

## Posttraumatic stress following the 2023 Odisha train accident: a cross-sectional comparison study of passengers, health professionals, and the local community

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**(a) Title:**

**Posttraumatic stress following the 2023 Odisha train accident: a cross-sectional comparison study of passengers, health professionals and the local community**

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**Abbreviation**

DSM-5: Diagnostic and Statistical Manual edition 5

GAD-7: General Anxiety Disorder scale

OR: Odds Ratio

PCL-5: PTSD checklist

PHQ-9: Patient Health Questionnaire scale

PTSD: posttraumatic stress disorders

PTSS: posttraumatic stress symptoms

QOL: quality of life

WHO-QOL-BREF: World Health Organisation Quality of Life Brief scale

# **Posttraumatic stress following the 2023 Odisha train accident: a cross-sectional comparison study of passengers, health professionals and the local community**

## **Abstract**

### Objective:

We studied posttraumatic stress symptoms (PTSS) and disorder (PTSD), associated factors, and quality of life (QOL) of a group of passengers (n: 58) affected by the 2023 Odisha train accident, comparing it with health professionals (n: 42) such as doctors and nurses who treated them, and individuals from the local community (n: 65). We also checked the anxiety and depression of passengers.

### Methods:

In a cross-sectional study, we assessed accident experience and used the PTSD checklist, WHO-QOL-BREF, General Anxiety Disorder, and Patient Health Questionnaire scales.

### Results:

The PTSS was common; specifically intrusive memories (36.4%), feeling upset while reminded of the experience (33.9%), and avoidance of memories (30.9%). Strong negative feelings, loss of interest, feeling distant, irritability or anger outbursts were significantly more common among passengers than others. PTSD was present in 20.7% of passengers, 19.0% of health professionals, and 7.7% of local participants. Seeing dead bodies significantly contributed to PTSD. Clinical levels of anxiety (58.3%) and depression (50%) were present in passengers, which were significantly associated with PTSD, along with fear of death. Passengers had the worst QOL and health satisfaction among the groups.

### Conclusions:

Following the train accident, stress-related psychiatric problems were common and highlighted the intervention needs of the affected people.

## **Keywords**

Accidents; Anxiety; Depression; Post-Traumatic Stress Disorder; Railroads; Survivors

## **Introduction**

Train accidents are common and are extremely stressful. The experience of a train crash involves a threat to life, an existential threat, loss of control, and a state of unimaginable chaos in the face of death.<sup>1,2</sup> Associated stressors for survivors include personal bereavement and physical injuries.<sup>3</sup> However, studies on related psychiatric disorders following train accidents are remarkably scant.<sup>4</sup> Probably, mental health consequences are not assessed, and this results in most survivors not getting related assessments and appropriate support.<sup>5</sup>

Various posttraumatic stress symptoms (PTSS) such as reliving, nightmares, intrusive thoughts, and functional impairments have been reported following train accidents.<sup>2</sup> Compared with other commuters, accident survivors have been reported to have higher PTSS which was significantly associated with physical injuries.<sup>6</sup> Reportedly the PTSS following train accidents continue for a long period.<sup>7,8,9</sup> Similarly many studies have reported posttraumatic stress disorders (PTSD) with a variable range of prevalence from 19%<sup>4</sup> to 59.4%.<sup>10</sup> In addition to PTSD, there are reports of depression and anxiety disorder.<sup>4</sup> All these highlight the need for evaluation and intervention studies.

Recent theories of PTSD combine the stimulus and response components, with a cognitive model involving trauma memory, meaning, interpretation, and appraisal.<sup>11,12</sup> In addition to trauma experiences such as exposure intensity, physical damage, and economic losses,<sup>13</sup> its processing is dependent on several factors such as the cause of trauma, ability to assimilate, personal coping strategies, pre-trauma vulnerability, and support available.<sup>14</sup> Besides the direct victims of a major traumatic event, family members and close relatives,<sup>15</sup> local people who witness the traumatic event, and the supporting professionals such as rescuers, disaster workers,<sup>16</sup> and medical personnel who care for the injured are also indirectly affected. Directly and indirectly affected people may process their experiences differently, and it is essential to study the outcome in these separate groups.

## **The 2023 Odisha train accident**

There was a catastrophic triple train accident near Balasore in Odisha, India on June 2, 2023; in which 296 passengers were reportedly killed and over 1200 were injured,<sup>17</sup> making it one of the most traumatic train accidents. Following the accident, as there were no adequate facilities at the local healthcare systems, passengers were moved to different hospitals, some more than 100 kilometers away.<sup>5</sup> There was further trauma for the affected passengers and their families, which included a lack of information and communication, and

instances of unidentified and incorrectly labeled bodies.<sup>5</sup> Besides, many survivors had long-term consequences because of injury and disability.

