A multi-institutional study of post-traumatic stress disorder and its risk factors in Ethiopian pediatric patients with physical trauma

Tadesse Tarik Tamir1*, Selam Fisiha Kassa1 and Daniel Ayelegne Gebeyehu2

Abstract

Introduction: Post Traumatic Stress Disorder (PTSD) was more common in children who had suffered physical trauma than in adults. Despite its prevalence, the prevalence and factors associated with PTSD in pediatric patients with physical trauma are unknown in Ethiopia. As a result, the purpose of this study was to determine the prevalence of PTSD and associated factors among pediatric patients with physical trauma who attended Northwest Amhara referral hospitals.

Methods: An institutional-based cross-sectional study design was used in 422 pediatric patients with physical trauma aged 8–18 years from March 15 to May 15/2021. Using a systematic random sampling technique, data were collected from a sample of selected trauma patients via interviews and chart review. A standardized, pre-tested Child PTSD Symptom Scale was used to assess the severity of PTSD. Epidata 4.6 was used to enter the data, and Stata 14.0 was used to analyze it. Bivariable and multivariable binary logistic regression models were used to identify PTSD determinants.

Result: The study included 422 paediatric patients who had suffered physical trauma, with a response rate of 97.87 percent. PTSD was found in 22.03 percent of paediatric patients with physical trauma in Northwest Amhara referral hospitals. The study discovered that female gender (AOR = 3.04, 95 percent CI: 1.58–5.84), age of 8 to 10 years old (AOR = 3.70, 95 percent CI: 1.39–9.87), having a chronic medical illness (AOR = 5.99, 95 percent CI: 2.60–13.77), having severe pain (AOR = 3.17, 95 percent CI: 1.12–8.99), low social support (AOR = 8.97, 95 percent CI: 4.04–19 were associated with PTSD.

Conclusion and recommendation: The prevalence of PTSD was found to be high among pediatric patients who had experienced physical trauma. Special attention should be given to female patients, aged 8 to 10 years old, who have a chronic illness, for those who complain of severe pain and engaging others to provide good social support systems, are strongly recommended to alleviate PTSD in this segment of population.

Keywords: Pediatric, Post-Traumatic Stress Disorder, Trauma

Introduction

PTSD is defined by exposure to a traumatic event, such as a severe motor vehicle accident, which is likely to result in recurrent, involuntary, and intrusive distressing memories of the traumatic event, as well as dissociative reactions [1]; moreover, the individual faced the mentioned traumatic event through either directly experiencing the
traumatic event(s), witnessing, in person, the event(s) as it occurred to others, especially primary caregivers, and learning that the traumatic event(s) occurred to a parent or caregiving figure [1–3]. In studies, age, gender, address (place of residence), educational status, trauma cause, history of mental illness, family history of mental illness, and social support were associated with PTSD [4, 5].

Physical injury (trauma) is prevalent across many types of trauma experiences and can be associated with post-traumatic stress disorder (PTSD) symptoms [6]. It can be defined as a “body wound” caused by a sudden physical injury which mainly described as type 1 trauma [7].

According to a systematic review and meta-analysis of the prevalence of mental health conditions in ambulance personnel, the estimated prevalence of PTSD is around 11% [8]. A meta-analysis conducted in Australia revealed that the pooled prevalence of PTSD among children who had experienced physical trauma was 15.9% [9]. African studies reported a prevalence of PTSD among children ranging from 16% in Kenya to 55% in Uganda [10, 11].

Because the prevalence of PTSD following trauma has increased over time, it is critical to prioritise the disorder (PTSD) and develop strategies to address it in order to reduce the disorder’s negative effects on health, particularly in young trauma survivors [12]. The proportion of people suffering from PTSD who seek hospitalization is low all over the world, but it is especially low in low to middle-income countries [13]. Because PTSD is a complex and chronic disorder that causes significant distress and interferes with social and educational functioning, improving PTSD detection may be an effective strategy [14]. Furthermore, the presence of PTSD in patients who have experienced physical trauma can have an impact on their clinical outcome and utilization of health resources [15]. It also has an effect on pediatric quality of life due to the consequences of functional and emotional impairment, and there is a negative cost to society with high financial and social consequences from significantly increased rates of hospitalization and suicide attempts [16]. Similarly, it was previously established that the economic impact of PTSD in a community is substantial [17].

