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Prevalence and associated factors of post-traumatic stress disorder among emergency responders of Addis Ababa Fire and Emergency Control and Prevention Service Authority, Ethiopia: institution-based, cross-sectional study

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ABSTRACT

Objective To assess the prevalence and associated factors of post-traumatic stress disorder (PTSD) among emergency responders at Addis Ababa Fire and Emergency Control and Prevention Service Authority, Ethiopia.

Design Institution-based, cross-sectional design.

Setting The study was conducted at the Fire and Emergency Control and Prevention Service Authority, Addis Ababa, Ethiopia.

Participants 603 emergency responders who worked in the Fire and Emergency Control and Prevention Authority during the study period.

Measurement Data were collected using a self-administered questionnaire: an adaptation of the standardised PTSD Checklist–Civilian Version. The questionnaire was administered to subjects on duty. Social support was measured using the Oslo 3-Item Social Support Scale, while other stressful life events were measured using the List of Threatening Experiences, that is, experiencing one or more stressful life events in the last 6 months. Reliability and construct validity were verified. To be diagnosed with PTSD, a subject must display at least three different types of symptoms at once. Coded variables were entered into Epi Info V.3.5.1 and then exported to SPSS V.20 for analysis. Descriptive and bivariate and multivariate logistic regressions and 95% CI were employed to establish and test statistically significant associations.

Results A total of 603 subjects participated in the study, with 19.9% prevalence rate of PTSD (95% CI 16.9 to 23.1). The study found family history of mental illness (adjusted OR (AOR)=2.82; 95% CI 1.65 to 4.84), longer years of service (AOR=2.67; 95% CI 1.54 to 4.63), as well as prolonged exposure to emergency situations (AOR=0.44; 95% CI 0.24 to 0.84) and road traffic accidents (AOR=2.71; 95% CI 1.67 to 4.42) as significant predictors of PTSD among emergency responders.

Conclusion The prevalence of PTSD was high among the study population. Family history of mental illness, length of service, duration of exposure and type of exposure were found to be associated with PTSD. Mental health education

Strengths and limitations of this study

► The consistently stable reliability and construct validity of the PTSD Checklist–Civilian Version scale in the current study can be used as a reference in subsequent studies.
► Recall biases might have occurred among subjects while completing the questionnaire.
► By design, the limitation of the study emanates from its cross-sectional design, which may have only partially accounted for durable temporal relationships.
► The results are drawn from probabilistic samples and they are only generalisable to populations with similar underlying profile and in the context of a low-income/middle-income country.

and linking emergency responders with available mental health services/facilities should be prioritised to mitigate the problem.

INTRODUCTION
Background/rationale

Post-traumatic stress disorder (PTSD) is a mental disorder that potentially follows an event in which an individual experiences, witnesses or confronts either actual or probable loss of life or a serious injury, invoking a response of fear, helplessness or horror.[1] Globally, about 14% of the burden of disease has been attributed to neuropsychiatric disorders, mostly due to the chronic nature of depression and other common mental disorders.[2] The WHO's global burden of disease survey estimates that mental disease, including stress-related disorders, will be the second leading cause of disability by year 2020.[3] The prevalence of PTSD varies

extremely among different populations. Within high-income countries,[4–7] for instance, the lifetime prevalence of PTSD varies from 0.3% to 8.7%.

This study focuses on professional emergency responders, including firefighters, ambulance personnel, and search and rescue workers or first responders,[8] who are oftentimes exposed to both direct and indirect stressors, such as risking their own life to enter burning buildings, jumping into waters to rescue drowning persons and witnessing the suffering of others.[9] In many cases, these experiences induce psychological and physiological stress reactions, which lead to physical pain, mental disorders and substance abuse.[10] In other words, these professionals' occupational experiences are high in stress levels, inducing acute PTSD.[11]

Consequently, the estimated prevalence of PTSD among emergency responders (1.3%–15%) in high-income countries[12–14] is significantly higher than the prevalence rate in the general population. Specifically, the prevalence of PTSD among firefighters in high-income countries ranges between 22.2% in the USA (and 22% in the UK) and 12.1% in Sweden, while 17.3% in Canada and 18.2% in Germany.[15 16] On the other hand, PTSD among London ambulance personnel was found to be lower at 6%.[17 18] The situation in South Africa shows 16% of university-educated paramedic trainees have PTSD,[19 20] and this percentage depicts a relatively high prevalence as compared with the occurrence of PTSD among emergency responders in middle-income and low-income countries, that is, 1.6%–15%.[19 21]