### **Rationale for the study**

Train accidents are common in India,<sup>18</sup> which are associated with considerable life-changing injuries and fatalities,<sup>19</sup> and can have major consequences for the lives of the affected passengers and their families. There are no studies in India about the stress-related mental health outcomes of survivors of train accidents, health professionals involved in the acute care of injured passengers, and the local community who were indirectly affected. In the above context, we intended to study the PTSS, PTSD, quality of life (QOL), and associated socio-demographic and experience-related risk factors in the surviving passengers, comparing them with health professionals and the local community. In addition, we checked anxiety and depression among the passengers.

### **Method**

#### **Study design**

It was a cross-sectional observational study; which was part of a project to provide psychosocial support for train accident survivors.

#### **Setting**

The study was conducted at the Department of Psychiatry in a medical college hospital where a large proportion of train accident survivors were treated. It is a tertiary-level referral center for the region.

#### **Participants**

The sample for this study consisted of three groups. The first group was the passengers of the train accident who were 18 years of age or above. The passengers who were not willing to participate or those who did not provide consent were excluded. The second group included health professionals (nurses and doctors) who treated the injured passengers in the hospital. The third group included people from the local community who were acutely aware of the accident.

#### **Variables**

The outcome variables were PTSS, PTSD based on the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5),<sup>20</sup> degree of stress, overall QOL, and health satisfaction. Additionally, anxiety and depression were also assessed for the passengers.

### **Data sources and measurement**

Assessments were done using a predesigned form which included information about the project, the consenting process, and the questionnaires involving trauma, and mental health issues. Specifically, we checked the experience of the trauma, witnessing the injured and dead passengers on the site, in the hospital, and coverage over the TV news channel. We asked the participants for their overall stress experience through the question 'How distressed were you with the train accident?' with a response on a Likert scale of 1 being not at all to 5 being most distressed.

We assessed post-traumatic stress symptoms using the PTSD checklist (PCL-5)<sup>21</sup> for all the participants. The PCL-5 is a 20-item self-rated questionnaire, corresponding to the DSM-5 symptom criteria for PTSD.<sup>20</sup> The responses are rated on a 5-point Likert scale (0 being 'not at all' to 4 being 'extremely', with a total score range of 0-80. A provisional PTSD diagnosis can be made by treating each item rated as 2 = "Moderately" or higher as a symptom endorsed, then following the DSM-5 diagnostic rule which requires at least: 1 B item (questions 1-5), 1 C item (questions 6-7), 2 D items (questions 8-14), 2 E items (questions 15-20).

We assessed overall QOL and satisfaction related to health through specific items of the WHO QOL BREF questionnaire (WHOQOL-BREF).<sup>22,23</sup>

Additionally, from the passengers, we collected information about trauma, physical injury (minor: requiring first aid; moderate: hospitalization; and serious: life-threatening injuries, those needed a blood transfusion, surgery, ICU, etc.), and information about their treatment, hospital days, and admission to ICU.

We also studied the anxiety of the passengers using a 7-item General Anxiety Disorder (GAD-7),<sup>24</sup> a self-rated scale, with items scored as 0 (not at all) to 3 (nearly every day) with a total score range of 0-21, which are categorized as none (0-4), mild (5-9), moderate (10-14), and severe (15-21).

Depression of the passengers was assessed through a self-rated 9-item Patient Health Questionnaire PHQ-9) scale.<sup>25</sup> The items are scored as 0 (not at all) to 3 (nearly every day) with a total score range of 0-27 which are graded as none (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27).

Demographic details (age, education, marital status, religion, occupation, residence, family type, and self-reported socioeconomic status) were collected from all participants through a pre-designed questionnaire.

### **Data collection**

The passengers were identified from the list prepared following their medical assessment; and were contacted through phone. Clinical psychologists and psychiatrists contacted the survivors and explained the project objectives and the available support. The assessments were conducted using an online questionnaire. The questionnaires were self-rated, however mental health professionals (clinical psychologists, psychiatric nurses, and psychiatrists) helped survivors in the data collection process through telephone.

The doctors and nurses in the treating hospital were approached and provided the study link to complete after discussing the project with them. The link for the questionnaire was circulated to the local community through voluntary organizations, citizen groups, and forums, by the researchers. Detailed information about the project was available in the link, and there was scope for discussion with the researchers.

Questionnaires were prepared in local languages, such as Odia, Hindi, and Bengali, besides English as the passengers were spread across different linguistic regions. The clinical psychologists involved in the research were proficient in using these languages.

### **Ethics**

The project was approved by the Institutional Ethics Committee (No: 1456; Date 16/08/2023). The reasons for the psychosocial assessments were explained. Anonymity and the option to withdraw from the assessment without assigning any reason were highlighted. It was assured that psychosocial intervention would be provided irrespective of the participation in the study. Those who agreed to participate following the discussion about the study were requested to provide informed consent through the electronic format. All the victims who could be contacted were offered the psychosocial intervention, whether or not they participated in the study.