Because the treatment options for a child who has experienced a physical trauma are primarily focused on restoring physical health, PTSD goes undiagnosed or untreated [18]. As a result, it will reduce quality of life, limit physical rehabilitation, and lengthen hospital stays in pediatric units; this is especially true in low-income countries [17]. Despite the fact that the risk of developing PTSD is higher in this segment of the population when compared to adults, no previous studies in Ethiopia demonstrated the magnitude and associated factors of PTSD among children with physical trauma. Therefore, understanding the problem could help local decision makers as it helps to design a comprehensive strategy to tackle the problem as early as possible. Furthermore, for clinicians, it will provide clues that early screening for PTSD and treating other related psychological problems for children admitted because of physical trauma (injury) will be mandatory. Likewise, it will help to provide an information to the family that is the caregiver on how they handle the emotional experiences of the child during the problem.

Methods and materials
Study area, design, and population
An institutional-based cross-sectional study was planned to run from March 15 to May 15, 2021. The study was conducted at Northwest Amhara Referral Hospitals. The Amhara regional state has a total population of 17,221,976 people, according to the Central Statistical Agency of Ethiopia in 2007, with 8,641,580 men and 8,580,396 women [19]. Currently, the Region has eight referral hospitals. Each Referral Hospital serves between 3.5 and 5 million people [20]. Five of the eight referral hospitals (Debre Markos, Felege Hiwot, Tibebe Gion, University of Gondar, and Deretabor) are located in Amhara’s Northwest. The average flow of pediatric patients with physical trauma in University of Gondar, DebreTabor, Tibebe Geon, Felege Hiwot, and Debre Markos referral hospitals in the three months preceding data collection was 200, 100, 200, 250, and 100 patients per month, respectively.

As a source population, all pediatric patients aged 8 to 18 years admitted to the orthopedics and surgical wards with physical trauma were used. Pediatric patients aged 8–18 years admitted to the orthopedics and surgical wards having a physical injury of 1 month and above duration who were present during the data collection period were considered the study population. All methods were carried out in accordance with ethical and human rights standards.

Inclusion and exclusion criteria
The study included all pediatric patients aged 8 to 18 years admitted to surgical and orthopedic wards having a physical injury of at least 1 month duration. Individuals who have been seriously injured and are unable to respond properly to the questions, as well as those who have been diagnosed with PTSD prior to trauma, were excluded.

Sample size and sampling procedure
The required sample size was estimated using a single population proportion formula by considering the following statistical assumptions; the prevalence of
PTSD, 50% (since there is no similar study conducted in the country among Paediatrics with physical injury [21], 95% confidence interval, 5% degree of precision, and 10% non-response rate, which yielded a total sample size of 422. The participant was selected every 2 intervals \((K = 2)\) via the systematic sampling technique (Fig. 1).

**Data collection tools and procedures**

The data was collected using standardized pretested questionnaires, interviewer-administered questionnaires. In addition, chart review was used to collect data regarding clinical factors. The questionnaire which was originally developed in English was translated into the local language (Amharic) by experts and translated back to English to check the consistency. The questionnaire contains 52 questions divided into five sections: the first section includes six questions about the participants’ socio-demographic characteristics, the second section includes four questions about clinical factors, the third section includes ten trauma-related questions, and the fourth section includes twelve questions about social support. The questionnaire regarding the trauma-related factors, clinical factors, and socio-demographic characteristics was adapted from different works of literature [22, 23].

