttraumatic stress disorder (PTSD) symptoms and the quality of life (QOL) among the disaster relief volunteers. And the study also examined the socio-demographic variables of the participants. In addition, the association between the sociodemographic variable and the preferred coping strategies was also investigated through self-reporting checklist.

**Results:** The findings of this study revealed that 90.9% volunteers ( $n = 312$ ) experienced some levels of recurring stress throughout their lives, which led to burnout. Also, 96.8% ( $n = 332$ ) of the participants were categorized as having at least some symptoms of PTSD. However, self-reporting QOL measurements indicated that the participants are, in general, satisfied with their lives. Significant associations between the incidence of burnout, incidence of PTSD and QOL were identified. Both positive coping measures and behavioral or avoidant coping measures were also identified. Furthermore, a number of socio-demographic factors were also seen to interact significantly with burnout, PTSD and QOL.

**Conclusion:** This study provides some insights into the psychological challenges of disaster relief volunteers in Malaysia, and this impact can last a long time after the volunteers return to their hometowns. Several recommendations including practice development, policy and research were discussed in the study.

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## Introduction

Natural or man-made disasters occur daily worldwide.<sup>1</sup> These unwelcome events leave destruction and mayhem in their aftermath, causing a significant damage to properties and deadly consequences. While some natural disasters can be foreseen, such as hurricanes, some are unpredictably.<sup>2</sup> Relief effort normally comes in the form of volunteer workers who represent various organizations to provide the necessary assistance, i.e. rescue trapped civilians, provide relief to injured and displaced persons, or assist in reconstructing damaged crucial infrastructure.<sup>3</sup> Among them, volunteers with medical skills, such as the doctors and nurses, are

critically needed to provide an acute medical care to the disaster victims.

Our study of the literature suggested that most of the volunteers venturing into disaster zones may not be properly or sufficiently trained to manage the stress and hardship of providing relief after disaster strikes, which makes them more vulnerable to adverse effects when served in disaster zones.<sup>4</sup> Indeed, burnout and post-traumatic stress disorder (PTSD) have been documented among the emergency service personnel and humanitarian aid workers, but they often focus on helping others, their symptoms are often not noticed or treated. The physical and emotional injuries suffered by these groups are usually caused by physical, dangerous and exhausting difficult tasks. These tasks are manifested as lack of sleep, chronic fatigue, extreme emotions such as feelings of powerlessness, loss of spirit, guilt, terror, despair, etc.<sup>5</sup> This may affect their quality of life (QOL) and their overall well-being.

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Furthermore, it is believed that a stressful event or critical incident can overwhelm an individual's usual coping method. Therefore, understanding the relationship between volunteers' coping strategies and their QOL may assist in a better management of the effect on the disaster relief works.<sup>6</sup>

#### *Burnout in disaster relief work*

Our review of the literature suggested that volunteers assisting disaster victims in disaster relief work, exposed themselves to an environment that is stressful, such as earthquakes, floods and hurricanes. The common stressors encountered by volunteers in disaster relief works are extreme emotional reactions from victims and devastation of property,<sup>1</sup> contact with dead body and injury,<sup>1,7,8</sup> exposure to mass violence, health and safety issues,<sup>9</sup> and unsanitary condition.<sup>10</sup> The researcher would like to add the following to the list of common stressors: having to witness the extreme poverty experienced by victims during a recovery period.

In recent years, disaster relief workers often find themselves expose to not only the actual stressors associated with a disaster, but also to the occupational hazards, such as dealing with people who are in distress and may not be cooperative.<sup>11</sup> For instance, the increase of terrorism and human rights atrocities have also resulted in disaster relief workers being the direct target of violent extremists.<sup>12</sup> Even when the volunteers are trained and well prepared for the task, they are at higher risk of developing stress than the primary victims of the disaster.<sup>11</sup> Previous research had shown that the reasons for this include being far away from home, deprive of social support that they are used to, separated from loved ones, and in the midst of a chaotic environment.<sup>11</sup> These stressors and hazards created effects that can potentially put the volunteers at high risk for burnout and PTSD, as well as serious health problems.<sup>1</sup>

Studies have shown that repeated exposure to stressful disaster situations is potentially harmful to the volunteers' psychological well-being and the outcome of a relief effort.<sup>11,13</sup> Furthermore, as suggested by Podsakoff et al.,<sup>14</sup> a work-related stress has an adverse effect on job satisfaction, commitment and organizational outcome. This is further corroborated by the findings,<sup>13</sup> where serious health problems, such as depression and acute stress disorder have been diagnosed among volunteers. And on several occasions, they found that the rate of burnout of volunteers is higher than the one recorded for the primary victims. However, most of the findings are quite dated and clearly needed to be updated to fit in the need of current volunteers.

#### *PTSD following disaster relief work*

The Diagnostic and Statistical Manual of Mental Disorders states that PTSD can be diagnosed if symptoms of stress persist for over one month.<sup>15</sup> Individuals suffering from PTSD often have their home and work life disturbed due to repeated memories of stressful events, including dreams. Worst, they may also experience psychological distress or mental health problems that may spiral into contemplations of self-harm or suicide.<sup>16,17</sup> Indeed, a systemic review of PTSD following disasters by Neria et al.<sup>18</sup> showed that the prevalence of PTSD is high not only among survivors, but also among the first responders. The review also revealed the significant findings of a large body of research that span over three decades revealing the burden of PTSD among those exposed to disasters.

There is no doubt that disaster relief work exposes volunteers to traumatic events, and the victims they deal with may be individuals or entire communities.<sup>12</sup> Relief workers often suffer from the dismal conditions and situations during disasters, and they will experience revulsion, horror, grief, despair and a feeling of helplessness, which can subject them to stress.<sup>16</sup> In addition, workers

with a low level of training and preparedness also have a higher risk of developing PTSD than those with a high level of professional training.<sup>16</sup>

Studies on PTSD were widely conducted among disaster victims and many of them reported PTSD or high risk of developing PTSD.<sup>18</sup> There are some studies for disaster relief workers that have been conducted on people who worked on their local disaster area and dealt with specific type of disaster.<sup>18</sup> However, not much attention was given to disaster relief volunteers, especially the doctors and nurses, who served away from home and had a direct contact with victims and their family members. While the research had also shown that not everyone exposed to traumatic event, such as a disaster event, develops PTSD, the assumption should not be made that all trained medical personnel, such as doctors and nurses, are immune to PTSD or have a low risk of suffering from one.<sup>18</sup> Therefore, the mental health status of the doctors and nurses post-exposure to disaster relief work should be investigated as their conditions may differ from disaster victims or disaster relief workers who only work in their local disaster areas.

#### *The QOL for disaster relief volunteers*

The QOL for doctors, nurses and other professionals engaged in disaster relief work is often affected by the disastrous environments and situations, which they have found themselves in. Many disaster relief volunteers have stated about dilemmas which have become a source of profound discomfort. While they suffered untold hardships in areas of disaster, they were unable to ask for improvements of their QOL in the field because they thought that the money spent on them could be used to improve conditions for victims of disaster.<sup>19</sup> In addition, less attention has been given to their QOL and it appears that the QOL among disaster relief volunteers is a less popular topic of discussion compared to that of disaster victims or emergency workers. This may be due to the perceived nature of their work in disaster relief effort, which is considered short and temporary.

Nevertheless, the life of any aid workers in a disaster area can be quite disheartening, whether it is a short term or long term. Aid workers, especially working in man-made disaster situations such as wars and terrorism, have to live in isolated communities for security reasons.<sup>19</sup> Moreover, as Duffield<sup>20</sup> observed, there is often politicization of relief work that further increase the risk to the security of these personnel. Concerns about safety, coupled with the experience in the disaster zone, can be very distressing, because in many cases this not only affects the volunteers' professional functions, but also affects their private lives.<sup>21</sup> Even in the presence of protective factors, such as coping strategies and social support, exposure to such stressors are associated with mental health outcomes such as PTSD.<sup>21</sup>

#### *Coping strategies*

Coping strategies are based on the concept of resilience, which is defined as the dynamic process of adaptation in the face of significant adversity. Generally, there are two types of coping strategies: problem-focused or emotion-focused.<sup>22</sup> The contemporary theoretical approach of designing the coping intervention is to merge personal traits with situational and contextual factors.<sup>23,24</sup> Recent studies have shown that the outcome of a psychological process depends not only on personal traits, such as self-esteem and autonomy, but also on cultural and ecological factors.<sup>25,26</sup>

It has been found that professional disaster relief volunteers have significantly less difficulty in talking about their experiences and reaction compared to non-professional disaster relief volunteers.<sup>27–29</sup> The possible reason suggested is that the professionals

spent their working time talking with colleagues in similar disaster works, and therefore they are more open and understanding in such a discussion.<sup>29</sup> It is still difficult to pinpoint the beforehand coping strategies for the emergency workers, which could be effective for dealing with the possible stressors at work. Because the demand of their work is incomparable to the general population.<sup>27</sup> Nevertheless, understanding the coping strategies adopted by the volunteer groups can help them deal with the risk of developing psychological symptoms following exposure to disasters.