Studies document age, sex and social capital as factors mostly associated with the occurrence of PTSD among emergency responders. Specifically, those with low socioeconomic status, with dysfunctional family unit or have lost a family member are highly prone to PTSD.[14 22–25] Longer shift hours (more time spent per day on the job), distressing missions, and assisting survivors or being in close contact with victims are mostly associated with PTSD, whereby professionals could feel utmost fear and personal threat. The presence of a previously experienced trauma of any nature could aggravate the occurrence of PTSD.[14 25–27]

Studies reveal that due to the nature of their occupations, emergency responders carry high risks of developing PTSD, which generally leads to loss of ability to function well in social and professional environments, and affects their quality of life.[28] The economic and social impact of PTSD is felt by those who experience the disorder, and by families, coworkers, employers and the wider society.[23] Ordinarily, it increases job dissatisfaction, work absenteeism or early retirement among victims. Moreover, general social impairments increase more than 17-fold due to PTSD.[22 24]

Currently in Ethiopia, urbanisation has been associated with increasing fire, road traffic and construction-related accidents, adding to the preponderance of situations which expose emergency responders to various traumatic or stressful events. Consequently, a combination of rising prevalence and long-term complications, coupled with the alarming rate of urbanisation, will surely increase the burden of disease on the country's health system. However, little is known about this burden in Ethiopia as well as in Africa.

Objective
This study set out to assess the prevalence and associated factors of PTSD among emergency responders by taking the case of Addis Ababa Fire and Emergency Control and Prevention Service Authority (AFECA).

METHODS
Study design
The study employed an institution-based, cross-sectional study. It was conducted from May 2016 to June 2016.

Study setting
The study was conducted at AFECA. Addis Ababa, the capital city of Ethiopia, with its 10 subcities and 99 districts, lay at the foothills of Mount Entoto. The city has an elevation of 2360 m above sea level, with an estimated area of 526.99 square kilometres, density of 5165.1 people per square kilometre and a total population of 3 384 569, with an annual growth rate of 3.8% (Central Statistics Agency, 2007).

The city has one service provider for fire and other emergency situations, that is, AFECA. Established in 1926 European Calendar, AFECA experienced modest expansions as it opened new branches and diversified the types of service it provides to the residents of the city.

Study participants/subjects
The study includes all emergency responders on standby at AFECA during the study period. In total, there were 470 firefighters, 150 ambulance nurses and 40 search and rescue workers on the payroll of the Authority. We excluded those participants who were not directly involved in the emergency response of the Fire and Emergency Control and Prevention Service (such as administrative staff who were working at the office level) and those on leave during the study period.

Sample size determination
The minimum number of samples required for this study was estimated using the single population proportion formula with the following assumptions: the national proportion of prevalence and associated factors of PTSD are unknown in Ethiopia, p=0.5 was used; Z (standard normal distribution: 1.96) was assumed and CI was set at 95% (and =0.05); and a non-response rate of 10%. Accordingly, a representative/probabilistic sample size of the study was calculated to be 423. After considering all the extraneous factors that could increase non-response rate among subjects, the authors decided to include all emergency responders on the Authority's payroll (n=660).

Study variables

This study has three dependent variables: PTSD, other stressful life events and social support. The dependent variable PTSD was measured as a dichotomous variable (yes/no) on 17 items of the PTSD Checklist–Civilian Version (PCL-C), with the cut-off point set at greater than or equal to 50, that is, emergency responders who scored less than 50 had no PTSD and those who scored ≥50 had PTSD. Furthermore, to be diagnosed with PTSD, a person must have three different types of symptoms: re-experiencing of the trauma, numbing of affect and avoidance of trauma-related stimuli, and symptoms of excessive arousal not present before the event and must have lasted more than 1 month.[29]

Independent variables include sociodemographic factors (age, sex, marital status, ethnicity, educational status, type of profession, income), clinical variables (history of mental illness, previous childhood traumatic experience, family history of mental illness), work-related factors (service year, type of exposure, duration of exposure, number of exposures) and psychosocial factors (social support, other stressful life event, perceived threat).