Post-traumatic stress disorder (PTSD) was assessed using 20 items from the CPSS-SR-5, which was developed by the International Society for Traumatic Stress Studies (ISTSS) [24]. The CPSS-SR-5 is a DSM-5-adjusted version of the Child PTSD Symptom Scale Interview (CPSS-I). The 20 PTSD symptom items are rated on a 5-point frequency and severity scale ranging from 0 (never) to 4 (6 or more times per week/severe). The CPSS-SR-5 has good test–retest reliability \((r = 0.800)\) and excellent internal consistency for total symptom severity \((\text{Cronbach’s alpha} = 0.924)\). In sum, the CPSS-SR-5 is a valid and reliable self-report instrument for assessing DSM-5 PTSD diagnosis and severity for children and adolescents aged 8–18 years [24]. Thus, those who scored \(\geq 31\) will be considered as having PTSD [25].

To assess social support, the Multidimensional Scale of Perceived Social Support was used (MSPSS). MSPSS is a self-report measure consisting of 12 items rated on a seven-point Likert scale that assesses an individual’s perceived level of social support from family, friends, and significant others [26]. Participants with mean scale scores ranging from 1 to 2.9, 3 to 5, and 5.1 to 7 could be classified as having low, moderate, or high social support, according to the Multidimensional Scale of Perceived Social Support (MSPSS) [26].

The 0-to-10 Numerical Rating Scale (NRS) was used to assess pain intensity in trauma patients [27].

Physical injury (Trauma): can be explained as trauma that causes a body wound produced by sudden physical injury from Road traffic accident, Bullet/blast and Blow/assault, and Fall & Crush by a heavy object [7].

Duration of trauma: Patients with trauma lasting greater than 1 month after exposure are used in the...
diagnosis of PTSD, which may manifest up to 6 months after the trauma \[28\].

**Data quality assurance**

To assure the quality of the data, a pre-test was conducted prior to the data collection on 5% of study participants at Dessie Referral Hospital. The reliability test was performed for CPSS-SR questionnaires using Cronbach’s alpha and initially, the value was 0.96. Training was given to data collectors regarding the techniques of interviewing, as well as filling the checklist for two-hours.

Experts translated the questionnaire from English to Amharic and back again to ensure that the same meaning was conveyed. Two trained Psychiatry nurses were assigned to collect data from each hospital through a face-to-face interview, and two Psychiatry nursing professional supervisors were on-site during the data collection period, reviewing all completed checklists in the evening of each data collection day to isolate incomplete and incoherent data.

**Data Processing and analysis**

The data were double-checked for completeness and consistency. The data was then coded and entered into Epidata 4.6 before being exported to Stata 14.0 for further analysis. Descriptive statistics were computed, and the results were presented in the form of tables and graphs. The variance inflation factor (VIF = 1.23) and Hosmer–Lemeshow \( p = 0.776 \) were used to test for multicollinearity and model goodness of fit, respectively.

To identify independent predictors of PTSD, bivariable and multivariable binary logistic regression were used. To control for potential confounding factors, all variables associated with PTSD with a \( p \)-value less than 0.2 in the bivariable analysis were further examined using multivariable analysis. Variables with a \( p \)-value of less than 0.05 were declared to be associated to PTSD.

**Result**

**Socio-demographic characteristics of pediatric patients with physical trauma**

The study included 422 paediatric patients who had experienced physical trauma, with a 97.87% response rate. Males made up more than two-thirds of the participants in the study (68.04%). The median (IQR) age of the participants was 15(12–15). A little more than half of the participants (51.33%) were aged 15 and older. The vast majority of them (72.15%) identified as orthodox Christians (Table 1).

**Clinical related characteristics of pediatric patients with physical trauma**

In terms of a history of chronic illness, more than three-quarters (81.36 percent) of the participants had none (Table 2).