Studies of Asian populations suggest a high level of dysfunctional, cognitive and maladaptive coping strategy with stress, which probably arises from a low level of optimism and self-esteem, as Asians tend to focus more on failures than successes in self-evaluations.<sup>24,25</sup> While it seems to imply that the coping strategy in times of stress could be a challenge for people in Asian countries, studies have shown that Asian populations are actually more resilient than the Western populations.<sup>24,25</sup> Chang and Lim<sup>25</sup> offer a plausible explanation in the three-dimensional construct of Asian people context of resilience, namely, coping flexibility, emotional self-regulation and malleable belief about the self.

The coping flexibility arises from the fact that Asian countries tend to be collectivist societies, where the self is viewed as intricately connected to the society. Hence, the coping strategies adopted are usually contextual.<sup>24</sup> Additionally, Chang and Lim<sup>25</sup> had observed that there are many ways of regulating emotions, which had been tried over centuries and proved to be effective in Asian culture. The three-dimensions described above present avenues for developing mechanisms to regulate the development of coping strategies that are person-context specific.

*Conceptual framework of the study*

In this study, the independent variables are the sociodemographic data of the participants. These independent variables are the reasons for the outcomes that are being examined and referred to as the presumed effect. In addition, the dependent variables are the variables that are dependent on factors that are being measured. These variables are expected to change accordingly with the independent variables. In this study, the dependent variables are burnout, PTSD, QOL, and the coping strategies employed by the participants (Fig. 1).

**Methods**

*Study design and participation*

This study used a non-experimental cross-sectional design to take a snapshot or cross-section of a population, and then using it to

examine variables and relationships at a time point.<sup>30</sup> The data were gathered from 388 non-governmental organizations (NGOs) and institutions that are not registered under NGOs in Malaysia, such as government and private hospitals/institutions which participate in disaster relief works. The participants were selected by convenience sampling technique.

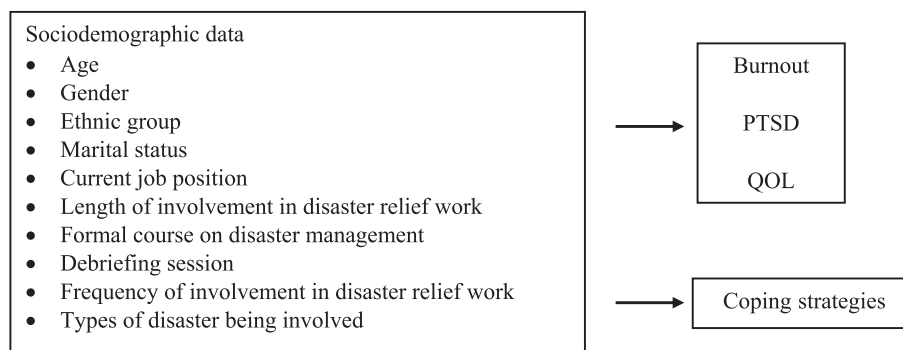
The population in this study were all the volunteers in Malaysia who had been involved in disaster relief works. The target population were volunteers in the medical profession. The inclusion criteria were: (1) volunteers who had participated at least once in disaster relief work, either serving on the disaster field or providing care to the victims in an organizational setting, such as a hospital/clinic; (2) volunteers were able to read and understand English and (3) volunteers consented to participate in the study. Permission to conduct the study was obtained through the Research Ethical Review Committee of MAHSA University (MAHSA/NUR/P23-1/C44 (17)). All subjects from all over Malaysia that were available and met the inclusion criteria of the study were selected as participants in this study. Three methods of email, hand delivery, post mail were employed for the data collection because of issues of accessibility to the subjects and the Privacy and Confidentiality Policy of NGOs in collecting volunteers' data. These three methods of delivery were used to ensure sufficient participation and enhancement of the response rate. The participants in this study were not given any incentives and they participated voluntarily. Reminder phone calls, messages and emails were sent to potential subjects in the NGOs and support groups to encourage participation.

*Research instrument*

The research method used in this study was a structured survey and the instrument was accessed from public domain.

*The relief worker burnout questionnaire*

The incidence of post-exposure burnout of disaster relief work was measured using the relief worker burnout questionnaire, which was developed to detect burnout of relief workers.<sup>5</sup> It was also used to measure stress among relief workers.<sup>31</sup> It is a 13-item questionnaire asking respondents to indicate how much a symptom is true of them over the past month based on a 5-point Likert scale, with 0 for "never" to 5 for "almost always (almost every day)". The sum of the scores from each item were interpreted in the following manner: a score of 0–15 suggests the worker is probably coping adequately with the stress of his or her work; 16 to 25 suggests the relief worker is suffering from work stress; 26 to 35 suggests possible burnout; and above 35 indicates probable burnout. This questionnaire was chosen for this research of disaster



**Fig. 1.** Conceptual framework of the study. PTSD: posttraumatic stress disorder, QOL: quality of life.

relief volunteers, because it is specifically for disaster relief personnel.

*PTSD checklist – specific version (PCL-S)*

PCL-S, is a self-reporting 17-item instrument which enquires about various symptoms in relation to an identified “stressful experience”. It is relevant for use in this study which aims to link symptoms to specific event encountered by the participants. Based on a particular disaster event, participants were asked to indicate how much they have been bothered by the problems in the past month. The responses were measured on a 5-point Likert scale, with 0 for “not at all” to 5 for “extremely”. A total symptom severity score, ranging from 17 to 85, was obtained by summing the scores from the 17 items. It is then analyzed using the correct scoring tool supplied by the Veterans Affairs National Center for PTSD. The dependent variable is a positive PCL-S screen, which is determined by response options ranging from 1 “not at all” to 5 “extremely” for each of the 17 items in the checklist. For this study, the researcher chose a cut-point score of 44 based on a review of predefined cut-points in the literature which states that a total score of 44 is considered to be PTSD positive for general population.<sup>32</sup> The reliability and validity of this instrument has been tested and the results for reliability are test-retest,  $r = 0.92$ ; Cronbach's alpha = 0.939; for content validity (with clinician administered PTSD Scale), sensitivity = 0.94, specificity = 0.86; criterion validity (with clinician administered PTSD Scale),  $r = 0.929$ .<sup>32</sup>

*The world health organization QOL (WHOQOL)-BREF*

The WHOQOL-BREF, an abbreviated version of WHOQOL-100, comprises 26 items with responses varying from score 1 to 5 for each item.<sup>33</sup> The WHOQOL-BREF was adopted because of its validity and reliability, and it is found suitable for this study. It is based on a four-domain structure: physical health, psychological, social relationship and environment. It denotes an individual perception of QOL in each domain. A high score denotes a high QOL. The mean score of the items within each domain is used to calculate the domain score. Mean scores are then multiplied by 4 in order to obtain the domain scores, which are comparable with the scores used in WHOQOL-100.

*Brief COPE scale*

In this study, the brief COPE inventory is used to assess the many coping methods used by people in response to stress. It has 28 items to measure 14 coping strategies, where each strategy is assessed by means of two items.<sup>34</sup> The 14 coping strategies are self-distraction, active coping, denial, substance use, emotional support, instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion and self-blame. Based on an event of disaster which is categorized as a stressful event, participants were asked to indicate the extent to which they coped using those different strategies on a 4-point Likert scale, with 1 for “I haven't been doing this at all” to 4 for “I've been doing this a lot”. The internal reliability of this scale gave Cronbach's alpha coefficients ranging from 0.50 to 0.90,<sup>34</sup> which had been shown to be a valid and reliable instrument for the Malaysian population.<sup>35</sup>

*Score for reliability test*

In this study, the reliability of the measure was assessed using Cronbach's alpha based on collected data in a pilot study (Table 1).

**Table 1**  
Score for reliability test.

Instrument	Reliability test $\alpha$
Relief worker burnout questionnaire	0.931
PTSD checklist – specific version (PCL-S)	0.931
Brief COPE scale	0.930
WHOQOL-BREF	0.909
Domain 1 Physical health	0.610
Domain 2 Psychological well-being	0.663
Domain 3 Social Relationship	0.810
Domain 4 Environmental support	0.857

PTSD: post-traumatic stress disorder, WHOQOL: world health organization QOL.

*Data analysis*

All statistical analysis was conducted using the SPSS 20.0 software. Both descriptive and inferential statistics were performed. The Kolmogorov-Smirnov test of normality was done and all distributions of observed data were found to be non-normal. The data were presented as descriptive, mean  $\pm$  SD and proportions as appropriate. Because the data were cross-sectional, there was limitation in the ability to assess causal factors of burnout and PTSD in the participants.