In this study, emergency responders are professionals who work in emergency situations such as attending to car accidents, fires, drownings and any other disasters. These professionals are firefighters, ambulance personnel (nurses) and search and rescue workers.

Data sources and measurement

Data were collected via a self-administered structured questionnaire. The questionnaire was administered to subjects on standby, who were expected to complete and return it to the supervisors on the spot unless they were too busy or called for duty. In the latter case, they were allowed to take the instrument home, complete and return it the other day. Supervisors had a BSc Degree in Psychiatric Nursing, and they were trained to explain unclear questions, orient subjects on the questionnaire as well as the ethical principles of confidentiality/ anonymity and data management prior to involvement in data collection, secure subjects' informed consent for participation, distribute copies of the questionnaire, and collect the completed and returned questionnaires.

Data on the magnitude of PTSD were collected using a standard questionnaire. The PCL-C is a general civilian version, and questions refer to 'a stressful experience in the past'; it is an easily administered self–report rating scale for assessing 17 Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV symptoms of PTSD.[30] A total symptom severity score (range=17–85) could be obtained by summing the scores from each of the 17 items, which had response options ranging from '1=not at all' to '5=extremely', with a cut-off ≥50 on PCL treated as a predictor of PTSD. It showed high internal consistency, reliability and strong correlation with PTSD diagnosis using a clinician-administered PTSD scale. The authors conducted a reliability analysis for the Amharic translated versions of the PCL-C, which had high reliability score (Cronbach's α=0.96). The scale was computed by summing each item. Higher scores indicated the probability of PTSD, while lower scores indicated no/less PTSD. The authors preferred to use the PCL-C rather than the PCL-S since the emergency responders could be and have been exposed to different kinds of traumatic events not only for specific traumatic events that feature in the life conditions of a specific population. Two studies of both Vietnam and Persian Gulf theatre veterans showed that the PCL was both valid and reliable.

Social support was measured using the Oslo 3-Item Social Support Scale, a self-report measure of support with high internal consistency (Cronbach's α=0.50) in a study done at Bayero University, Kano, Nigeria,[31] and with scores ranging between 3 and 14: 3–8=poor social support; 9–11=intermediate social support; and 12–14=strong social support. On the other hand, 'perceived threat' was measured in terms of respondents' affirmative response to the question 'Do you feel the situation is threatening to you?' Reliability and construct validity were good.

Other stressful life events were measured using the List of Threatening Experiences. The presence of stressful life events was explained by having experienced one or more stressful life events in the past 6 months starting from the time of the study. The revised version of this instrument has 10 items with a dichotomous yes/no response categories. The scale had reliability (alpha coefficient of 0.74) in this study.

Data quality management

The questionnaire was designed in English (by integrating the three standard tools) and was translated to Amharic and back to English, that is, forward and backward translation. A 1-day training was organised for supervisors. The questionnaire was pretested on 5% of the sample population of the Ethiopian Airlines Department of Emergency Services for 2 days to check its reliability to be deployed in the main survey. Based on the findings of the pretest, the questionnaire was revised and adapted, and a summary of the pretesting exercise is included in this report.

Statistical methods

First, the data were checked for completeness and consistency. For analysis, coded variables were entered into Epi Info V.3.5.1, then exported and analysed using SPSS V.20. Descriptive statistics were used to explain the subjects in relation to study variables. Bivariate binary logistic regression analysis was performed to assess the factors that affect the occurrence/likelihood of PTSD. Variables in the bivariate analysis with a p value of <0.2 were entered into the multivariable logistic regression analysis to control for confounders, and the results were expressed as adjusted ORs (AOR). A 95% confidence level was used to determine factors associated with PTSD,

Table 1 Distribution of sociodemographic factors of study participants in Addis Ababa Fire and Emergency Control and Prevention Service Authority, Addis Ababa, Ethiopia, 2016 (n=603)

Characteristics	Frequency	Percentage
Age		
18–24	167	27.7
25–34	307	50.9
35–44	106	17.6
>45	23	3.8
Sex		
Female	132	21.9
Male	471	78.1
Marital status		
Married	288	47.8
Single	289	47.9
Others*	26	4.3
Ethnicity		
Amhara	227	37.6
Oromo	190	31.5
Tigre	69	11.4
Gurage	60	10.0
Others	57	9.5
Educational status		
10th and 12th complete	182	30.2
Diploma	314	52.1
Degree	107	17.7
Type of profession		
Firefighter	459	76.1
Ambulance nurse	113	18.7
Search and rescue	31	5.1
Income		
1500–2500	123	20.4
2600–3600	391	64.8
>3700	89	14.8

*Others: divorced, widowed and separated.

that is, a p value of <0.05 was considered statistically significant.