**Trauma and related factors among pediatric patients with having physical trauma**

More than half (53.75%) of the participants had experienced trauma to their lower extremities. A road traffic accident was nearly one-third (35.11%) of the participants’ cause of injury. A large proportion (63.68 percent) of the participants suffered a fracture as a result of the accident. A significant majority (275(66.59%)) of study participants stated that the trauma occurred less than three months ago (Table 3).
Among the participants, 206 (49.88%) had high social support, 24.21% had moderate social support, and 25.91% had low social support.

Prevalence of PTSD among pediatric patients with physical trauma
Approximately 22.03 percent (95 percent CI: 18.3, 26.3) of pediatric patients with physical trauma in Northwest Amhara referral hospitals had PTSD, according to 413 respondents.

Factors associated with PTSD among pediatric patients with physical trauma in Northwest Amhara referral hospitals, 2021
As shown in Table 4, bivariate analyses were performed to investigate the factors associated with PTSD in pediatric patients who had experienced physical trauma. As a result, approximately twelve variables were found to be significantly associated with PTSD: gender, age, education, chronic medical illness, mental illness history, family history of mental illness, cause of trauma, complication of trauma, duration of trauma, presence of amputation, severity of pain, and social support. Finally, multivariable logistic regressions were conducted and six variables are significantly associated with PTSD; The odds of presenting PTSD among females were 3.04 (AOR = 3.04, 95% CI: 1.58–5.84) times higher as compared to male participants, those children in

| Variables | Response in Frequency (n) and Percent (%) |
|-----------|------------------------------------------|
| Hypertension | 11 (14.29%) |
| Diabetes Mellitus | 15 (19.48%) |
| HIV/AIDS | 22 (28.57%) |
| Cardiac | 5 (6.49) |
| Tuberculosis | 8 (10.39) |
| Cancer | 12 (84.42) |
| Asthma | 25 (32.47) |
| History of mental illness | 17 (41.2) |
| Family history of mental illness | 30 (7.26) |

*HIV/AIDS* Human Immune Deficiency Virus/Acquired Immune Deficiency Syndrome

Social support of pediatric patients with physical trauma
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| Variables | Category | Frequency (n) | Percent (%) |
|-----------|----------|---------------|-------------|
| Site of trauma | Upper Extremity | 125 | 30.27 |
| Cause of trauma | Road traffic accident | 145 | 35.11 |
| Type of trauma | Fractures | 263 | 63.68 |
| Trauma related complications | complications | 275 | 66.59 |
| Duration of trauma | 1–3 month | 367 | 88.86 |
| Presence of amputation | Yes | 21 | 5.08 |
| Pain | Yes | 393 | 95.16 |
| Pain intensity | Mild | 73 | 18.62 |
| Table 3 Trauma and related factors among pediatric patients with physical trauma in Northwest Amhara referral hospitals 2021(n = 413) |

Trauma related Complications: Gangrene, Amputation, and Infection
the age group of 8–10 were 3.70 (AOR = 3.70, 95% CI: 1.39–9.87) times more likely to develop PTSD as compared to those 15–18 years old, patients with having any chronic medical illness were nearly 6 times more likely to be positive for PTSD as compared to their counterparts (AOR = 5.99, 95% CI: 2.60–13.77), patients complaining a severe pain were 3.17 times more likely to develop PTSD as compared to those with mild pain (AOR = 3.17, 95% CI: 1.12–8.99), those who had low social support were 8.97 times more likely to develop PTSD compared to high social support (AOR = 8.97, 95% CI: 4.04–19.91) and respondents having moderate social support were 3.75 times more likely to develop PTSD as compared to having high social support (AOR = 3.75, 95% CI: 1.64–8.59) (Table 4).