### **Statistical methods**

Data was entered in Excel and quality checked. The data was analyzed with SPSS version 28. We analyzed descriptive statistics of demographic variables and trauma experience. The chi-square test was used to study the association between categorical variables of participants with or without PTSD. We used t-test to compare the

means, and ANOVA while comparing more than two means. We studied the correlation among variables by Pearson's test. The odds ratio (OR) was calculated to check the risk of variables contributing to the presence of PTSD. We used regression analysis to check for variables that predicted the diagnosis of PTSD. Where appropriate, 95% confidence interval (95% CI) of the findings was provided. We checked the internal consistency of the scales used in the study through Cronbach's alpha which was 0.942 for PCL-5, 0.937 for PHQ-9, and 0.950 for GAD-7 suggesting good reliability. Statistical significance was considered at below 0.05.

## **Results**

### **Participants' demographics**

The sample included 58 passengers, 42 health professionals, and 65 participants from the local community. Their mean age  $\pm$  SD were  $31.1 \pm 8.2$ ,  $33.9 \pm 8.7$ , and  $39.4 \pm 16.9$  years respectively. The demographic details are given in Table 1. Most passengers were male (84.5%), married (69.0%), with education up to high school (86.2%), from rural background (84.5%), nuclear family (56.9%), half of them were unemployed, and half were below the poverty line.

### **Trauma experience**

The trauma experiences of the sample are given in Table 2. There were obvious differences among the groups; with a significantly higher proportion of passengers reporting different types of traumatic experiences. Reported distress scores (mean  $\pm$  SD) of passengers ( $3.8 \pm 1.3$ ), health professionals ( $3.0 \pm 1.4$ ), and community participants ( $3.1 \pm 1.6$ ) differed significantly ( $F= 4.7, P<.05$ ).

### **PTSS**

The PTSS reported by the sample are given in Table 3. Commonly reported symptoms included intrusive memories (36.4%), feeling upset while reminded of the experience (33.9%), avoidance of memories (30.9%), avoiding external reminders (26.1%), repeated dreams (23.6%) and strong negative feelings (20.6%). Among the PTSS, a significantly higher proportion of passengers had strong negative feelings, loss of interest, feeling distant or cut off, irritability, or anger outbursts compared to the other two groups.

The PTSS score of passengers ( $18.9 \pm 15.9$ ) was higher than that of health professionals ( $13.6 \pm 12.3$ ), and community participants ( $13.9 \pm 12.7$ ). Overall comparison of PTSS scores in the three groups was not

significant ( $F= 2.6, P= .076$ ). PTSS score was significantly correlated with self-reported stress score ( $r= .488, p<.001$ ), and negatively correlated with QOL ( $r= -.344, P<.001$ ), and health satisfaction ( $r= -.321, P<.001$ ).

### **PTSD and associated factors**

According to DSM-5 criteria, PTSD was present in 12 (20.7%, 95% CI: 11.2-33.4) passengers, 8 (19.0%, 95% CI: 8.6-34.1) health professionals, and 5 (7.7%, 95% CI: 2.6-17.1) community participants. The proportion of passengers with PTSD was significantly ( $\chi^2= 4.35, P<0.05$ ) higher than that of community participants.

We analyzed associations of various sociodemographic and trauma experiences among participants with or without PTSD (Table 4). There was no significant association with any sociodemographic group. The mean age of persons with PTSD ( $32.9 \pm 10.8$  years) did not differ significantly from those without ( $35.5 \pm 13.5$ ). Among the traumatic experiences, only one variable of seeing dead bodies of the passengers either at the accident site, hospital, or elsewhere (OR= 3.5, 95% CI: 1.2-9.8) had a significantly higher risk. Considering the whole sample, persons with PTSD ( $n= 25$ ) reported significantly higher PTSS score based on PCL-5 ( $39.0 \pm 13.4$  vs.  $11.4 \pm 9.2, P<.001$ ) and self-reported distress ( $4.2 \pm 1.1$  vs.  $3.2 \pm 1.5, P<.01$ ) compared with those without. Otherwise, these two groups were comparable in age, QOL, and satisfaction in health.

Further, a linear regression analysis was carried out to examine the contributing role of variables which were found significant in the bivariate analyses, in predicting PTSD diagnosis. Degree of distress due to accident ( $B= .059, 95\% \text{ CI: } .023-.094$ ) and seeing dead bodies ( $B=.0146, 95\% \text{ CI: } .039-.253$ ) contributed significantly (Model  $R^2= .097, \text{ adjusted } R^2= .085, F= 8.7, p<.001$ ).

