Original Article

Post-Traumatic Stress Disorder and Depression Among the Survivors of the Derna Flood 2023

Amina Muftah Elsaid[1], Naji Mustafa Boshaala[2]

1.Department of Community Medicine, Faculty of Medicine, Libyan International Medical University.

2.MBBC, Faculty of Medicine, Libyan International Medical University.

Corresponding Author Amina Muftah Elsaid: email. amina.elsaid@limu.edu.ly

ABSTRACT:

Purpose: Natural disasters are catastrophic events that result from natural phenomena such as floods, the most recent and devastating natural disaster that affected Libya was the flood that occurred in September 2023 had a significant impacts on the mental health of the survivors, who may experience various psychological problems such as post-traumatic stress disorder (PTSD), depression that can impair the quality of life, Aim of study: Our research aim is to determine the prevalence of PTSD and depression among the adult survivors of the Derna flood.

Methodology: A descriptive cross sectional study was done online through Google forms from December 2023 to April 2024.

Result: The majority of respondents were male (86.4%), with females comprising a minority (13.6%). Regarding age distribution, approximately half of the participants (50.5%) were aged between 18 and 28 years. The findings revealed a high prevalence of PTSD symptoms among the participants, with 72.8% reporting experiencing symptoms consistent with PTSD Moreover, the majority of participants (82.5%) exhibited symptoms of depression, the level of depression was significantly associated with employment status.

Conclusion: our study underscores the substantial burden of PTSD and depression among survivors of the Derna flood in Libya. The findings highlight the urgent need for tailored mental health interventions and support services to address the psychological needs of survivors in the aftermath of natural disasters.

Key words: disaster, flood, depression, post traumatic disorder, Derna, Libya

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INTRODUCTION:

Natural disasters are catastrophic events that result from natural phenomena such as floods, earthquakes, hurricanes, and volcanic eruptions. They cause widespread damage, displacement, and suffering to the affected populations and environments. According to the World Health Organization, natural disasters affect more than 200 million people every year and cause an average of 60,000 deaths[1]. Moreover, natural disasters have significant impacts on the mental health of the survivors, who may experience various psychological problems such as post-traumatic stress disorder (PTSD), depression, anxiety, and substance abuse[2].

Libya is a North African country that has experienced several natural disasters in its history, such as droughts, floods, landslides, and locust infestations[3]. However, the most recent and devastating natural disaster that affected Libya was the flood that occurred in September 2023, triggered by Storm Daniel, a powerful Mediterranean cyclone that brought heavy rains and high winds to the region[4]. The flood was caused by the collapse of two dams along the Wadi Derna river, which unleashed a massive torrent of water and mud that swept through the city of Derna, destroying roads, buildings, and entire neighborhoods[5]. The flood killed more than 4,000 people and left about 10,000 missing, making it one of the worst natural disasters in Libya's history[6].

PTSD is a mental disorder that develops after exposure to a traumatic event that involves actual or threatened death, serious injury, or sexual violence[7]. Depression is another common mental disorder that affects mood, motivation, and functioning[8].

The prevalence and risk factors of PTSD and depression among natural disaster survivors vary depending on the type, severity, and duration of the disaster, the characteristics of the exposed population, the availability and quality of mental health services, and the cultural and social context[9].

A meta-analysis of 63 studies involving 105,986 natural disaster survivors from 21 countries found that the pooled prevalence of PTSD was 17.4%, with higher rates among women (20.4%) than men (14.3%). The pooled prevalence of depression was 14.8%, with higher rates among women (16.9%) than men (12.6%). The prevalence of PTSD and depression was also higher among survivors of floods (20.5% and 16.3%, respectively) than other types of disasters, such as earthquakes (13.5% and 13.2%, respectively), hurricanes (12.8% and 11.9%, respectively), and wildfires (5.8% and 5.6%, respectively)[10].

Some of the factors that were consistently associated with higher risk of PTSD and depression were female gender, low socioeconomic status, high exposure to the disaster, pre-existing mental or physical health problems, lack of social support, and poor coping skills[11,12].

One of the most common and devastating types of trauma that can trigger PTSD and depression is exposure to natural disasters, such as floods, earthquakes, hurricanes, and wildfires. Natural disasters can cause massive loss of life, property, and livelihood, as well as displacement, disruption of social support, and exposure to environmental hazards. Natural disasters can also affect the mental health of not only the direct victims, but also the rescue workers, the relatives, and the witnesses of the disaster[13].

Both PTSD and depression can impair the quality of life, social functioning, and physical health of the affected individuals and increase the risk of morbidity and mortality[14,15].