**Discussion**

The prevalence and associated factors of PTSD among pediatric patients with physical trauma in Northwest Amhara referral hospitals were investigated in this study. As a result, 22.03 percent of pediatrics with physical trauma were found to have PTSD, implying that it is a significant public health concern that necessitates a well-planned and comprehensive strategy to produce a healthy and fruitful generation. The prevalence of PTSD discovered in this study is consistent with a 22.5 percent prevalence found in a study conducted in the United States [29]. Nonetheless, it is significantly lower than studies conducted in Kenya (49%), Uganda (54.9%), and Palestine (54%), and slightly lower than India (30.6%) [11, 30–32]. This lack of clarity could be related to PTSD
measurement tools (a study conducted in Kenya, Uganda, and Palestine used the Posttraumatic Stress Disorder Reaction Index (ULCA PTSD-R1), 16-item Harvard Trauma Questionnaire (HTQ-16), and Post-Traumatic Stress Disorders Symptoms Scale (PTSDSS), respectively) [11, 30–32]. The CPSS-SR-5, which has excellent reliability and good specificity, was used in this study, which could explain why the current study reported lower prevalence. Furthermore, male participants outnumber females in the current study. Despite the fact that boys in Ethiopia learn to suppress or deny their psychological symptoms than girls [33]. As a result, the child may have been prone to hiding his psychological symptoms; this could explain why the current study found lower prevalence.

On the other way, the finding was higher than studies in China 9.7%, Italy 1.9%, UK 9.6%, and Brazil 7.8% [34–37]. This discrepancy could be attributed to the study population; in this study, pediatric patients with physical trauma from any cause were included, rather than just single accident survivors, which could explain why the current study reported higher. This was also evidenced that prevalence of child PTSD after trauma differ with regard to the types of trauma included [38].

Regarding gender, being female has significantly increased the risk of PTSD. This is consistent with other studies done in Netherland and Korea [22, 39]. It is also consistent with a report of the WHO that also showed gender differences in the ability to cope with stress after a traumatic event [40]. Females are thought to be more sensitive to stress hormones and threats, with a lower likelihood of using effective coping strategies and a higher likelihood of negatively interpreting disasters than males, making them more prone to developing PTSD [41]. Furthermore, the DSM-5 identified gender (Female) as a risk factor for PTSD symptoms and diagnosis [30, 42]. In Ethiopia, females’ traditionally burdened roles in society (such as increased household activity, early marriage against their will, and society’s misperception of females being less important than males in economical contribution) may expose them to more stress. Early gender role socialization may also play a role, as boys learn to suppress or deny psychological symptoms, whereas girls learn to reflect their feelings more and become more emotionally expressive [33].

The study revealed that youngest children (8–10 years old) are more prone to develop PTSD than the middle (11–14 years old) and oldest age group (15–18 years old). This finding is supported by another studies [43, 44]. As evidenced by cognitive developmental models of PTSD [44], younger children are more vulnerable to developing PTSD than older children because they may have a poor protective mechanism to manage and interpret the traumatic event, and the difference in the development of both cognitive-affective regulation and getting peer group support. Nonetheless, these findings contradicted a study conducted in Palestine, which found that the middle age group was more vulnerable than the youngest and oldest ages [30]. It could be due to differences in lifestyle and environmental factors (like, socioeconomic resources, culture, availability and quality of health services, and etc.) influencing children's developmental stages across countries.

In the current study, pediatric patients diagnosed with chronic medical illness were more prone to develop PTSD. Previous studies have revealed similar result [45–48]. This could be explained by the fact that having a chronic illness could be a trigger event (stressor) for PTSD in paediatric patients, as having an accumulation of adverse conditions, such as illness, poly-medication, and a lack of a support network due to medical illness, increases the risk of PTSD [49–51].

The study found that experiencing pain with severe intensity was significantly associated with PTSD. This is consistent with previous studies [36, 52, 53]. It is possible that pain-related sensations can trigger the disorder’s symptoms, like flashback (a somatic reminder of the traumatic experience), and re-experiencing symptoms [54].

Another important finding observed in this study is that pediatrics who had poor social support experienced PTSD. Other studies back up this finding [22, 55, 56]. Despite the fact that children with positive social support are less likely to develop PTSD as positive social support appears to mitigate the negative effects of traumatic injury [57]. Furthermore, low social support has also been linked to physiological and neuroendocrine markers of stress reactivity, such as increased heart rate, blood pressure, and exaggerated cardiovascular and neuroendocrine responses to stressors, making them more vulnerable to developing comorbid medical illness [58, 59].