### **Factors associated with posttraumatic stress among passengers**

The PTSS score of the passengers significantly ( $P<.001$ ) correlated with reported stress score ( $r= .508$ ), anxiety ( $r= .824$ ), depression ( $r= .896$ ), and negatively correlated with QOL ( $r= -.491$ ), and satisfaction with health ( $r= -.630$ ). The age of the passengers correlated with reported stress ( $r= .308, P <.05$ ), and anxiety ( $r= .281, P <0.05$ ), suggesting higher the age, the higher the reported stress and anxiety.

We compared passengers with ( $n= 12$ ) or without ( $n= 46$ ) PTSD for associated factors (Table 5). Fear of death, anxiety, and depression were significantly associated with PTSD. Passengers with PTSD reported significantly higher self-reported stress ( $4.5 \pm 0.8$  vs.  $3.6 \pm 1.4, p<.05$ ) and less satisfaction with health status ( $1.8 \pm 0.4$  vs.

2.8 ± 1.0,  $P < 0.01$ ); however, their age, QOL were comparable. The majority of passengers with PTSD identified as having mental health issues (83.3% vs. 37.0%,  $P < 0.01$ ).

We studied the factors contributing to PTSD diagnosis among passengers with a regression analysis. The variables that were significantly associated with PTSD in bivariate analyses were entered. Only one of the variables seeing dead bodies of the passengers ( $B = .294$ , 95% CI: .072-.516) contributed significantly (Model  $R^2 = .541$ , adjusted  $R^2 = .487$ ,  $F = 10.0$ ,  $P < .001$ ).

### **Anxiety and depression of passengers**

Among the passengers 34.5% had mild, 13.8% had moderate and 5.2% had a severe level of anxiety based on GAD-7 scores, suggesting around 19% had a possibility of anxiety disorder. Similarly, 36.2% had mild, 15.5% had moderate and 3.4% had severe levels of depression according to PHQ-9, which would mean 18.9% had a possibility of depressive disorder. More than half (58.3%) of the passengers with PTSD had moderate or severe levels of anxiety, and half of them had moderate to severe depression. Passengers with PTSD had significantly higher score of anxiety ( $11.8 \pm 4.7$  vs.  $4.1 \pm 3.9$ ,  $P < .001$ ) and depression ( $12.0 \pm 6.5$  vs.  $4.0 \pm 3.7$ ,  $P < .001$ ) compared to those without.

### **QOL**

Considering the overall-QOL ( $F = 23.7$ ,  $P < .001$ ) and health satisfaction ( $F = 9.6$ ,  $P < .001$ ) the three groups differed significantly, with passengers having the worst scores among the three groups. Categorically, a majority (62.1%) of passengers reported poor or very poor QOL, compared to 9.5% of health professionals and 13.9% of the community participants ( $P < .001$ ). Similarly, most (68.9%) passengers were dissatisfied or very dissatisfied with their health compared to 16.7% of health professionals and 27.7% of community participants ( $P < .001$ ).

### **Limitations**

There are a few limitations to the study. Most of the passengers (87.9%) in the sample were admitted to the hospital while others were at least medically assessed. So it may be difficult to generalize the findings to all passengers who travelled that day, as many of them were not assessed medically or their contact details were not available. However, the sample included a range of passengers with minor to severe injuries, not just severe ones. In addition, not all the passengers in the available list could be contacted, for issues related to contact details and connectivity. Family members of the passengers are a specifically vulnerable group, especially of the

deceased; and they could not be included in this study due to unavailability of contact details. The railway workers who were exposed to the accident were also not included, who are likely to have higher risk.<sup>26,27</sup>

The sample size of persons from the local community was small. Although the study link was circulated through multiple contact persons and local voluntary organizations, the response was limited. There might be various factors influencing the response from local communities; inability to find any personal benefit, lack of time, etc. In addition, there were the limitations of telephone-based remote assessments compared to clinical in-person assessments.

## **Discussion**

To our knowledge, this is the first study on mental health outcomes of train accident survivors, compared with the health professionals and individuals from the local community. It highlighted the mental health needs of the affected people which might help to organise appropriate care.

This study tried to find out the PTSS and PTSD among study participants who were directly or indirectly affected by a catastrophic train accident. It was observed that PTSS were commonly reported; a higher proportion of passengers had PTSD compared to control groups. Witnessing dead bodies was significantly associated with PTSD in general, whereas specifically, among the passengers, the factors were fear of death, anxiety, and depression. Similarly, a significantly higher proportion of passengers with PTSD reported having mental health issues.