**Results**

*Data collection and participation*

In this study, the volunteers were identified via personal contact, friends' contact and recommendation by NGOs and support groups. A total of 388 volunteers who met the inclusion criteria was identified and 225 questionnaires were sent by email, 32 by hand delivery and 131 by postal mail. Out of these, 364 questionnaires were returned, however, only 343 were considered useable, of which the response rate was 88%. The other 21 questionnaires were considered unusable due to partially completed questions, with major portions of the survey left blank. The demographic characteristics of the participants are shown in Table 2.

It shows that 6.7% of the volunteers were probably coping adequately with stress, 40.2% suffering from work stress, 32.1% had possible burnout and 21.0% had probable burnout. And according to the incidence of PTSD, the result suggested that 3.2% of the volunteers had no evidence of PTSD, 43.7% had a little symptom, 35.6% had moderate symptoms, 15.2% had quite a bit of symptoms and 2.3% had extreme symptoms of PTSD.

*Perceived QOL*

The participants' perception of their QOL is presented in Table 3. Of the 343 participants, 84.9% rated their overall general health status to be good or very good and 71.4% were satisfied with their life. The overall and domain specific scores are provided in Table 4. On a scale of 4–20, the mean score for each of the domain was about 14, with an overall score of  $14.35 \pm 2.05$ .

*Coping strategies*

The descriptive summary for the coping strategies used is shown in Table 5.

**Table 2**  
The association between socio-demographic variables and burnout (n = 343).

Variable	Frequency	Coping adequately n (%)	Suffering from work stress n (%)	Possible burnout n (%)	Probable burnout n (%)	Chi-square statistics (df)	p value
Age group (years)						17.500 (12)	0.132
≤ 30	115	9 (7.8)	42 (36.5)	39 (33.9)	25 (21.8)		
31–40	120	4 (3.3)	42 (35.0)	45 (37.5)	29 (24.2)		
41–50	62	4 (6.4)	29 (46.8)	16 (25.8)	13 (21.0)		
51–60	34	4 (11.8)	17 (50.0)	8 (23.5)	5 (14.7)		
≥ 61	12	2 (16.7)	8 (66.6)	2 (16.7)	0 (0)		
Gender						2.785 (3)	0.426
Male	85	9 (10.6)	32 (37.6)	27 (31.8)	17 (20.0)		
Female	258	14 (5.4)	106 (41.1)	83 (32.2)	55 (21.3)		
Ethnic group						18.861 (9)	0.026
Malay	190	9 (4.7)	73 (38.4)	67 (35.3)	41 (21.6)		
Chinese	90	10 (11.1)	33 (36.7)	28 (31.1)	19 (21.1)		
Indian	52	2 (3.8)	29 (55.8)	9 (17.3)	12 (23.1)		
Others	11	2 (18.2)	3 (27.3)	6 (54.5)	0 (0)		
Marital status						9.922 (3)	0.019
Married	258	12 (4.6)	105 (40.7)	90 (34.9)	51 (19.8)		
Single	85	11 (13.0)	33 (38.8)	20 (23.5)	21 (24.7)		
Current job position						14.043 (9)	0.121
Medical officer	64	9 (14.1)	23 (35.9)	21 (32.8)	11 (17.2)		
Specialist	59	3 (5.1)	30 (50.8)	18 (30.5)	8 (13.6)		
Nurse	121	8 (6.6)	45 (37.2)	42 (34.7)	26 (21.5)		
Nurse with post-basic	99	3 (3.0)	40 (40.4)	29 (29.3)	27 (27.3)		
Length of being disaster relief volunteer (years)						6.356 (9)	0.703
≤ 1	80	4 (5.0)	37 (46.3)	28 (35.0)	11 (13.7)		
2–5	190	12 (6.3)	75 (39.5)	58 (30.5)	45 (23.7)		
6–9	49	5 (10.2)	16 (32.7)	16 (32.7)	12 (24.4)		
≥ 10	24	2 (8.3)	10 (41.7)	8 (33.3)	4 (16.7)		
Formal course on disaster management						6.704 (3)	0.082
Yes	145	9 (6.2)	65 (44.8)	36 (24.8)	35 (24.2)		
No	198	14 (7.1)	73 (36.8)	74 (37.4)	37 (18.7)		
Attended debriefing session in disaster relief work						0.967 (3)	0.809
Yes	209	12 (5.7)	86 (41.1)	66 (31.6)	45 (21.5)		
No	134	11 (8.2)	52 (38.8)	44 (32.8)	27 (20.2)		
If yes, indicate the time of the debriefing (n = 209)						15.469 (6)	0.017
During trip	53	3 (5.6)	21 (39.6)	18 (34)	11 (20.8)		
Post trip	98	9 (9.2)	30 (30.6)	32 (32.7)	27 (27.5)		
Both	58	1 (1.8)	35 (60.3)	14 (24.1)	8 (13.8)		
Frequency of involvement in disaster relief work						26.192 (9)	0.002
1 time	179	11 (6.1)	77 (43.1)	63 (35.2)	28 (15.6)		
2–5 times	153	8 (5.2)	58 (37.9)	45 (29.4)	42 (27.5)		
6–9 times	6	2 (33.3)	2 (33.3)	0 (0)	2 (33.4)		
≥ 10 times	5	2 (40.0)	1 (20.0)	2 (40.0)	0 (0)		

**Table 3**  
Perceived overall health and satisfaction in life (n = 343).

Variable	n (%)
Single-item 'general QOL' (Q1)	
Very poor	4 (1.0)
Poor	25 (7.3)
Neither poor nor good	100 (29.2)
Good	191 (55.7)
Very good	23 (6.7)
Single-item 'general health status' (Q2)	
Very dissatisfied	1 (0.3)
Dissatisfied	11 (3.2)
Neither satisfied not dissatisfied	86 (25.1)
Satisfied	224 (65.3)
Very satisfied	21 (6.1)

*The association with socio-demographic factors*

The followings are results of a statistical analysis of the association between the participants' socio-demographic variables and burnout, PTSD, QOL and coping strategies, respectively.

**Table 4**  
Overall and domain-specific QOL (n = 343).

Items	Mean ± SD
Overall QOL (26 items)	14.35 ± 2.05
Domain 1 physical health	14.37 ± 2.22
Domain 2 psychological well-being	14.01 ± 2.65
Domain 3 social relationship	14.31 ± 2.57
Domain 4 environmental support	14.53 ± 1.83

SD: standard deviation. QOL: quality of life

**Socio-demographic factors and burnout**

Among the tested variables, only ethnic group, marital status, attendance of debriefing and frequency of involvement in disaster relief work had a significant association with burnout ( $p < 0.05$ ). In the Malay ethnic group, 38.4% suffered work stress, 35.3% possible burnout, 21.6% probable burnout, and 4.7% was coping well. In the Chinese group, 36.7% suffered work stress, 31.1% possible burnout, 21.1% probable burnout, and 11.1% was coping adequately. As for the Indians, 55.8% suffered work stress, 17.3% possible burnout, 23.1%

**Table 5**  
Descriptive summary for coping strategies (n = 343).

Coping strategy	Mean ± SD
Religion	5.87 ± 1.879
Acceptance	5.35 ± 1.584
Positive reframing	5.35 ± 1.569
Use of emotional support	5.24 ± 1.735
Use of instrumental support	5.24 ± 1.756
Active coping	5.22 ± 1.554
Planning	5.03 ± 1.332
Self-distraction	4.73 ± 1.782
Venting	4.59 ± 1.184
Self-blame	4.16 ± 1.888
Humor	4.15 ± 1.724
Behavioral disengagement	3.90 ± 1.785
Denial	3.88 ± 1.791
Substance use	2.66 ± 1.235

SD: standard deviation.

probable burnout, and 3.8% was coping adequately. Among other ethnic groups, 54.5% suffered possible burnout, but non-reported having probable burnout. Among those who are singles, 13% were coping adequately compared to only 4.6% of the married ones. Also, among those who were single, 23.5% have probable burnout compared to 34.9% of the married ones. In addition, those who attended the debriefing session of during and after relief work showed a low level of burnout compared to those attended only one debriefing session. The level of burnout increased with the frequency of involvement in disaster relief work. All of them were presented in Table 2.

**Socio-demographic factors and PTSD**

Among the tested variables, only marital status, current job position, length of being a disaster relief volunteer, attendance of debriefing, and frequency of involvement in disaster relief work showed a significant association ( $p < 0.05$ ) with PTSD. Among those who are single, 5.9% had no evidence of PTSD compared to 2.3% of the married ones. Similarly, 38% of those who are married had quite a bit of PTSD compared to 28.2% of those who are single. Compared with specialist physicians (15.3%), the incidence of PTSD among medical staff (26.5%) was higher, and nurses with post basic (23.2%) were higher than nurses without post-basic (9.1%). Those volunteers involved in disaster relief work for 2–9 years showed a higher PTSD levels than those who had worked less than one year or more than 10 years. Those who attended both debriefing sessions showed a lower level of PTSD compared to those who attended only one debriefing session. Also, the level of PTSD increased with the frequency of involvement in disaster relief work. The results are presented in Table 6.