Ethical considerations

The purpose of the study was explained to the participants. The consent form indicated that participation was voluntary and that clients had the right to withdraw from completing the questionnaire at any time without reason. Participants were also informed that there was no guarantee of preferential treatment or any associated benefits and risks associated with the study. All data collected were used for academic purposes only. None of the data collected contained subjects' identifying information, ensuring their anonymous responses. Completed questionnaires and computer data were kept confidential with codes. Data were stored on a computer and protected by password known only to the authors.

Patient and public involvement

In the current study our study participants are people who are working at Addis Ababa Fire, Emergency Control and Prevention Service Authority, and patients were not included in this study. Our study participants were also not involved in the study design and recruitment. The results of this study will be disseminated to the Emergency Control and Prevention Service Authority and the Federal Ministry of Health through presentation and policy briefing.

RESULTS

Subjects' sociodemographic characteristics

A total of 603 participants took part in the study, with a response rate of 91.4%. Three-quarters of the participants (78.1%) were male, nearly half (47.9%) were single and more than one-third (37.6%) were of Amhara ethnicity (the second largest ethnic group of the country). Half of them (52.1%) were diploma graduates, and the same proportion (50.9%) was in the age range of 25–34 years. Three-quarters of the respondents (76.1%) were firefighters, nearly one-fifth (18.7%) were ambulance nurses and one-twentieth (5.1%) were search and rescue workers. More than half of the participants (64.8%) were in the income group of 2600–3600 birr (table 1).

Subjects' clinical profiles

Twenty (3.3%) of the participants had history of mental illness, 5 (5.0%) experienced physical abuse and neglect during childhood, and 50 (15.1%) had family history of mental illness (table 2).

Table 2 Distribution of clinical factors of study participants in Addis Ababa Fire and Emergency Control and Prevention Service Authority, Addis Ababa, Ethiopia, 2016 (n=603)

Characteristics	Frequency	Percentage
History of mental illness		
No	583	96.7
Yes	20	3.3
Childhood trauma (physical abuse and neglect)		
No	573	95.0
Yes	30	5.0
Family history of mental illness		
No	512	84.9
Yes	91	15.1

Table 3 Distribution of work-related and type of exposures of study participants in Addis Ababa Fire and Emergency Control and Prevention Service Authority, Addis Ababa, Ethiopia, 2016 (n=603)

Characteristics	Category	Frequency	Percentage
Service year	≤3 years	342	56.7
	4–5 years	129	21.4
	>5 years	132	21.9
Duration exposure	<3 hours	89	14.8
	3–4 hours	114	18.9
	>5 hours	400	66.3
Type of exposures	Fire accident		
	No	143	23.7
	Yes	460	76.3
	Road traffic crash		
	No	475	78.8
	Yes	128	21.2
	Drowning		
	No	581	96.4
	Yes	22	3.6
	Dead person		
	No	515	85.4
	Yes	88	14.6
	Other		
	No	517	85.7
	Yes	86	14.3
Number of exposures	<10 times	191	31.7
	10–20 times	208	34.5
	30–40 times	100	16.6
	>40 times	104	17.2

Table 4 Distribution of psychosocial factors for study participants in Addis Ababa Fire and Emergency Control and Prevention Service Authority, Addis Ababa, Ethiopia, 2016 (n=603)

Characteristics	Frequency	Percentage
Perceived threatening		
No	494	81.9
Yes	109	18.1
Social support		
Poor	221	36.7
Moderate	313	51.9
Strong	69	11.4
Other stressful life events		
No	3	5
Yes	600	95.5

Main results

Subjects' work-related exposure (outcome) to PTSD

The exposure of subjects to PTSD varied in terms of type and duration of their work. Specifically, the duration of exposure of 400 (66.3%) subjects to stressful working conditions was ≥5 hours, and three-quarters (76.3%) of them were exposed to fire accidents. More than half (56.7%) of the subjects had less than 3 years of work experience in the Authority and one-third of them (34.5%) were exposed 10–20 times (table 3).