## **Prevalence of PTSS and PTSD**

It was observed that PTSS was common in all the groups, with a range of 8.5% (taking risks or doing harmful things) to 36.4% (repeated, disturbing memories) which was also the most common among the passengers. The intrusive traumatic memories of the accident are known to remain ingrained for many survivors, although some overcome these over a period.<sup>1,10</sup> The PTSS with the significant difference among the groups were strong negative feelings, loss of interest in enjoyable activities, feeling distant or cut off from other people, and feeling irritable, angry, and aggressive; all of these were reported more by the passengers. While trauma symptoms differentiating directly and indirectly affected people were identified, the findings also suggested that considerable proportions in both groups had PTSS. Trauma and psychological symptoms of indirectly affected

persons have been reported.<sup>28</sup> This highlights the need for trauma-related interventions for all the affected population.

Based on the DSM-5 criteria, PTSD was present in 20.7% of the passengers studied, which was slightly higher than the proportion (19.0%) of health professionals taking care of them; but significantly more compared with that (7.7%) among people from the local community. The observed PTSD prevalence in this study is higher than the rate (0.2%) reported in the general population in India,<sup>29</sup> or the proportion (0.22%) of psychiatric outpatients with PTSD in a tertiary psychiatric center,<sup>30</sup> but lower than those following catastrophic natural events in India.<sup>31–33</sup> A study on victims of a motor vehicle accident in India reported a higher (32.4%) prevalence of PTSD.<sup>34</sup> The reported range of PTSD prevalence after train accidents varies widely.<sup>4,10</sup> Following the accident, there was an active rescue effort and medical support arranged by the local authorities;<sup>5</sup> and these actions might have some moderating effect on the stress impact; as early support might decrease the risk of PTSD;<sup>35–38</sup> and lower perceived support is linked to higher PTSS.<sup>39</sup> It is reported that support from family, friends, and fellow passengers is important in the recovery process of train crash survivors.<sup>1</sup>

### **Contributing factors**

PTSS is commonly observed in people directly or indirectly affected by trauma;<sup>28</sup> which includes first responders, nurses, doctors, and psychologists who are all affected by the trauma.<sup>16</sup> Exposure to trauma through work as a health professional or disaster responder is also known to be associated with PTSS and PTSD.<sup>40–42</sup> Reportedly local communities also get affected, and this may have long-lasting effects.<sup>43,44</sup> This indicates that there is a need for assessment and support for these people who were indirectly affected. In essence, while taking care of direct victims, it is important to assess and take care of stress symptoms of indirectly affected people such as health professionals, rescuers, along the affected local communities.<sup>5</sup> The support may be in the form of public education in general; through online or group-based support regarding stress symptoms, relaxation techniques, and facilitating positive coping strategies; and specific therapy for those having the disorders.

Considering the sociodemographic variables, persons with PTSD were comparatively younger, less educated, from a nuclear family, married, and unemployed; and considering the socioeconomic status, fewer of them were below the poverty line and more in the upper group; however these were not statistically significant. A higher risk of PTSD at lower educational levels has been reported;<sup>45,46</sup> suggesting higher vulnerability in this category.

Based on the factors related to trauma experience, only seeing dead bodies was significantly associated with PTSD. This suggests, the necessity of taking appropriate measures limiting exposure to dead bodies following a catastrophic event with loss of life.

Besides the PTSS score, persons with PTSD had significantly higher self-reported distress compared to those without. High perceived stress has been linked to PTSD,<sup>47</sup> and can continue long term.<sup>7</sup> Experience of higher distress following a traumatic event has been reported to indicate the possibility of developing stress-related disorders, specifically PTSD.<sup>48</sup> Various trauma-related experiences of the passengers were significantly more common than the other groups (Table 2), which was obvious. Seeing dead bodies of passengers was a consistent factor that predicted PTSD, in all the study participants and specifically among the passengers. The majority (80.0%) of participants with PTSD witnessed dead bodies in the hospital and elsewhere, compared to 53.6% of those without PTSD. Similarly, a study on a motor vehicle accident found witnessing death and perceived death threats as determinants for PTSD.<sup>34</sup> Witnessing mass casualty and being forced to deal with the death of near ones can worsen mental health in the short and long runs.<sup>5</sup> However, in our study, physical injury or their severity, hospitalization, or ICU treatment did not differentiate those with or without PTSD.

It appeared that media coverage had some contribution to psychological stress following the accident (Table 2). While slightly more than half of the passengers reported being affected by the media coverage, the majority of health professionals and community participants reported being distressed by the coverage. Portrayal of traumatic images in the media, often repetitively, might play a role; which suggests media need to be more considerate while showing the disaster's impact on human life. Amelioration of the impact of trauma through the use of discretion warning and adherence to other journalistic principles,<sup>49</sup> need to be specifically evaluated.