**Socio-demographic factors and QOL**

Among the tested variables, only marital status and length of being disaster relief volunteer showed a significant association with the physical fitness of QOL domain ( $p < 0.05$ ). Those who are single appeared physically healthier compared to the married ones. Those volunteers served 2–9 years in disaster relief work showed a poorer physical health compared to those served less than one year or more than 10 years in disaster relief work (Table 7). Psychological well-being, age, current job and the length of being disaster relief volunteer showed a significant association ( $p < 0.05$ ) with QOL domain. Psychological well-being generally increases with age. Medical officers appeared to show a lower level of psychological well-being compared to other jobs. Also, those with an involvement between 2 and 9 years as a disaster relief volunteer showed a

poorer psychological well-being compared to those with less than one year or more than 10 years (Table 7).

The length of being a disaster relief volunteer and the attendance of formal course on disaster management showed a significant association ( $p < 0.05$ ) with the social relationship of QOL domain. Those who had 2–9 years of involvement as a disaster relief volunteer showed a poorer social relationship compared to those with less than one year or more than 10 years of involvement. On the other hand, those who have attended the formal course on disaster management had a better social relationship compared to those who have not (Table 7).

Lastly, only the length of being a disaster relief volunteer and the attendance of formal course on disaster management showed significant association ( $p < 0.05$ ) with the environmental support of QOL domain. Those who had between 2 and 9 years of involvement as a disaster relief volunteer showed a lower environmental support compared to those with less than one year or more than 10 years of involvement. On the other hand, those who have attended formal course on disaster management showed a higher environmental support compared to those who have not (Table 7).

*The correlation between incidence of burnout and incidence of PTSD*

Spearman's correlation ( $r$ ) was used to test the association between the incidence of burnout and incidence of PTSD. There is a significantly strong positive correlation between the incidence of burnout and incidence of PTSD ( $r = 0.578, n = 30, p = 0.000$ ). It appears that the higher the level of burnout is, the severer the PTSD is. The participants who scored higher for burnout also have a higher score for PTSD.

*The association between coping strategies and the disaster relief effort*

The Spearman correlation ( $r$ ) was used to test the associations between scores of each sub-categories of the brief COPE (acceptance, emotional support, instrumental support, positive reframing, religion, venting, planning, active coping, self-distraction, humor, behavioral disengagement, denial, self-blame and substance use) and the scores of each sub-categories of burnout, PTSD and QOL, respectively.

*The association between coping strategies and PTSD*

As shown in Table 8, there was a strong positive correlation between venting, self-distraction, humor, behavioral disengagement, denial, self-blame and substance use and the incidence of burnout and incidence of PTSD. Also, the greater the use of venting, self-distraction, humor, behavioral disengagement, denial, self-blame and substance use as coping strategies, the higher the incidence of burnout and incidence of PTSD. On the other hand, there is a negative correlation between acceptance, emotional support, instrumental support, positive reframing, religion and active coping strategies with the incidence of burnout and incidence of PTSD. Therefore, a high use of acceptance, emotional support, instrumental support, positive reframing, religion and active coping strategies resulted in a low incidence of burnout and incidence of PTSD.

*The association between coping strategies and QOL*

As shown in Table 9, there is a positive correlation between acceptance, emotional support, instrumental support, positive reframing, religion and active coping strategies, with all the four domains of QOL, respectively. In addition, there is a positive

**Table 6**  
The association between socio-demographic variables and PTSD (n = 343), n (%).

Variable	n	No evident	A little symptom	Moderate symptom	Quite a bit of symptom	Extreme symptom	Chi-square statistics (df)	p value
Age group (years)							26.131 (16)	0.052
≤30	115	3 (2.6)	52 (45.2)	41 (35.7)	17 (14.8)	2 (1.7)		
31–40	120	0 (0)	47 (39.1)	53 (44.2)	16 (13.3)	4 (3.4)		
41–50	62	4 (6.5)	27 (43.5)	17 (27.4)	13 (21.0)	1 (1.6)		
51–60	34	2 (5.9)	16 (47.1)	9 (26.5)	6 (17.6)	1 (2.9)		
≥ 61	12	2 (16.7)	8 (66.6)	2 (16.7)	0 (0)	0 (0)		
Gender							1.037 (4)	0.904
Male	85	4 (4.7)	38 (44.7)	28 (32.9)	13 (15.3)	2 (2.4)		
Female	258	7 (2.7)	112 (43.4)	94 (36.4)	39 (15.1)	6 (2.4)		
Ethnic group							20.567 (12)	0.057
Malay	190	5 (2.6)	76 (40)	78 (41)	27 (14.2)	4 (2.1)		
Chinese	90	4 (4.5)	43 (47.8)	26 (28.9)	13 (14.3)	4 (4.5)		
Indian	52	0 (0)	27 (51.9)	14 (26.9)	11 (21.2)	0 (0)		
Others	11	2 (18.2)	4 (36.4)	4 (36.4)	1 (1.0)	0 (0)		
Marital status							10.990 (4)	0.027
Married	258	6 (2.3)	110 (42.6)	98 (38)	41 (15.9)	3 (1.2)		
Single	85	5 (5.9)	40 (47.0)	24 (28.2)	11 (13.0)	5 (5.9)		
Current job position							42.221 (12)	0.000
Medical officer	64	7 (11.0)	27 (42.2)	13 (20.3)	13 (20.3)	4 (6.2)		
Specialist	59	0 (0)	33 (55.9)	17 (28.8)	9 (15.3)	0 (0)		
Nurse	121	4 (3.3)	55 (45.5)	51 (42.1)	9 (7.4)	2 (1.7)		
Nurse with post-basic	99	0 (0)	35 (35.4)	41 (41.4)	21 (21.2)	2 (2.0)		
Length of being disaster relief volunteer (years)							32.259 (12)	0.001
≤ 1	80	2 (3.0)	44 (55.0)	25 (31.2)	8 (10.0)	1 (1.3)		
2–5	190	3 (1.6)	75 (39.5)	76 (40.0)	32 (16.8)	4 (2.1)		
6–9	49	2 (4.1)	18 (36.7)	18 (36.7)	10 (20.4)	1 (1.1)		
≥ 10	24	4 (16.7)	13 (54.2)	3 (12.5)	2 (8.3)	2 (8.3)		
Formal course on disaster management							7.652 (4)	0.105
Yes	145	2 (1.4)	72 (49.7)	48 (33.1)	18 (12.4)	5 (3.4)		
No	198	9 (4.5)	78 (39.4)	74 (37.4)	34 (17.3)	3 (1.4)		
Attended debriefing session in disaster relief work							2.403 (4)	0.662
Yes	209	6 (2.9)	94 (45.0)	77 (36.8)	27 (12.9)	5 (2.4)		
No	134	5 (3.7)	56 (41.8)	45 (33.6)	25 (18.7)	3 (2.2)		
if yes, indicate the time of the debriefing (n = 209)							17.320 (8)	0.027
During trip	53	2 (3.8)	26 (49.0)	18 (34.0)	7 (13.2)	0		
Post trip	98	4 (4.1)	33 (33.7)	40 (40.8)	16 (16.1)	5 (5.1)		
Both	58	0 (0)	35 (60.3)	19 (32.7)	4 (7.0)	0		
Frequency of involvement in disaster relief work							96.627 (12)	0.000
1 time	179	5 (2.8)	83 (46.4)	55 (30.7)	32 (17.9)	4 (2.2)		
2–5 times	153	2 (1.4)	62 (40.5)	67 (43.8)	18 (11.8)	4 (2.6)		
6–9 times	6	4 (66.7)	0 (0)	0 (0)	2 (33.3)	0 (0)		
≥10 times	5	0 (0)	5 (100.0)	0 (0)	0 (0)	0 (0)		

PTSD: post-traumatic stress disorder.

correlation between planning strategy with QOL domains for psychological well-being and social relationship, respectively. It appears that the higher of the usage of acceptance, emotional support, instrumental support, positive reframing religion and active coping strategies is, the better the QOL becomes. There is a negative correlation between self-distraction, humor, behavioral disengagement, denial and self-blame with all the four domains of QOL, respectively. The higher the use of self-distraction, humor, behavioral disengagement, denial and self-blame is, the lower the QOL becomes. On the other hand, there is a positive correlation between venting strategy with the QOL domains, namely, physical health, psychological well-being and social relationship, respectively.