The flood had a profound impact on the mental health and well-being of the survivors, who faced multiple stressors such as loss of loved ones, property, and livelihood, displacement, insecurity, and lack of basic services and resources[16]. However, there is a scarcity of data on the prevalence and risk factors of PTSD and depression among the survivors of the Derna flood, as well as the availability and effectiveness of mental health interventions for this population. Therefore, this study is one of the earliest researches aims to fill this gap by conducting a cross-sectional psychiatric assessment of the survivors of the Derna flood, using standardized instruments and methods. So, The significance of this study lies in its

contribution to the existing literature on the mental health consequences of natural disasters, especially in the context of Libya, a country that has been affected by multiple humanitarian crises and has limited mental health resources and research capacity[16]. This study will also benefit the survivors of the Derna flood, who are in need of adequate and timely mental health care and support, as well as the mental health professionals, policy makers, and humanitarian agencies, who are involved in the planning and delivery of mental health services and interventions for this population. Furthermore, this study will provide valuable insights and evidence for future studies and interventions on the mental health of natural disaster survivors in Libya and other similar settings. Overall, research on PTSD and depression among the survivors of the Derna flood in Libya is important for understanding the psychological aftermath of the disaster, developing targeted interventions, informing policy decisions, and contributing to the global understanding of post-disaster mental health.

One of the most recent and catastrophic floods that occurred was the 2020 Petrinja (Croatia) flood, which was caused by the collapse of two dams after a record rainfall brought by Storm Daniel. The flood resulted in the destruction of a quarter of the city, the death of more than 5,000 people, and the displacement of thousands more. The flood also affected the already fragile political and security situation in the country, which has been divided by civil war since 2011. A cross-sectional study by Löw et al[17] assessed the prevalence and predictive factors of PTSD and depression among 374 adult survivors of the 2020 Petrinja flood, approximately 2 months after the disaster. The study used the PTSD Checklist for DSM-5 (PCL-5) and the Hospital Anxiety and Depression Scale (HADS) to measure PTSD and depression, respectively. The study found that the prevalence of PTSD (PCL-5 score ≥ 33) and depression (HADS score ≥ 8) among flood survivors were 18.9% and 47.2%, respectively. The study also found that home damage, female gender, lower education level, lower income level, and passive coping strategies, such as avoidance and emotional venting, were significantly associated with PTSD and depression. The study concluded that PTSD and depression are common and persistent mental

health problems among the Petrinja flood survivors, and that there is a need for psychological and social support for survivors to decrease the health burden from PTSD and depression.

Another flood that affected a large population was the 2018 Kerala (India) flood, which was caused by heavy rainfall during the monsoon season. The flood affected more than 5.4 million people and killed more than 500 people in the state of Kerala. The flood also caused extensive damage to infrastructure, agriculture, and environment in the affected regions. A cross-sectional study by Suresh et al[18] estimated the prevalence of PTSD and depression and determined their associated factors in 1000 adult survivors of the 2018 Kerala flood, who were living in four severely affected districts, six months after the disaster. The study used the Post-traumatic Stress Disorder Checklist-Civilian Version (PCL-C) and the Patient Health Questionnaire-9 (PHQ-9) to assess PTSD and depression, respectively. The study found that the prevalence of PTSD (PCL-C score ≥ 50) and depression (PHQ-9 score ≥ 10) among flood survivors were 14.5% and 19.5%, respectively. The study also found that female gender, lower education level, lower income level, higher exposure to trauma, and lower social support were significantly associated with PTSD and depression. The study concluded that PTSD and depression are still prevalent among survivors six months after the Kerala flood, and that it is important to provide psychological and social support for survivors to decrease the health burden from PTSD and depression.

A third flood that affected a large population was the 2010 Pakistan flood, which was caused by heavy monsoon rains that triggered flash floods and riverine floods across the country. The flood affected more than 20 million people and killed more than 2000 people in Pakistan. The flood also caused widespread destruction of infrastructure, livelihood, and environment in the affected regions. A cross-sectional study by Khan et al[19] assessed the prevalence of PTSD and depression among 300 adult survivors of the 2010 Pakistan flood, who were living in two severely affected districts, one year after the disaster. The study used the Impact of Event Scale-Revised (IES-R) and the Beck Depression Inventory-II (BDI-II) to

measure PTSD and depression, respectively. The study found that the prevalence of PTSD (IES-R score $\geq$ 33) and depression (BDI-II score $\geq$ 14) among flood survivors were 29.7% and 34.3%, respectively. The study also found that female gender, lower education level, lower income level, higher exposure to trauma, and lower social support were significantly associated with PTSD and depression. The study concluded that PTSD and depression are common and persistent mental health problems among the Pakistan flood survivors, and that there is a need for psychological and social support for survivors to decrease the health burden from PTSD and depression.