In the context of trauma, the outcome is also influenced by the risk resilience framework, where resources and protective factors counterbalance the impact of disaster on individuals.<sup>50</sup> It has been reported that resilience has a negative relationship with anxiety, depression, and PTSD.<sup>51</sup> Although we did not study resilience specifically, it was evident from the findings that PTSD was linked to those with heightened stress perception, specifically seeing dead bodies and having mental health problems such as anxiety and depression. Supporting the affected individuals in working through the stress, assimilating, managing through positive coping strategies, and using specific interventions for improving resilience,<sup>52</sup> might help.

### **Specific factors related to passengers**

PTSD among the passengers was significantly associated with those who were afraid for their lives (Table 5). This factor has been known to contribute to the stress impact, symptoms, and disorder during various traumatic events and disasters.<sup>53,54</sup> Screening for the presence of fear of death early might help to identify vulnerable individuals to provide support. Significantly more passengers with PTSD in this study recognized that they had mental health issues. This is important as awareness may help in seeking intervention; for which appropriate information and facilities should be made available to affected persons.

### **Anxiety, depression, and PTSD**

Among the passengers in this study, PTSD was associated with higher levels of depression and anxiety (Table 5). These disorders reportedly co-occur in injury cases.<sup>55-57</sup> The association of anxiety, depression, and PTSD as comorbid conditions is well established in various contexts.<sup>31,58,59</sup> Their significant association as observed in this study of train accident survivors, suggests that comorbidity should be explored which might help in intervention planning.

### **QOL**

The impact on QOL was evident, with significantly more passengers having poorer QOL and dissatisfaction with their health than the comparison groups. There could be various reasons. In the immediate aftermath of the Odisha train accident, the mental health care needs of the passengers were not met.<sup>5</sup> It is known that the impact of trauma affects QOL negatively; and poorer QOL in trauma survivors,<sup>60,61</sup> especially those with direct exposure,<sup>62</sup> severe injury<sup>63</sup> has been well-reported. Anxiety, depression, and PTSD are contributors to poorer QOL;<sup>64,65</sup> unmet mental health needs of the affected people may influence it more. Based on this, it appears comprehensive person-specific intervention plans for accident survivors are required,<sup>66</sup> which might help the recovery process from trauma-related mental health problems and improve QOL.

### **Conclusion**

A considerable proportion of passengers, health professionals, and people from the local community had PTSS and PTSD following the 2023 Odisha train accident, which highlighted that the trauma affected many indirectly exposed persons besides the passengers. Seeing dead bodies was significantly associated with PTSD, in all participants; whereas fear of death, anxiety, and depression were additional factors for passengers. A high proportion of passengers with PTSD reported having mental health issues. In addition, a majority of participants

were affected by the media coverage of the incident showing traumatic pictures. The findings highlighted the interventions needs for the affected people. Future studies should explore mental health among all passengers including those who do not need physical check-ups or interventions following the accident, the family members of the passengers (both survivors and deceased), and assess their support needs. There is a need for follow-up studies to see the long-term outcome of mental health problems, also comparing those who received or did not receive psychosocial support.

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**Table 1. Sociodemographic profile of the sample**

Variables	Categories	Passengers (n: 58) n (%)	Health professionals (n: 42) n (%)	Community participants (n: 65) n (%)	Total n (%)	Stat $\chi^2, P$
Sex	Female	9 (15.5)	11 (26.2)	35 (53.8)	55 (33.3)	21.6, <.001
	Male	49 (84.5)	31 (73.8)	30 (46.2)	110 (66.7)	
Education	Up to high school	50 (86.2)	0 (0.0)	4 (6.2)	54 (32.7)	116.6, <.001
	Above high school	8 (13.8)	42 (100)	61 (93.8)	111 (67.3)	
Relationship	Single	18 (31.0)	17 (40.5)	26 (40.0)	61 (37.0)	1.4, .51
	Married	40 (69.0)	25 (59.5)	39 (60.0)	104 (63.0)	
Religion	Hindu	49 (84.5)	39 (92.9)	64 (98.5)	152 (92.1)	8.3, .016
	Others	9 (15.5)	3 (7.1)	1 (1.5)	13 (7.9)	
Occupation	Unemployed	29 (50.0)	0 (0.0)	2 (3.1)	31(18.8)	57.3, <.001
	Others	29 (50.0)	42 (100.0)	63 (96.9)	134 (81.2)	
Residence	Rural	49 (84.5)	11 (26.2)	27 (41.5)	87 (52.7)	38.6, <.001
	Urban	9 (15.5)	31 (73.8)	38 (58.5)	78 (47.3)	
Family type	Joint	25 (43.1)	14 (33.3)	39 (60.0)	78 (47.3)	7.9, <.05
	Nuclear	33 (56.9)	28 (66.7)	26 (40.0)	87 (52.7)	
Socioeconomic status	Below poverty line	29 (50.0)	0 (0.0)	8 (12.3)	37 (22.4)	90.1, <.001
	Lower	18 (31.0)	2 (4.8)	1 (1.5)	21 (12.7)	
	Lower middle	9 (15.5)	15 (35.7)	18 (27.7)	42 (25.5)	
	Upper middle	1 (1.7)	22 (52.4)	31 (47.7)	54 (32.7)	
	Upper	1 (1.7)	3 (7.1)	7 (10.8)	11 (6.7)	