The study’s strength was conducting the study in this understudied area of mental health (PTSD in Paediatrics), particularly in a country with a scarcity of research, which will help to design a comprehensive strategy to tackle the problem through early screening for PTSD and treating other related psychological problems in children. As the findings indicate, PTSD is more prevalent in this population segment, and it has been identified as an important public health concern that requires a well-designed comprehensive strategy. Furthermore, because injuries are a growing national concern in Ethiopia [60], the findings of this study will be used as a baseline data to design and implement preventive trauma-related mental health policies to reduce the psychological impact of the problem. Nonetheless, because PTSD can develop as a result of witnessing or learning about a traumatic event,
it is critical to screen the child’s parents or caregivers for the condition. Similarly, it would have been more novel if the study had been supplemented by qualitative studies to investigate possible childhood psycho-social development in relation to the country in which this study was conducted.

Conclusion and recommendation

PTSD was found to be prevalent in paediatric patients who had experienced physical trauma. To alleviate PTSD in this population, special attention should be given to female patients, aged 8 to 10 years old, those who have a chronic illness and complain of severe pain. Furthermore, engaging others to provide good social support systems is highly recommended.

Abbreviations

AIDS: Acquired Immune Deficiency Syndrome; AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude odds ratio; CPSS-SR: Child PTSD Symptom Scale—Self Report; CSH: Comprehensive Specialized Hospital; DSM: Diagnostic and Statistical Manual; ISTSS: International Society for Traumatic Stress Studies; MSPSS: Multidimensional Scale of Perceived Social Support; NGO: Non-Governmental Organization; PTSD: Post Traumatic Stress Disorder; ULCA PTSD-R: Posttraumatic Stress Disorder Reaction Index; WHO: World Health Organization.

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Authors’ contributions

TT conceived the idea and wrote the proposal, participated in the data collection process, analyze data, and drafted the paper. TT, SF, and DAG approved the proposal with some revisions, participated in data analysis, and reviewed the manuscript. All authors approved the final draft of the manuscript.

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Availability of data and materials

All relevant data are available within the manuscript.

Declarations

Ethical approval and consent to participate

Ethical clearance was obtained from the research and ethical committee of the school of nursing college of medicine and health science (Ref.no.-C/H/N164/7/2013) on behalf of the Research Ethical Committee of University of Gondar. All methods were carried out in accordance with ethical and human rights standards. Ethical assent was obtained from the parents of the study participants and informed consent was obtained from all subjects and legal guardians of minor participants before the beginning of data collection. Confidentiality was kept by using codes rather than stating their names. Initially, they were informed about their right to withdraw from the study at any time of the interview process. When they were informed about their right to withdraw they agreed to leave the study whenever they are not feeling comfortable. At the end of the interview, patients positive for PTSD symptoms were linked to the psychiatry clinic.

Consent to publication

Not applicable.

Competing interests

The authors have declared that they have no competing interests.

Author details

1 Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia. 2 Department of Community Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