Out of the total of 603 participants, nearly one-fifth (18.1%) reported perceived threat, half (51.9) had moderate social support and the overwhelming majority (99.5%) had other stressful life events (table 4) that accompanied their work experience.

The overall prevalence of PTSD among emergency responders at the Authority was found to be 120 (19.9% (95% CI 16.9 to 23.1)). Of the 19.9% prevalence of PTSD, the percentages of ambulance nurses and firefighters were, respectively, 11.5% (95% CI 6.2 to 17.0) and 20.7% (95% CI 17.2 to 24.8). The prevalence among search and rescue workers was 38.7%, which is significantly higher than the overall prevalence in the total sample, that is, 19%.

Factors associated with PTSD

Bivariate analysis of PTSD found age, marital status, family history of mental illnesses, length of service, duration of exposure, road traffic accident exposures and number of exposures were significant predictors of PTSD at a p value less than 0.2. These predictors were then entered into the multivariable logistic regression model to control for their confounding effects (table 5).

The result of the multivariate analysis showed that family history of mental illness, years of service, prolonged exposure and exposure to road traffic accidents were significantly associated with PTSD. The odds of developing PTSD among participants with family history of mental illness were about three times higher than those who had no such family history (AOR=2.82; 95% CI 1.65 to 4.84). The odds of developing PTSD were more than two times higher among participants who had 4–5 years of work experience than those who had less than 3 years of work experience (AOR=2.67; 95% CI 1.54 to 4.63). On duration of exposure, the odds of developing PTSD among those who were exposed for greater than 5 hours decreased by 56% compared with those who were exposed for less than 3 hours (AOR=0.44; 95% CI 0.24 to 0.84). The odds of developing PTSD were more than two times higher among those who were exposed to road traffic accidents than those who had not had exposure to road traffic accidents (AOR=2.71; 95% CI 1.67 to 4.42) (table 5).

DISCUSSION

Emergency responders were usually exposed to both direct and indirect stressors, such as risking their lives when entering a burning building, rescuing a drowning person or witnessing the suffering of others.[32] In many

Table 5 Bivariable and multivariable independent predictors of PTSD among emergency responders in Addis Ababa Fire and Emergency Control and Prevention Service Authority, Addis Ababa, Ethiopia, 2016 (n=603)

Variables	Total (F, %)	PTSD		COR (95% CI)	AOR (95% CI)
		No	Yes		
Age					
18–24	167 (27.7)	147 (30.4)	20 (16.7)	0.91 (0.25 to 3.33)	0.28 (0.06 to 1.31)
25–34	307 (50.9)	248 (51.3)	59 (49.2)	1.59 (0.46 to 5.52)	0.49 (0.12 to 2.06)
35–44	106 (17.6)	68 (14.1)	38 (31.7)	3.73 (1.04 to 13.36)*	1.21 (0.29 to 4.99)
>45	23 (3.8)	20 (4.1)	3 (2.5)	1	1
Marital status					
Married	288 (47.8)	231 (47.8)	57 (47.5)	1	1
Single	289 (47.9)	238 (49.3)	51 (42.5)	0.87 (0.57 to 1.32)	1.15 (0.69 to 1.90)
Others†	26 (4.3)	14 (2.9)	12 (10.0)	3.47 (1.52 to 7.92)**	1.59 (0.61 to 4.16)
Family history of mental illness					
No	512 (84.9)	427 (88.4)	85 (70.8)	1	1
Yes	91 (15.9)	56 (11.6)	35 (29.2)	3.14 (1.94 to 5.09)***	2.68 (1.56 to 4.59)***
Service year					
≤3 years	342 (56.7)	292 (60.5)	50 (41.7)	1	1
4–5 years	129 (21.6)	83 (17.2)	46 (38.3)	3.24 (2.03 to 5.17)***	2.59 (1.49 to 4.51)***
>5 years	132 (21.9)	108 (22.4)	24 (20.0)	1.29 (0.76 to 2.21)	0.85 (0.41 to 1.77)
Duration of exposure					
<3 hours	89 (14.8)	67 (13.9)	22 (18.3)	1	1
3–4 hours	114 (18.9)	78 (16.1)	36 (30.0)	1.41 (0.75 to 2.62)	1.24 (0.62 to 2.46)
≥5 hours	400 (66.3)	338 (70.0)	62 (51.7)	0.56 (0.32 to 0.97)*	0.44 (0.24 to 0.84)**
Road traffic crash type exposure					
No	475 (78.8)	399 (82.6)	76 (63.3)	1	1
Yes	128 (21.2)	84 (17.4)	44 (36.7)	2.75 (1.77 to 4.27)***	2.71 (1.66 to 4.42)***
Number of exposure					
<10 times	191 (31.7)	153 (31.7)	38 (31.7)	1	1
10–20 times	208 (34.5)	158 (32.7)	50 (41.7)	1.27 (0.79 to 2.05)	1.02 (0.59 to 1.77)
30–40 times	100 (16.6)	80 (16.6)	20 (16.7)	1.00 (0.55 to 1.84)	0.74 (0.38 to 1.46)
>40 times	104 (17.2)	92 (19.0)	12 (10.0)	0.53 (0.26 to 1.06)	0.58 (0.26 to 1.25)
Social support					
Poor	221 (36.7)	179 (37.1)	42 (35)	0.26 (0.1 to 0.66)*	2.23 (0.79 to 6.26)
Moderate	313 (51.9)	240 (49.7)	73 (60.8)	0.77 (0.5 to 1.18)	2.24 (0.81 to 6.17)
Strong	69 (11.4)	64 (13.3)	5 (4.2)	1	1