**Table 2. The trauma experience of all the participants**

Variables	Passengers n (%)	Health professionals n (%)	Community participants n (%)	Total n (%)	Stat $\chi^2, P$
Seen injured passengers at the accident site	50 (86.2)	9 (21.4)	11 (16.9)	70 (42.4)	70.4, <.001
Seen dead bodies at the accident site	50 (86.2)	9 (21.4)	12 (18.5)	71 (43.0)	58.1, <.001
Seen injured in the hospitals	58 (100.0)	40 (95.2)	23 (35.4)	121 (73.3)	76.3, <.001
Seen dead bodies of train accident passengers at hospital or elsewhere	44 (75.9)	28 (66.7)	23 (35.4)	95 (57.6)	22.5, <.001
Distressed by seeing the coverage of the accident on the TV and /or social media					
• Not seen the coverage on TV or social media	18 (31.0)	2 (4.8)	0 (0.0)	20 (12.1)	34.5, <.001
• Not really	7 (12.1)	3 (7.1)	5 (7.7)	15 (9.1)	
• Yes, to some extent	18 (31.0)	21 (50.0)	28 (43.1)	67 (40.6)	
• Yes, to a large extent	15 (25.9)	16 (38.1)	32(49.2)	63 (38.2)	

**Table 3. Posttraumatic stress symptoms reported by the participants**

Posttraumatic stress symptoms	Passengers n (%)	Health professionals n (%)	Community participants n (%)	Total n (%)	Stat $\chi^2, P$
1. Repeated, disturbing, and unwanted memories	25 (43.1)	14 (33.3)	21 (32.3)	60 (36.4)	1.8, .413
2. Repeated, disturbing dreams	18 (31.0)	8 (19.0)	13 (20.0)	39 (23.6)	2.7, .256
3. Suddenly feeling or acting as if the stressful experience were actually happening again	13 (22.4)	7 (16.7)	12 (18.5)	32 (19.4)	0.6, .75
4. Feeling very upset when something reminded you of the stressful experience	23 (39.7)	16 (38.0)	17 (26.2)	56 (33.9)	2.9, .232
5. Having strong physical reactions when something reminded you of the stressful experience	15 (25.9)	11 (26.2)	11 (16.9)	37 (22.4)	1.9, .393
6. Avoiding memories, thoughts, or feelings related to the stressful experience	19 (32.8)	12 (28.6)	20 (30.8)	51 (30.9)	0.2, .904
7. Avoiding external reminders of the stressful experience	18 (31.0)	8 (19.0)	17 (26.2)	43 (26.1)	1.8, .403
8. Trouble remembering important parts of the stressful experience	10 (17.2)	8 (19.0)	13 (20.0)	31 (18.8)	0.2, .925
9. Having strong negative beliefs about yourself, other people, or the world	7 (12.1)	5 (11.9)	6 (9.2)	18 (10.9)	0.3, .856
10. Blaming yourself or someone else for the stressful experience or what happened after it	6 (10.3)	4 (9.5)	5 (7.7)	15 (9.1)	0.3, .872
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame	21 (36.2)	5 (11.9)	8 (12.3)	34 (20.6)	13.3, .001
12. Loss of interest in activities that you used to enjoy	19 (32.8)	3 (7.1)	5 (7.7)	27 (16.4)	17.6, <.001
13. Feeling distant or cut off from other people	17 (29.3)	5 (11.9)	5 (7.7)	27 (16.4)	11.3, .004
14. Trouble experiencing positive feelings	12 (20.7)	8 (19.0)	8 (12.3)	28 (17.0)	1.7, .427
15. Irritable behavior, angry outbursts, or acting aggressively	16 (27.6)	4 (9.5)	5 (7.7)	25 (15.2)	10.8, .004
16. Taking too many risks or doing things that could cause you harm?	5 (8.6)	5 (11.9)	4 (6.2)	14 (8.5)	1.1, .580
17. Being "super alert" or watchful or on guard?	6 (10.3)	11 (26.2)	10 (15.4)	27 (16.4)	4.5, .103
18. Feeling jumpy or easily startled	6 (10.3)	8 (19.0)	3 (4.6)	17 (10.3)	5.8, .056
19. Having difficulty concentrating	14 (24.1)	7 (16.7)	6 (9.2)	27 (16.4)	4.9, .083
20. Trouble falling or staying asleep?	12 (20.7)	4 (9.5)	7 (10.8)	23 (13.9)	3.4, .180