**Discussion**

*The incidence of burnout and PTSD among volunteer workers*

The findings from the relief worker burnout questionnaire indicated that 40.2% of the participants in this study suffered from work stress with only a small minority (6.7%) reported coping

adequately with stress. Most of them appeared to suffer from burnout, either possible burnout (32.1%) or probable burnout (21%). Furthermore, a huge majority (93.3%) of the participants reported experiencing symptoms of stress. However, it is important to note here that the majority of our participants are doctors and nurses, who work in regular healthcare settings, not engaged as volunteers in disaster relief efforts. Hence, these medical professionals, even without involvement of the disaster relief work, are already working with stressful. These professionals often experience high levels of stress in their daily activities, which often lead to burnout.<sup>36,37</sup>

Therefore, our next question is, “Could this incidence of burnout reported by the participants of the current study be the result of their occupation and not just the volunteering experiences?” Yes, it is indeed possible and indeed likely, that some of the burnout reported by the participants in this study is related to the occupational stressors each day. This is certainly one of the limitations of this retrospective design study, in which causal factors cannot be controlled or directly identified effectively. Nevertheless, our finding is consistent with a previous cross-sectional observational

**Table 7**  
The association between socio-demographic variables and QOL domains (n = 343).

Variable	n	Physical health			Psychological well-being			Social relationship			Environmental support		
		Mean rank	U Test	p value	Mean rank	U Test	p value	Mean rank	U Test	p value	Mean rank	U Test	p value
		Chi-Square statistics (df)			Chi-square statistics (df)			Chi-square statistics (df)			Chi-square statistics (df)		
Age group (years)		7.460 (4)		0.113	16.994 (4)		0.002	16.994 (4)		0.002	5.110 (4)		0.276
≤ 30	115	182.82			187.98			187.98			165.19		
31–40	120	154.25			151.51			151.51			196.41		
41–50	62	173.11			163.55			163.55			167.41		
51–60	34	180.44			176.90			176.90			199.38		
≥ 61	12	210.50			253.58			253.58			209.55		
Gender		10,665		0.704	9589		0.081	9589		0.081	10,671		0.709
Male	85	168.46			155.81			155.81			168.54		
Female	258	173.16			177.33			177.33			173.14		
Ethnic group		3,499 (3)		0.321	3,442 (3)		0.328	3,442 (3)		0.328	1,973 (3)		0.578
Malay	190	165.37			176.49			176.49			167.79		
Chinese	90	172.71			157.46			157.46			174.66		
Indian	52	187.74			174.30			174.30			175.07		
Others	11	206.23			202.55			202.55			208.50		
Marital status		9135		0.021	9789		0.135	9789		0.135	10,790		0.824
Married	258	164.91			167.44			167.44			171.32		
Single	85	193.54			185.84			185.84			174.06		
Current job position		4,789 (3)		0.188	9,319 (3)		0.025	9,319 (3)		0.025	5,087 (3)		0.166
Medical officer	64	164.66			142.24			142.24			169.22		
Specialist	59	194.69			169.31			169.31			195.99		
Nurse	121	173.99			188.58			188.58			161.39		
Nurse with post-basic	99	160.79			172.57			172.57			173.76		
Length of being Disaster relief volunteer (years)		10,663 (3)		0.014	30,056 (3)		0.000	30,056 (3)		0.000	14,788 (3)		0.002
≤ 1	80	201.18			213.37			213.37			196.31		
2–5	190	161.66			154.32			154.32			160.56		
6–9	49	157.31			147.40			147.40			153.36		
≥ 10	24	186.60			224.29			224.29			219.58		
Formal course on disaster management		12,973		0.126	13,153		0.182	13,153		0.182	12,564		0.047
Yes	145	181.53			182.29			182.29			184.35		
No	198	165.02			165.93			165.93			162.95		
Attended debriefing session in disaster relief work		13,891		0.900	13,808		0.827	13,808		0.827	12,763		0.163
Yes	209	172.54			172.93			172.93			177.94		
No	134	171.16			170.54			170.54			162.74		
if yes, indicate the time of the debriefing (n = 209)		5,129 (2)		0.077	2,658 (2)		0.265	2,658 (2)		0.265	5,802 (2)		0.055
During trip	53	96.86			105.55			105.55			104.47		
Post trip	98	100.48			98.80			98.80			96.29		
Both	58	120.04			114.97			114.97			120.20		
Frequency of involvement in Disaster relief work		2,289 (3)		0.515	0,502 (3)		0.918	0,502 (3)		0.918	2,749 (3)		0.432
1 time	179	165.82			159.21			159.21			160.76		
2–5 times	153	154.77			165.96			165.96			159.09		
6–9 times	6	149.54			156.93			156.93			168.58		
≥10 times	5	190.83			168.83			168.83			208.67		

QOL: quality of life.

study of the stress and burnout among healthcare workers who were involved in the 2009 L'Aquila Earthquake relief work, where a high prevalence of burnout (23.24%) was reported.<sup>38</sup> However, a couple of studies have also reported a low burnout rate among disaster relief volunteers.<sup>39,40</sup> To answer whether the burnout reported by most participants was indeed related to their volunteer work experiences in disaster areas, the prevalence of PTSD symptoms among participants was investigated. Compared with daily work experiences, disaster relief work is more likely to cause PTSD.<sup>41</sup>

In this study, 96.8% of participants demonstrated some degrees of PTSD symptoms, with 2.3% experiencing extreme symptoms, 43.7% experiencing some symptoms, 35.6% experiencing moderate symptoms, and 15.2% deemed to be experiencing significant symptoms. It is in accordance with a previous study, which

indicated a probable PTSD rate of 30% and a probable depression rate of 27.1% among its study subjects.<sup>42</sup> Furthermore, the risk of developing PTSD symptoms among volunteers working in disaster relief areas has been emphasized by Sakuma et al.<sup>41</sup> While a low incidence of PTSD among disaster relief volunteers has also been reported, with 6% by Hagh-shenas et al.<sup>6</sup> and 6.6% by Sakuma et al.,<sup>41</sup> this does not rule out the risk of developing PTSD.

The incidence of PTSD mentioned in this study suggests that these volunteers have considerable levels of PTSD symptoms. Therefore, the high level of burnout identified among our participants is likely to be related to their working time in the disaster relief areas. These figures also point to an identifiable need that volunteers who have been involved in disaster relief areas require psychological support following their return home, as PTSD and



**Table 8**  
The association between coping strategies and incidence of burnout and incidence of PTSD.

Coping strategy	Incidence of burnout		Incidence of PTSD	
	r	p value	r	p value
Acceptance	-0.236 <sup>a</sup>	0.000	-0.267 <sup>a</sup>	0.000
Emotional support	-0.157 <sup>a</sup>	0.004	-0.091	0.092
Instrumental support	-0.125 <sup>b</sup>	0.021	-0.085	0.115
Positive reframing	-0.226 <sup>a</sup>	0.000	-0.229 <sup>a</sup>	0.000
Religion	-0.115 <sup>b</sup>	0.033	-0.168 <sup>a</sup>	0.002
Venting	0.188 <sup>a</sup>	0.030	0.288 <sup>a</sup>	0.000
Planning	0.054	0.321	0.053	0.325
Active coping	-0.260 <sup>a</sup>	0.000	-0.205 <sup>a</sup>	0.000
Self-distraction	0.414 <sup>a</sup>	0.000	0.486 <sup>a</sup>	0.000
Humor	0.359 <sup>a</sup>	0.000	0.373 <sup>a</sup>	0.000
Behavioral disengagement	0.438 <sup>a</sup>	0.000	0.535 <sup>a</sup>	0.000
Denial	0.482 <sup>a</sup>	0.000	0.609 <sup>a</sup>	0.000
Self-blame	0.535 <sup>a</sup>	0.000	0.615 <sup>a</sup>	0.000
Substance use	0.202 <sup>a</sup>	0.000	0.170 <sup>a</sup>	0.002

PTSD: posttraumatic stress disorder.

<sup>a</sup> Correlation is significant at the 0.01 level (2-tailed).

<sup>b</sup> Correlation is significant at the 0.05 level (2-tailed).

high levels of stress have been shown to have a considerable impact on one's QOL and overall health.<sup>43,44</sup>

There is of course a caveat to these findings on burnout and PTSD. The PTSD symptoms here are gauged from the use of PCL-S (a self-reporting checklist) and not from the clinical assessment, which would normally be required to diagnose PTSD. Nevertheless, while the PCL-S cannot confirm the incidence of PTSD, it can legitimately identify PTSD symptomatology. Our findings here are similar with other studies which focus on the mental health of medical professionals engaged in disaster relief work.<sup>8,9,18</sup>

*The QOL among volunteer workers*

In line with the findings of the wide literature regarding burnout and QOL, it would be reasonable to expect the QOL within this cohort which reported a constant and high incidence of burnout to be low.<sup>45,46</sup> On the contrary, based on the responses given to the WHOQOL-BREF, the QOL of our participants, for the most part, is “neutral” or “acceptable”. Furthermore, the mean obtained for all the domains measured by WHOQOL-BREF were all above the score of 12.0 used as a midpoint or neutral estimation of QOL.