*P<0.05, **p<0.01, ***p<0.001.
†Others: divorced, widowed and separated.
AOR, adjusted OR; COR, Crud Odds Ratio; PTSD, post-traumatic stress disorder.

cases, these experiences induce various psychological and physiological stress reactions which may lead to PTSD, making PTSD one of the most common disorders among emergency responders.[10]

This study found the overall prevalence of PTSD among emergency responders to be 19.9%, which is the same as the prevalence among emergency responders at the World Trade Center in the USA (14.3%–17.4%).[25 33] The correspondence in results between ours and previous studies could possibly be due to the similarity of the

instrument used. Nonetheless, variations in the nature of work, duration of exposure and experience in the process might have played their roles in the marginal variations between the results. The 19.9% prevalence of PTSD was higher than those found in Norway (1.3%), Japan (1.6%–6.6%), China (1.6%–3.1%), South Korea (8.3%), South Africa (11.6%) and Pakistan (15%).[12 19 21 22 34 35] The possible difference could be due to the inclusion of other emergency responders, such as recovery workers, police officers and municipality workers, in addition to

differences in study setting, instrument used and socio-cultural differences.

PTSD among firefighters accounted for 19.9%, of the 19.9% of the general PTSD prevalence among emergency responders, which is similar to the prevalence among firefighters in the USA, Australia, Germany and Kuwait.[18 25 27 34 36] The similarity in the magnitude could be due to the study design and type of exposure. Conversely, this finding was lower than the study done in Australia, which was 31%.[37] The possible reason might be the nature or magnitude of the accidents they deal with.

The prevalence of PTSD among ambulance nurses accounted for 11.5% of all PTSDs, which is similar to (or higher than) findings from London (6%) and Sweden (5.2%).[38 39] The similarity in the magnitude could be due to educational and professional preparations. Our finding was higher than the 22% seen in the UK. The difference could be due to sociocultural variations. Our finding was lower than the 5.6% reported in Brazil.[17] The discordance could be due to the potential variations in the nature and magnitude of accident exposures that the firefighters deal with in their day-to-day practice.

Nations in different locale tend to evolve differently in response to the varying physical environment. Their cultures—as mechanisms of adaptation—prescribe the appropriate or desirable course of action when faced with environmental challenges such as emergency or risk situations. People's awareness of the environment, technological advancement, sense of duty or commitment to community welfare, definitions of risk and vulnerability, and so on vary between nations as they have different social values and cultural ethos, which they developed over centuries to meet the demands of the environment, and these variations account, at least partially, for variations among emergency responders in terms of their definition of risk, stressful situations and coping mechanisms, as well as their effects on mental health, in countries as varied as the USA, UK, Haiti and Ethiopia. This is only plausible, for as members of a community of people the culture of the group and its value system will impact members' assessment of situations as well as their risk-taking or risk aversion behaviours.

The prevalence of PTSD among search and rescue workers accounted for 38.7%, which is lower than 40% found in Haiti.[40] The possible difference could be due to study design, sociocultural differences, and the nature and magnitude of the accidents covered in the study.