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References

1. Regier DA, Kuhl EA, Kupfer DJ. The DSM-5: Classification and criteria changes. World Psychiatry. 2013;12(2):92–8.
2. Organization WH. The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines: World Health Organization; 1992.
3. Keller SM, Burton M, Feeny NC. Posttraumatic stress disorder. Clinical handbook of psychological disorders in children and adolescents: A step-by-step treatment manual. 2017:240–72.
4. Tian Y, Wong TK, Li J, Jiang XJ, Bph. Posttraumatic stress disorder and its risk factors among adolescent survivors three years after an 8.0 magnitude earthquake in China. 2014;14(1):1–7.
5. Tortella-Felis M, Fullana MA, Pérez-Vigil A, Torres X, Chamorro J, Littarelli SA; et al. Risk factors for posttraumatic stress disorder. An umbrella review of systematic reviews and meta-analyses. 2019;107:154–65.
6. Cody MW, Beck JG. Physical injury, PTSD symptoms, and medication use: examination in two trauma types. J Trauma Stress. 2014;27(1):74–81.
7. https://news.un.org/en/story/2021/07/1095882.
8. Petrie K, Milligan-Saville J, Gayed A, Ddey M, Phelps A, Dell L, et al. Prevalence of PTSD and common mental disorders amongst ambulance personnel: a systematic review and meta-analysis. 2018;33(9):897–909.
9. Alish C, Zalta AK, Van Wessel F, Larsen SE, Hassanpour K, et al. Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: meta-analysis. 2014;204(5):335–40.
10. Copeland WE, Keeler G, Angold A, Costello EJ. Posttraumatic stress without trauma in children. Ann J Psychiatry. 2010;167(9):1059–65.
11. Ovuga E, Oyok TO. Moro EJ. Mo. Post traumatic stress disorder among former child soldiers attending a rehabilitative service and primary school education in northern Uganda. 2008;8(3):136–41.
12. Mehta S. Ameratunga SN. Jop. Health c. Prevalence of post-traumatic stress disorder among children and adolescents who survive road traffic crashes: a systematic review of the international literature. 2012;48(10):876–85.
13. Koenen K, Ratanatharathorn A, Ng L, McLaughlin K, Bremet L, Stein D, et al. Posttraumatic stress disorder in the world mental health surveys. 2017;47(13):2260–74.
14. Trickey D, Siddaway AP, Meiser-Stedman R, Serpell L, Field AP. Jop. A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. 2012;32(2):122–38.
15. Tedstone JE, Tarrier NJ. Jop. Posttraumatic stress disorder following medical illness and treatment. 2003;23(3):409–48.
16. Davidson JJJ. Jop. Trauma: the impact of post-traumatic stress disorder. 2000;14(2):suppl1.SS:S12.
17. McGowan UJJ. Jop. Health M. The Economic Burden of PTSD. A brief review of salient literature. 2019;(1):20–6.
18. Fekadu W, Mekonen T, Belete H, Belete A. Johannes KJ. Jop. Incidence of post-traumatic stress disorder after road traffic accident. 2019;10:519.
19. Agency CS. 2007 population and housing census of Ethiopia. Central Statistical Agency; Addis Ababa, Ethiopia. 2007.
20. Alebachew A, Waddington C. Improving health system efficiency: Ethiopia: human resources for health reforms. World Health Organization, 2015.
21. Naing L, Winn T, Rusli B. Practical issues in calculating the sample size for prevalence studies. Arch Oralofac Sci. 2006;1:9–14.
22. Lee SH, Kim EJ, Noh J-W, Chae J-H.JUkoms. Factors associated with post-traumatic stress symptoms in students who survived 20 months after the Sewol ferry disaster in Korea. 2018;33(1).

23. Zaffina S, Carnia V, Monducci E, Vinci MR, Vicari S. Bergamaschi A.JUkml. PTSD prevalence and associated risk factors after a fire disaster that broke out in a paediatric hospital: a cross-sectional study. 2014;105(3):163–73.

24. Schnyder U.JUrup. International society for traumatic stress studies Isss. 2008;24(2):261–.

25. Foa EB, Arnaani A, Zang Y, Capaldis S, Yeh R. Psychology A. Psychometrics of the Child PTSD Symptom Scale for DSM-5 for trauma-exposed children and adolescents. J Clin Child Adolesc Psychol. 2018;47(1):38–46.

26. Brucker B, Emsley R, Kidd M, Lochner C. Searae SJCp. Psychometric properties of the Multidimensional Scale of Perceived Social Support in youth. 2008;49(2):195–201.