**Table 9**  
The association between coping strategy subscales with the QOL domains.

Coping strategy	Physical health		Psychological well-being		Social relationship		Environmental support	
	r	p value	r	p value	r	p value	r	p value
Acceptance	0.334**	0.000	0.407**	0.000	0.392**	0.000	0.322**	0.000
Emotional support	0.173**	0.001	0.244**	0.000	0.233**	0.000	0.280**	0.000
Instrumental support	0.191**	0.000	0.241**	0.000	0.258**	0.000	0.224**	0.000
Positive reframing	0.295**	0.000	0.381**	0.000	0.316**	0.000	0.335**	0.000
Religion	0.157**	0.004	0.258**	0.000	0.236**	0.000	0.206**	0.000
Venting	-0.216**	0.000	-0.220**	0.000	-0.127*	0.019	-0.068	0.211
Planning	0.000	0.993	0.151**	0.005	0.139*	0.010	0.003	0.956
Active coping	0.247**	0.000	0.335**	0.000	0.298**	0.000	0.276**	0.000
Self-distraction	-0.429**	0.000	-0.293**	0.000	-0.243**	0.000	-0.377**	0.000
Humor	-0.388**	0.000	-0.336**	0.000	-0.248**	0.000	-0.325**	0.000
Behavioral disengagement	-0.453**	0.000	-0.403**	0.000	-0.307**	0.000	-0.366**	0.000
Denial	-0.528**	0.000	-0.480**	0.000	-0.375**	0.000	-0.401**	0.000
Self-blame	-0.445**	0.000	-0.442**	0.000	-0.336**	0.000	-0.377**	0.000
Substance use	-0.101	0.062	-0.122*	0.024	-0.104	0.055	-0.093	0.086

QOL: quality of life, r: pearson product-moment correlation coefficient.

\*\* : Correlation is significant at the 0.01 level (2-tailed).

\* : Correlation is significant at the 0.05 level (2-tailed).

A number of questions can be raised for the counter-intuitive findings here. Issues of self-report accuracy may be seen as playing a part in this, but the participants are of a sufficient size for this consideration to be negated to an extent. It is also possible, as suggested by Michalos,<sup>47</sup> that the effects of burnout can take a considerable amount of time to impact on the QOL, which can be the case here. Another explanation for the counter-intuitive findings may be one ideal that is ignored here: act of altruism. We have focused on the idea that the experiences endured by volunteers in disaster relief zones induced feelings of long-standing stress. However, it is possible that acting as a volunteer is regarded as a highly altruistic act which, therefore, brought in positive psychological feelings, reframing a sense of satisfaction. There is an evidence to suggest that “it's good to be good”, which acts in an altruistic fashion brings personal psychological rewards.<sup>48,49</sup>

Therefore, it is possible that while working in disaster relief areas triggers the harmful factors to affect the mental health, like stress noted above. It also simultaneously triggers the buffering of harmful factors, which achieves the good QOL. However, the function or ability of the present study does not elucidate further on this hypothesis, but it can be examined in the future studies in detail.

*The association with socio-demographic factors*

One of the core hypotheses of this study is that the level of burnout, PTSD and QOL can vary according to the demographic variables and this is supported by our results.

*The association with age*

Statistically significant findings were identified in age groups for QOL domain of psychological well-being, with older participants reporting a high psychological well-being. However, no association among age, burnout and PTSD were found. It is consistent with the findings of past studies by Ballard<sup>39</sup> and Musa and Hamid,<sup>50</sup> in which both studies found that the age is not associated with burnout and PTSD. On the contrary, one study by Eriksson et al.<sup>51</sup> found that age is related to burnout.

The following argument can be adopted to support our finding. As aging, we develop more coping mechanisms, or to be more precise, we discover what optimal coping strategies may be in a range of differing triggering situations which result in a better QOL.<sup>52</sup> Based on this finding, there is a need to provide younger volunteers greater psychological supports, before and after serving

in disaster relief areas. Nevertheless, the findings here need to be repeated and future studies is needed to perform the analysis of data on these variables (i.e. analysis without age categories) in order to determine trends and direct correlations, which will further increase the understanding in this area.

#### *The association with marital status*

Our study finds the significant association between marital status and risk of burnout and PTSD, as well as the level of QOL domain for physical health. Participants who are single appeared to have an increased risk percentage for burnout and PTSD, respectively. Married participants scored lower on the QOL domain for physical health compared to single ones. Cardozo et al.<sup>21</sup> reported a contradictory study which shows that for humanitarian aid workers it has higher levels of life satisfaction of married workers but lower risk of psychological distress of single participants. Also, a much old study in the 70's by Maslach<sup>53</sup> found that single and divorced workers suffered more emotional exhaustion after a disaster relief work compared to married disaster relief workers.

According to the results of the mixed survey, although a married life may bear certain responsibilities and may cause anxiety and stress during deployment, the long-term relationships may provide the support needed to mitigate the impact of working in the disaster area. Lack of this support may explain a high risk of burnout and PTSD among single participants. However, it is not confirmed in our study. It appears that marital status does not give a clear advantage or disadvantage to those who are involved in disaster relief efforts. Indeed, while Hagh-shenas et al.<sup>6</sup> found that marital status was associated with an adverse effect of dealing with traumatic situations, such as a disaster. In relatively recent studies, it was found that marital status is not correlated with psychological complaints.<sup>38,42</sup>

#### *The association with job status*

Statistically significance were found in current job positions with PTSD and QOL domain for psychological well-being, respectively. In our study, specialist doctors appeared to have the lowest risk for PTSD and this is similar with the findings of past studies.<sup>6,38</sup> This may be explained by the fact that specialist doctors normally come with years of working experience, therefore, they have better coping strategies with stress.

This finding is vital because the most important part of any healthcare organization is its employees, and they who volunteer to work in disaster relief areas need the appropriate and personalized care, because it is not only essential for the individual, but also for the organization.<sup>54</sup> For that, it suggests that extra psychological preparation and after-care should be given to volunteers who have less experience in mission works.

#### *The association with length as a relief volunteer and frequency of involvement*

It was statistically significant among the length as a disaster relief volunteer and frequency of involvement with burnout and PTSD, respectively. Our findings revealed that participants involving in disaster relief work for 6–9 years have an increased risk of PTSD compared to those for only one year or more than nine years. They also scored low for all the QOL domains. Indeed, an increase risk in anxiety was found among volunteers who had served much long in hostile disaster areas by Connorton et al.<sup>55</sup> However, it should be noted that disaster relief volunteers who only serve at a disaster area for a short time are still at risk of developing stress response.

Furthermore, our findings also revealed that participants who were frequently involved in relief efforts have a low risk for burnout and PTSD. This is consistent with the research of Soliman, Lingle

and Raymond,<sup>56</sup> who found that experienced disaster relief volunteers showed less secondary traumatic stress than inexperienced volunteers.

#### *The association with management of relief effort*

The management of relief work may also affect the outcome of volunteers' psychological relief. Participants who had undergone formal course on disaster management appeared to have a better QOL for social relationship and environmental support. Indeed, studies have shown that volunteers with low levels of training and preparedness showed a higher risk of developing PTSD.<sup>16,55</sup>

In addition, we also found that the time of reporting after the disaster relief work showed a statistically significant difference with burnout and PTSD, respectively. Participants who undergo the debriefing showed the lowest risk of burnout and PTSD. This is in accordance with the findings of Chan and Huak<sup>57</sup> and Hagh-shenas et al.<sup>6</sup> which concluded that debriefing is helpful for disaster relief volunteers. However, neither of the studies specified when the debriefing sessions should be conducted.

#### *Coping strategies*

Using the Brief Cope Inventory, we identified two contrasting poles of strategies, by which our participants coped with stress. On one hand, positive psychological approaches such as acceptance, positive reframing and active coping are some of the most commonly utilized coping strategies, alongside support garnered from religion and emotional/instrumental sources. On the other hand, negative psychological approaches and behavioral coping strategies appeared to be used. Fortunately, negative and behavioral approaches are rarely used (or only reportedly used), including substance use, behavioral disengagement, denial and use of humor.