MATERALS AND METHODS:

This study was conducted in the city of Derna, which is located in Libya and overlooks the shores of the Mediterranean Sea. It was damaged by Hurricane Daniel, which caused a great flood that swept away valleys and buildings on its way to the sea, causing human and material damage to the city in September 2023. It included all survivors both sex aged 18 and above willing to participate in the study experienced the flood directly. And excluded who had severe cognitive impairment, severe mental illness or current substance abuse disorder.

Voluntary response sampling through public online survey (Google form).

Data Collection
Data will be collected using an approved validated multiple-choice questionnaire based on previous study. The structured English form in the questionnaire will be first translated into Arabic by the authors. This version will be revised and translated back to English by another expert and compared with the original form to ascertain the precision of translation. An Arabic version of the questionnaire was used to collect the data. Questionnaire was sent to general population across Derna by sharing link through popular social media groups and administered to participants in person. The questionnaire will cover the following topics:

PTSD Checklist for DSM-5 (PCL-5): This is a 20-item self-report questionnaire that assesses the symptoms of PTSD.

Patient Health Questionnaire-9 (PHQ-9): This is a 9-item self-report questionnaire that assesses the symptoms of depression. In addition to the demographic, disaster-related, and psychosocial factors that may influence the development and maintenance of PTSD and depression.

The data analysis was conducted using SPSS software, version 25. Descriptive statistics was used to summarize the demographic characteristics of the sample and the prevalence of PTSD and depression. Chi-squared tests and independent t-tests was used to compare the prevalence of PTSD and depression between different subgroups of participants (e.g., by age, gender, and severity of exposure to the flood).

Ethical Considerations.

All participants will be required to provide consent before participating in the study. The confidentiality of the participants' data will be ensured. Ethical approval was obtained from the relevant authorities and participants before the study commences. Ethical approval was obtained from the ethical committee of Libyan international medical university.

RESULT:

Demographic Characteristic

A total of 103 questionnaires were received from participants residing in Derna. The majority of respondents were male (86.4%), with females comprising a minority (13.6%). Regarding age distribution, approximately half of the participants (50.5%) were aged between 18 and 28 years, while (40.8%) fell within the 29-50 age range, and a small proportion (8.7%) were aged above 50 years.
Concerning marital status, the majority (57.8%) were single, while (42.2%) were married; none reported being separated, divorced, or widowed. Educationally, the predominant proportion (68.6%) held a bachelor's or equivalent degree, with (8.8%) possessing a master's or doctoral degree, and the remainder (22.6%) attaining a high school diploma or less. In terms of employment status, (46.5%) of participants were unemployed, (3%) were retired, while half (50.5%) were employed. Among the employed, (28.4%) were engaged in

freelance work, (23.5%) occupied office positions, (21.6%) were students, (8.8%) held teaching roles, and (5.9%) were employed as medical practitioners.

Family size varied, with (45.5%) reporting 4 to 6 members, (15.8%) having 1 to 3 members, and (38.6%) indicating more than 7 members. A minority of respondents (36%) reported tobacco use post-flood, while (5%) acknowledged using sedative and hypnotic medications; none reported alcohol, cannabis, or other substance abuse.

Depression Study Result

The majority of participants (82.5%) exhibited symptoms of depression that met the criteria outlined in the PHQ-9 (Patient Health Questionnaire-9). Among them, (34%) experienced severe depression, (18.4%) demonstrated moderately severe symptoms, (10.7%) reported moderate depression, and (19.4%) displayed mild symptoms, while only (17.5%) reported no depressive symptoms, as depicted in Figure 1.
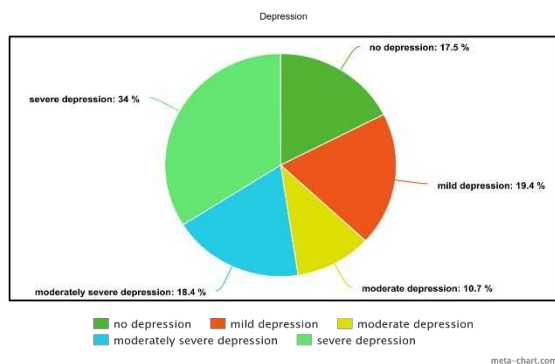
All female participants (100%) showed signs of depression, with half of them (50%) experiencing severe depression. Conversely, (79%) of male participants exhibited depressive symptoms, with nearly a third (31%) classified as severely depressed. Additionally, all participants (100%) aged above 50 years displayed symptoms of depression. The level of depression was found to be significantly associated with employment status (p=0.02). However, it was not significantly associated with age (p=0.07), gender (p=0.33), educational level (p=0.34), marital status (p=0.72), occupation (p=0.32), or family size (p=0.86).