27. Castilnas E, Jensen MP, von Baeyer CL. Miró JRTCJop. Psychometric properties of the numerical rating scale to assess self-reported pain intensity in children and adolescents. 2017;33(4):376–83.

28. Morgan JE, Ricker JH. Textbook of clinical neuropsychology: Taylor & Francis; 2017.

29. Aaron J, Zaglul H, Emery REJJopp. Posttraumatic stress in children followed by acute physical injury. 1999;24(4):33–43.

30. El-Khodary B, Samara M. Askew CJFip. Traumatic events and PTSD among Palestinian children and adolescents: the effect of demographic and socioeconomic factors. 2020;31.

31. Kar N, Mohapatra PK, Nayak KC, Pattanak P, Swain SP. Kar HJCJbp. Post-traumatic stress disorder in children and adolescents one year after a super-cyclone in Orissa, India: exploring cross-cultural validity and vulnerability factors. 2007;7(1):1–9.

32. Ombok C, Obondo A, Kangoths R, Atwoli LJEAmj. The prevalence of post-traumatic stress disorder among sexual abused children at kenyatta national hospital in Nairobi, Kenya. 2011;90(10):332–7.

33. Fink G. Stress: Physiology, Biochemistry, and Pathology. Handbook of Stress Series, Volume 3: Academic Press; 2019.

34. Foerres B, Soncini F, Bottosso E, Di Pietro E, Scarpini G, Scaini S, et al. Post-traumatic stress disorder, emotional and behavioral difficulties in children and adolescents 2 years after the 2012 earthquake in Italy: an epidemiological cross-sectional study. 2020;30(2):227–38.

35. Zhang Z, Ran M, Li Y, Ou G, Gong R, Li R, et al. Prevalence of post-traumatic stress disorder among adolescents after the Wenchuan earthquake in China. 2012;42(8):1687.

36. Meiser-Stedman R, McKinnon A, Dixon C, Boyle A, Smith P. Dalglish TJJoCP, et al. A core role for cognitive processes in the acute onset and maintenance of post-traumatic stress in children and adolescents. 2019;60(8):875–84.

37. Avanci JQ, Serpeloni F, de Oliveira TP, de Assis SG. Posttraumatic stress disorder among adolescents in Brazil: a cross-sectional study. BMC Psychiatry. 2021;21(1):75.

38. Leksel S, Klang S, Firdol J, Wang J, Kerley SP, Leenstra R, et al. Gender differences in DSM-5 versus DSM-IV-TR PTSD prevalence and criteria comparison among S12 survivors to the L Aquila earth quake. J Affect Disord. 2014;160:55–61.

39. Kolko DJ, Hurlbut MS, Zhang J, Barth RP, Leslie LK. Burns BJcJ. Post-traumatic stress symptoms in children and adolescents referred for child welfare investigation: A national sample of in-home and out-of-home care. 2010;15(1):148–63.

40. Salmon K, Bryant RRAJcpr. Posttraumatic stress disorder in children. The influence of developmental factors. 2002;22(2):163–88.

41. Tang B, Deng Q, Glik D, Dong J, Zhang L. A meta-analysis of risk factors for post-traumatic stress disorder (PTSD) in adults and children after earthquakes. Int J Environ Res Public Health. 2017;14(12):1537.

42. Carmassi C, Akiskal H, Beissonov D, Massimetti G, Calderani E, Stratta R, et al. Gender differences in DSM-5 versus DSM-IV-TR PTSD prevalence and criteria comparison among S12 survivors to the L Aquila earthquake. J Affect Disord. 2014;160:55–61.

43. Kolko DJ, Hurlbut MS, Zhang J, Barth RP, Leslie LK. Burns BJcJ. Post-traumatic stress symptoms in children and adolescents referred for child welfare investigation: A national sample of in-home and out-of-home care. 2010;15(1):148–63.

44. Salmon K, Bryant RRAJcpr. Posttraumatic stress disorder in children. The influence of developmental factors. 2002;22(2):163–88.