Similar to our findings, the study by Prati et al.<sup>27</sup> of coping strategies and professional QOL among emergency workers suggested that the most used coping strategies were acceptance, planning active coping, instrumental support and positive reframing. In contrast, a study of Sanders<sup>28</sup> in a small town in Florida, US reported that the most used prevalent coping strategy was avoidance. Since our study is conducted among the Malaysian volunteers, we can argue that our findings may be due to the inherent resilience of Asians.<sup>58</sup>

While coping behavior has been associated with burnout, PTSD and QOL, the association are polarized in nature. There is a number of notably effective coping strategies to eliminate the effects among the three mentioned, but a number of coping strategies were apparently ineffective. For the effective strategies, it was found statistical significance with the use of emotional support, instrumental support, acceptance, religion, positive reframing and active coping, respectively. Our findings also revealed that the greater use of these coping strategies is associated with the better QOL. It is important to note here that tests, such as Spearman's Correlation cannot infer causality, so it would not be appropriate, based on these results, to make the claim that any of the coping strategies mentioned here would lead to or cause decreased incidence of burnout, but rather that those who utilized these strategies are more likely to report reduced burnout levels.

Meanwhile, the ineffective strategies, such as venting, self-distraction, use of humor, behavioral disengagement, denial, self-blame or substance abuse, are significantly more likely to experience (or self-report) a higher burnout and PTSD level. Again, it must be emphasized that a causal relationship between these maladaptive coping strategies and the increased rate of burnout cannot be inferred by utilizing the method of the current study.

Despite of the limitation of the test used here, the results of the positively adaptive and maladaptive coping strategies gave some interesting findings for consideration. The question is why some individuals employ positive coping strategies, while others utilize negative coping strategies. This has been suggested to be due to a variety of reasons, which include individual differences, biological predispositions, and social situations.<sup>59</sup>

Again, it is beyond the scope of this study to pontificate on the reasons behind the use of certain strategies by specific individuals or groups of people. Instead, we should consider some practical benefits that could be obtained from these findings. Considering the high incidence of burnout of medical volunteers in disaster relief areas<sup>41</sup> and the high personal and social costs of PTSD,<sup>43</sup> coping strategies customized by individual could provide a useful screening tool to identify those most high levels of stress upon after returning home from a disaster relief work. A simple question is how to identify that an individual experiences the high levels of burnout or PTSD, and therefore, a necessary support needs to be provided as quickly as possible. Early intervention may quickly identify the risk burnout and PTSD, and provide the necessary assistance an early stage.<sup>60,61</sup>

It must be pointed out that, as with other areas of this study that have been discussed, more work is needed to use a random sample of participants to gain the greater confidence that these are indeed issues that affect the entire population. Secondly, it is important to consider the methodology to utilize for the data collection in the study. Although this method has the advantage of collecting large amounts of data from a large number of participants, the self-report questionnaires of researching personal and mental health issues is not without problems.<sup>62</sup> In addition, it is sometimes impossible to get a definitive response, especially for some behaviors that may be forbidden, such as drug abuse. The outcome in this research are certainly worthy of further study in order to introduce early identification schemes in a fast and effective manner.

### Limitations

This study is primarily concerned with volunteers in Malaysia and thus it has a limited ability to provide the generalizable information to a wider population of volunteers into different disaster areas. However, to date, there is a dearth of literature examining the experiences of these specific population.

The sample size is impressive ( $n = 343$ ), and the response rate of invited participants is high (88%). However, there are some considerations for these sample. The sample of this study shows the image of what a volunteer in disaster relief areas looks like in Malaysia, including their typical demographics, backgrounds, and so on, and of which the sampling method must be considered. For practical and resource-related considerations, this study did not use random sampling. Since that, it is probably not representative. This is a retrospective study collecting volunteers' recollection of events and thoughts. While a prospective study may be more capable of controlling factors, such as disaster type and timing,<sup>63</sup> it is not within the scope of this study. The research tools used in this study are based on self-report measures, and thus, it is prone to bias and distortion.<sup>64</sup>

In conclusion, the study provides the information of volunteers engaging in the relief work in disaster relief in Malaysia. The focus of the study is on burnout, PTSD and QOL, as well as the coping strategies they used. We find that volunteers worked in disaster relief suffer varying degrees of burnout and PTSD. Their experience in disaster relief work has also had different impacts on various domains of their QOLs. How much they suffer burnout and PTSD, and how much the experience of working in disaster relief zones affect their QOL are associated with their demographic variables as

well as the coping strategies adopted. Therefore, identifying the volunteers in advance who are most likely to experience these negative symptoms will help minimize potential stress and prevent the long-term psychological harm. Hence, it is imperative for the volunteer organizations, employers, and also health-related bodies to recognize the need to provide the necessary level of support to the relief volunteers in order to protect their overall well-being.

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Nil.

### Ethical statement

The study was approved by the Ethics and Review Board of MAHSA University.

### Declaration of competing interest

All the authors agree that there is no conflict of interest associated with this manuscript.

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### References

1. Word J, Brower RS. Volunteers, nonprofits, and community capacity: a case study in preparing for disaster response and recovery. *J Nonprof Manag.* 2012;15(1):65–83.
2. Gardner RO. The emergent organization: improvisation and order in gulf coast disaster relief. *Symbolic Interact.* 2013;36:237–260. <https://doi.org/10.1002/symb.70>.
3. Sodhi MS. Natural disasters, the economy and population vulnerability as a vicious cycle with exogenous hazards. *J Oper Manag.* 2016;45:101–113. <https://doi.org/10.1016/j.jom.2016.05.010>.
4. Sauer LM, Catlett C, Tosatto R, et al. The utility of and risks associated with the use of spontaneous volunteers in disaster response: a survey. *Disaster Med Public Health Prep.* 2014;8:65–69. <https://doi.org/10.1017/dmp.2014.12>.
5. Ehrenreich JH. *Coping with Disasters. A Guidebook to Psychosocial Intervention*; 2001. <https://www.hhri.org/publication/coping-with-disasters-a-guidebook-to-psychosocial-intervention/>.
6. Hagh-shenas H, Goodarzi MA, Dehbozorgi G, et al. Psychological consequences of the bam earthquake on professional and nonprofessional helpers. *J Trauma Stress.* 2005;18:477–483. <https://doi.org/10.1002/jts.20055>.
7. Mitchell TL, Walters W, Stewart S. Swissair flight 111 disaster response impacts: lessons learned from the voices of the disaster volunteers. *Brief Treat Crisis Interv.* 2006;6:154–170.
8. Alexander DA. Psychological intervention for victims and helpers after disasters. *Br J Gen Pract.* 1990;40:345–348.
9. Smith E, Morgans A, Qureshi C, et al. Paramedics' perceptions of risk and willingness to work during disasters. *Aust J Emerg Manag.* 2009;24:21–27. [arrow.monash.edu.au/vital/access/manager/Repository/monash](http://arrow.monash.edu.au/vital/access/manager/Repository/monash).
10. Frank D, Sullivan L. The lived experience of nurses providing care to victims of the 2005 hurricanes. *SOJNR.* 2005;8(3):1–11.
11. Quevillon RP, Gray BL, Erickson SE, et al. Helping the helpers: assisting staff and volunteer workers before, during, and after disaster relief operations. *J Clin Psychol.* 2016;72:1348–1363. <https://doi.org/10.1002/jclp.22336>.
12. Shah SA, Garland E, Katz C. Secondary traumatic stress: prevalence in humanitarian aid workers in India. *Traumatology.* 2007;13:59–70. <https://doi.org/10.1177/1534765607299910>.
13. Hauke A, Georgiadou P, Pinotsi D, et al. *Emergency Services: A Literature Review on Occupational Safety and Health Risks.* Luxembourg: Publications Office of the European Union; 2011.
14. Podsakoff NP, Lepine JA, Lepine MA. Differential challenge, stressor hindrance, stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: a meta-analysis. *J Appl Psychol.* 2007;92:435–454. <https://doi.org/10.1037/0021-9010.92.2.438>.
15. Organization AP. *Diagnostic and Statistical Manual of Mental Disorders.* fifth ed. Arlington, VA: American Psychiatric Association; 2013.
16. Tomczyk D, Alvarez D, Borgman P, et al. Caring for those who care: the role of the occupational health nurse in disasters. *AAOHNJ.* 2008;56:243–250. <https://doi.org/10.3928/08910162-20080601-08>.