PTSD Study Result

A considerable portion of the participants (72.8%) reported experiencing a cluster of symptoms associated with post-traumatic stress disorder (PTSD), as assessed by the PCL-5 (Posttraumatic Stress Disorder Checklist for DSM-5). Within this group, (36.9%) exhibited mild symptoms, followed by (26.2%) with moderate symptoms, and (9.7%) displaying severe PTSD symptoms. Conversely, (27.2%) reported the absence of any PTSD-related symptoms, as shown in Figure 2.
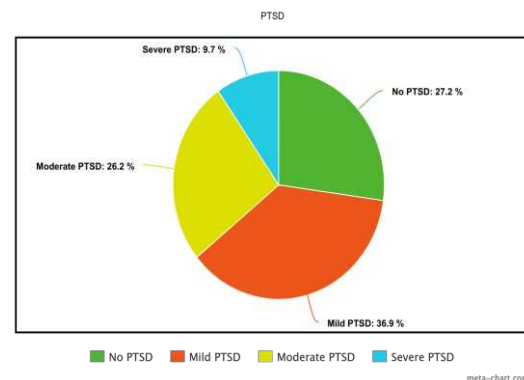
No statistically significant association were found between PTSD symptoms and age (p=0.38), gender (p=0.24), educational level (p=0.1), occupation (p=0.26), employment status (p=0.7), marital status (p=0.14), or family size (p=0.88)

DISCUSSIN:

The present study aimed to investigate the prevalence of Post-Traumatic Stress Disorder (PTSD) and depression among adult survivors of the Derna flood in Libya, as well as to identify demographic, disaster-related, and psycho-social factors associated with these mental health conditions. The findings revealed a high prevalence of PTSD symptoms among the participants, with 72.8% reporting experiencing symptoms consistent with PTSD, as assessed by The PCL-5. This prevalence is notably higher than reported rates in other post-disaster studies (Norris et al., 2002)2, indicating the significant impact of the Derna flood on the mental well-being of survivors. Moreover, the majority of participants (82.5%) exhibited symptoms of depression according to the PHQ-9, further highlighting the pervasive psychological distress among survivors. Regarding demographic factors, while no

significant associations were found between age, gender, educational level, marital status, occupation, or family size and the presence of PTSD symptoms, the level of depression was significantly associated with employment status. Unemployed participants displayed more severe depressive symptoms compared to their employed counterparts. These findings align with previous research suggesting that unemployment can exacerbate mental health issues following a natural disaster (Galea et al., 2007)20. Comparing our results with previous studies on post-disaster mental health, the prevalence rates of PTSD and depression in our study appear to be higher than those reported in similar contexts (Galea et al., 2005; Wang et al., 2013)20,21. This disparity may be attributed to various factors, including the severity of the disaster, socio-political contexts, and cultural differences in coping mechanisms and help-seeking behaviors. Additionally, differences in measurement tools and sampling methods may contribute to variations in prevalence rates across studies. The study's findings hold significant implications for post-disaster mental health policy and practice. They underscore the urgent need for tailored interventions aimed at addressing the psychological needs of survivors in the aftermath of natural disasters. Such interventions should prioritize the provision of accessible and culturally sensitive mental health services, as well as targeted support for vulnerable populations, including the unemployed. Future research should delve deeper into the long-term trajectories of post-

disaster mental health outcomes and evaluate the efficacy of interventions aimed at mitigating psychological distress in affected communities.

Research limitation:

Small Sample Size:

The sample size of 103 participants may limit the generalizability of the findings. With a larger sample size, we could achieve greater statistical power and potentially detect subtler associations between variables. Additionally, a larger sample size would provide more robust estimates of the prevalence of PTSD and depression among survivors of the Derna flood.

CONCLUSION:

In conclusion, our study underscores the substantial burden of PTSD and depression among survivors of the Derna flood in Libya.

The findings highlight the urgent need for tailored mental health interventions and support services to address the psychological needs of survivors in the aftermath of natural disasters.

Future research should further investigate the long-term trajectories of post-disaster mental health outcomes and evaluate the effectiveness of interventions aimed at mitigating psychological distress in affected populations.

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