**Table 4. Factors associated with PTSD**

Factors	Categories	No PTSD (n:140) n (%)	PTSD (n: 25) n (%)	Total n (%)	Stat $\chi^2, P$
<b>Socio-demography</b>					
Gender	Female	44 (31.4)	11 (44.0)	55 (33.3)	1.5, .219
	Male	96 (68.6)	14 (56.0)	110 (66.7)	
Education	Up to high school	42 (30.0)	12 (48.0)	54 (32.7)	3.1, .077
	Above high school	98 (70.0)	13 (52.0)	111 (67.3)	
Family type	Joint	70 (50.0)	8 (32.0)	78 (47.3)	2.8, .097
	Nuclear	70 (50.0)	17 (68.0)	87(52.7)	
Residence	Rural	75 (53.6)	12 (48.0)	87 (52.7)	0.3, .607
	Urban	65 (46.4)	13 (52.0)	78 (47.3)	
Religion	Hindu	130 (91.5)	22 (88.0)	152 (92.1)	0.7, .406
	Others	10 (7.1)	3 (12.0)	15 (7.9)	
Marital status	Single	55 (39.3)	6 (24.0)	61 (37.0)	2.1, .145
	Married	85 (60.7)	19 (76.0)	104 (63.0)	
Occupation	Unemployed	24 (17.1)	7 (28.0)	31 (18.8)	1.6, .200
	Others	116 (82.9)	18 (72.0)	134 (81.2)	
Socioeconomic status	Below Poverty Line	33 (23.6)	4 (16.0)	37 (22.4)	3.2, .520
	Lower	17 (12.1)	4 (16.0)	21 (12.7)	
	Lower Middle	34 (24.3)	8 (32.0)	42 (25.5)	
	Upper Middle	48 (34.3)	6 (24.0)	54 (32.7)	
	Upper	8 (5.7)	3 (12.0)	11 (6.7)	
<b>Trauma experience</b>					
Saw injured passengers at the accident site	Yes	55 (39.3)	15 (60.0)	70 (42.4)	3.7,.054
Saw dead bodies at the accident site	Yes	57 (40.7)	14 (56.0)	71 (43.0)	2.0,.155

Saw injured in the hospitals	Yes	99 (70.7)	22 (88.0)	121 (73.3)	3.2, .072
Saw dead bodies at hospital or elsewhere	Yes	75 (53.6)	20 (80.0)	95 (57.6)	6.1, .014
Distressed by media coverage of the accident	Not seen the media coverage	17 (12.0)	3 (11.5)	20 (11.9)	1.8, .617
	Not really	13(9.2)	2 (7.7)	15 (8.9)	
	Yes, to some extent	60 (42.3)	8 (30.8)	68 (40.5)	
	Yes, to a large extent	52 (36.6)	13 (50.0)	65 (38.7)	

**Table 5. Factors associated with PTSD in passengers**

Factors	No PTSD (n: 46) n (%)	PTSD (n: 12) n (%)	Total n (%)	Stat, <i>P</i>
Physical injury	35 (76.1)	11 (91.7)	46 (79.3)	1.4, .235
Lost a limb/sight/hearing	3 (6.5)	1 (8.3)	4 (6.9)	0.1, .825
Hospitalized	42 (91.3)	9 (75.0)	51 (87.9)	2.4, .123
Admitted to ICU	5 (10.9)	2 (16.7)	7 (12.1)	0.3, .583
Fear of death	18 (39.1)	11 (91.7)	29 (50.0)	10.5, .001
Received any support regarding the experience	29 (63.0)	7 (58.3)	36 (62.1)	0.1, .765
Perceived need for any support	36 (78.3)	12 (100.0)	48 (82.8)	1.8, .178
Any mental health issues at present	17 (37.0)	10 (83.3)	27 (46.6)	8.2, .004
Any physical health problems at present	30 (65.2)	10 (83.3)	40 (69.0)	1.5, .227
Physical injury category				
Minor	16 (34.8)	4 (33.3)	20 (34.5)	0.6, .731
Moderate	12 (26.1)	2 (16.7)	14 (24.1)	
Serious	18 (39.1)	6 (50.0)	24 (41.4)	
Anxiety				
None	27 (58.7)	0 (0.0)	27 (46.6)	22.9, <.001
Mild	15 (32.6)	5 (41.7)	20 (34.5)	
Moderate	4 (8.7)	4 (33.3)	8 (13.8)	
Severe	0 (0.0)	3 (25.0)	3 (5.2)	
Depression				
None	26 (56.5)	0 (0.0)	26 (44.8)	18.3, <.001
Mild	15 (32.6)	6 (50.0)	21 (36.2)	
Moderate	5 (10.9)	4 (33.3)	9 (15.5)	
Severe	0 (0.0)	2 (16.7)	2 (3.4)	