17. Solanki H. *Mindfulness and Wellbeing. Mental Health and Humanitarian Aid Workers: A Shift of Emphasis from Treatment to Prevention*. London: CHS Alliance; 2015.
18. Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: a systematic review. *Psychol Med*. 2008;38:467–480. <https://doi.org/10.1017/S0033291707001353>.
19. da Costa D. *Working in Challenging Environments: Risk Management and Aid Culture in South Sudan Field Report South Sudan*. London: Overseas Development Institute; 2012.
20. Duffield M. Risk-management and the fortified aid compound: everyday life in post-interventory society. *J Interv Statebuilding*. 2010;4:453–474. <https://doi.org/10.1080/17502971003700993>.
21. Cardozo BL, Crawford CG, Eriksson C, et al. Psychological distress, depression, anxiety, and burnout among international humanitarian aid workers: a longitudinal study. *PLoS One*. 2012;7, e44948. <https://doi.org/10.1371/journal.pone.0044948>.
22. Fletcher D, Sarkar M. Psychological resilience. A review and critique of definitions, concepts, and theory. *Eur Psychol*. 2013;18:12–23. <https://doi.org/10.1027/1016-9040/a000124>.
23. Graber R, Pichon F, Carabine E. *Psychological Resilience State of Knowledge and Future Research Agendas*. London: Overseas Development Institute; 2015.
24. Sivam RW, Chang WC. Occupational stress: the role of psychological resilience in the ecological transactional model. *Eur Sci J*. 2016;12:64–90. <https://doi.org/10.19044/esj.2016.v12n14p63>.
25. Chang WC, Lim LH. Resilience and subjective wellbeing in an Asian context: Singapore. *J Psychol Chin Soc*. 2007;8:47–69.
26. Newness KA. Stress and coping style: an extension to the transactional cognitive appraisal model. In: *FIU Electronic Theses and Dissertations*; 2011. <https://digitalcommons.fiu.edu/etd/346>.
27. Prati G, Palestini L, Pietrantonio L. Coping strategies and professional QOL among emergency workers. *Australas J Disaster Trauma Stud*. 2009;1:1–11.
28. Sanders LS. *A Study of the Relationships Among Secondary Traumatic Stress, Coping, and Years of Service in Firefighter/emergency Medical Service Personnel*. Dissertation. Argosy University; 2002.
29. Dyregrov A, Kristoffersen JI, Gjestad R. Voluntary and professional disaster-workers: similarities and differences in reactions. *J Trauma Stress*. 1996;9:541–555. <https://doi.org/10.1007/BF02103663>.
30. Polit DF, Beck CT. *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2014.
31. International Federation of Red Cross and Red Crescent Societies. *Managing Stress in the Field*. fourth ed. Switzerland: International Federation of Red Cross and Red Crescent Societies; 2009.
32. Norris FH, Hamblen JL. Standardized self-report measures of civilian trauma and PTSD. In: Wilson JP, Keana TM, eds. *Assessing Psychological Trauma and PTSD*. second ed. New York: The Guilford Press; 2003:63–102.
33. Geneva. Programme on Mental Health World Health Organization. *WHOQOL-BREF Introduction, Administration, Scoring and Generic Version of the Assessment*. Switzerland. Programme on Mental Health World Health Organization; 1996.
34. Carver CS. *Brief COPE Inventory*. Department of Psychology. University of Miami; 1997.
35. Yusoff N, Low WY, Yip CH. Reliability and validity of the brief COPE scale (English version) among women with breast cancer undergoing treatment of adjuvant chemotherapy: a Malaysian study. *Med J Malaysia*. 2010;65:41–44.
36. Adriaenssens JM. *Surviving Chaos: Predictors of Occupational Stress and Well-Being in Emergency Nurses*. Dissertation. Leiden University; 2014.
37. Thormar SB, Gersons BPR, Juen B, et al. The impact of disaster work on community volunteers: the role of peri-traumatic distress, level of personal affectedness, sleep quality and resource loss, on post-traumatic stress disorder symptoms and subjective health. *J Anxiety Disord*. 2014;28:971–977. <https://doi.org/10.1016/j.janxdis.2014.10.006>.
38. Mattei A, Fiasca F, Mazzei M, et al. Stress and burnout in health-care workers after the 2009 L'Aquila earthquake: a cross-sectional observational study. *Front Psychiatr*. 2017;8:98. <https://doi.org/10.3389/fpsy.2017.00098>.
39. Ballard E. *Prevalence of Secondary Traumatic Stress Among Disaster Relief Volunteers*. Dissertation. Rowan University; 2013.
40. Olivares RM. *Burnout and Stress in Disaster Relief Volunteers: Recommendations to Improve Volunteer Retention and Engagement*. Dissertation. The University of Texas; 2015.
41. Sakuma A, Takahashi Y, Ueda I, et al. Post-traumatic stress disorder and depression prevalence and associated risk factors among local disaster relief and reconstruction workers fourteen months after the Great East Japan Earthquake: a cross-sectional study. *BMC Psychiatr*. 2015;15:58. <https://doi.org/10.1186/s12888-015-0440-y>.
42. Zhen Y, Huang ZQ, Jin J, et al. Posttraumatic stress disorder of red cross nurses in the aftermath of the 2008 Wenchuan China earthquake. *Arch Psychiatr Nurs*. 2012;26:63–70. <https://doi.org/10.1016/j.apnu.2011.02.004>.
43. Kim TY, Kim SJ, Choi JR, et al. The effect of trauma and PTSD on telomere length: an exploratory study in people exposed to combat trauma. *Sci Rep*. 2017;7:4375. <https://doi.org/10.1038/s41598-017-04682-w>.
44. Taft CT, Creech SK, Murphy CM. Anger and aggression in PTSD. *Curr Opin Psychol*. 2017;14:67–71. <https://doi.org/10.1016/j.copsyc.2016.11.008>.
45. de Frias CM, Whyne E. Stress on health-related QOL in older adults: the protective nature of mindfulness. *Aging Ment Health*. 2015;19:201–206. <https://doi.org/10.1080/13607863.2014.924090>.
46. Costa ALS, Heitkemper MM, Alencar GP, et al. Social support is a predictor of lower stress and higher QOL and resilience in Brazilian patients with colorectal cancer. *Canc Nurs*. 2017;40:352–360. <https://doi.org/10.1097/NCC.0000000000000388>.
47. Michalos AC. Social indicators research and health-related QOL research. *Soc Indic Res*. 2004;65(1):27–72. <https://doi.org/10.1023/A:1025592219390>.
48. Post SG. Altruism, happiness, and health: it's good to be good. *Int J Behav Med*. 2005;12:66–77. [https://doi.org/10.1207/s15327558ijbm1202\\_4](https://doi.org/10.1207/s15327558ijbm1202_4).
49. Ricard M. *Happiness: Transforming the Development Landscape*. The Centre for Bhutan Studies and GNH; 2017:156–168.
50. Musa SA, Hamid AARM. Psychological problems among aid workers operating in Darfur. *Soc Behav Pers*. 2008;36:407–416. <https://doi.org/10.2224/sbp.2008.36.3.407>.
51. Eriksson CB, Bjorck JP, Larson LC, et al. Social support, organisational support, and religious support in relation to burnout in expatriate humanitarian aid workers. *Ment Health Relig Cult*. 2009;12:671–686. <https://doi.org/10.1080/13674670903029146>.
52. Johnson SJ, Holdsworth L, Hoel H, et al. Customer stressors in service organizations: the impact of age on stress management and burnout. *Eur J Work Organ Psychol*. 2013;22:318–330. <https://doi.org/10.1080/1359432X.2013.772581>.
53. Maslach C. Burnout. *Hum Behav*. 1976;5:16–21.
54. Berry SJ. Staff are an employer's best asset. *Nurs Stand*. 2014;28(39):62–63. <https://doi.org/10.7748/ns.28.39.62.s47>.
55. Connorton E, Perry MJ, Hemenway D, et al. Humanitarian relief workers and trauma-related mental illness. *Epidemiol Rev*. 2012;34:145–155. <https://doi.org/10.1093/epirev/mxr026>.
56. Soliman HH, Lingle SE, Raymond A. Perceptions of indigenous workers following participation in a disaster relief project. *Ment Health J*. 1998;34:557–568. <https://doi.org/10.1023/a:1018706900439>.
57. Chan AO, Huak CY. Emotional impact of 2004 Asian Tsunami on Singapore medical relief workers. *Int J Disaster Med*. 2004;2:152–156. <https://doi.org/10.1080/15031430510034695>.
58. Chang WC. Forged in fire: indigenous resilience factors of Singaporean Chinese and Malays. *Asian J Soc Psychol*. 2007;4:17–39.
59. Cummings EM. *Life-span Developmental Psychology: Perspectives on Stress and Coping*. New York: Psychology Press; 2014.
60. Freedman SA, Dayan E, Kimelman YB, et al. Early intervention for preventing posttraumatic stress disorder: an Internet-based virtual reality treatment. *Eur J Psychotraumatol*. 2015;6:25608. <https://doi.org/10.3402/ejpt.v6.25608>.
61. Birur B, Moore NC, Davis LL. An evidence-based review of early intervention and prevention of posttraumatic stress disorder. *Community Ment Health J*. 2017;53:183–201. <https://doi.org/10.1007/s10597-016-0047-x>.
62. Csikszentmihalyi M, Larson R. Validity and reliability of the experience-sampling method. *J Nerv Ment Dis*. 1987;175:526–536. <https://doi.org/10.1097/00005053-198709000-00004>.
63. Bryman A. *Social Research Methods*. Oxford: Oxford University Press; 2015.
64. Aldunce P, Beilin R, Handmer J, et al. Framing disaster resilience: the implications of the diverse conceptualisations of “bouncing back”. *Disaster Prev Manag*. 1992;23:252–270.