On the independent predictors of PTSD, family history of mental illness, length of service, duration of exposure and type of road traffic accident exposure were found to be statistically significant predictors of PTSD. Specifically, the greater likelihood of PTSD occurrence among those with family history of mental illness than those who had no such family history is similar with the results from Australia, where 55% of the survivors of a bush fire disaster with PTSD had family history of psychiatric conditions. In addition, psychological and genetic vulnerability made participants more highly predisposed to PTSD.[41]

On service years, the odds of developing PTSD increase with increase in work experience, which is similar to the case unravelled in America,[14] which is possibly due to longer job experience that increased the number of potential traumatic events, which might aggravate PTSD symptoms (dose–response relationship). On the other hand, emergency responders exposed to traumatic events for longer hours are more likely to develop PTSD partly due to the sustained and longer emotional, psychological and physiological stress on victims. This result is different from the American case (mean=10.0 days (SD=3.8)),[14] which could be related to differences in sociocultural context and mechanisms of adaptation to their emergency responder roles.

On type of exposure, experiencing road traffic accidents doubles the odds of developing PTSD among emergency responders. This finding was supported by the results of studies conducted in Norway.[22 42] Such findings could be partially explained by the relatively more shocking and devastating nature of road traffic accidents compared with the other forms of accidents. Moreover, the magnitude of accidents, distressed perception of the situation, or assisting or engaging in close contact with survivors might be unconsciously internalised to redefine self-image and/or bring catastrophic reaction to the event.

Limitations of the study

Recall bias might have occurred when the subjects were completing some of the items on the questionnaire, and we were unable to address individuals who had PTSD for further investigation and intervention because of the use of a self-administered questionnaire.

Additionally, by design, that is, a cross-sectional study design, this study is limited to unravel temporal relationships, and thus the observed/reported associations may not necessarily be causal. On the other hand, the results can be generalised only to a sample population. Nonetheless, although the study covers emergency responders of AFECA, its findings can be generalised to emergency responders in similar occupational and sociocultural contexts, that is, national technological advancement, culture of risk-taking and so on, and mostly in low-income/middle-income countries. As long as similarities between patterns of response to emergency and disaster situations in the study population and any population of concern could be established, the results of the study have a likelihood of generalisability. However, we have to take the transferability of knowledge outside the study's scope with caution as any study population is unique, with peculiar characteristics that make perfect transferability impossible. General insights and methodological notes could, however, be drawn in designing further studies or attempting at explanations in other settings.

One of the main problems with such types of cross-sectional studies is misclassification of exposure and outcome when participants are diagnosed with PTSD on a simple questionnaire. This is most likely due

to the diagnosis which is based on a strict interview. This clerical and diagnosis error in the classification of exposure and outcome status can occur while the questionnaire states both exposure and the outcome at one point in time. In addition to this, the authors did not consider other mental health issues that can confound study outcomes. For instance, the presence and effects of anxiety and depression, which are commonly associated with PTSD symptoms and severity of PTSD, duration of mental illness, or exposure to other diseases were not covered in the study. Besides, the study did not cover predisposing factors such as personality traits or history of neurotic illness to PTSD, which could have increased misclassification of exposure as it risks overestimating PTSD. Furthermore, measurement errors could also occur, obscuring the evidence due to strong confounding errors. Therefore, we recommend further studies to focus on outcome measurement, including evaluations of measurement errors.

CONCLUSIONS AND RECOMMENDATIONS

Overall, the prevalence of PTSD was found to be high among emergency responders of the Authority. Family history of mental illness, length of service, duration of exposure and type of exposure such as road traffic accidents were found to be independent predictors of PTSD. Considering linkage with mental health service providers (Amanuel mental specialised hospital (AMSH)) is recommended. One study shows that social support like family and friends can prevent work-related PTSD.[43] Moreover, creating a sound and supportive organisational and working environment, and systematic training of employees, will also prevent the occurrence of the problem.[44]

Incorporating education/training on effective handling of stressful missions (stress management) and coping mechanisms in orientation/induction programmes and regular curriculum debriefing is strongly suggested. It is better to organise refresher courses, professional programmes and psychosocial support to those who have been on the job for longer periods. We recommend a PTSD-focused regular screening of emergency responders by trained health professionals to identify its nature and magnitude, as well as find plausible solutions. We believe the scale could adequately be deployed in further studies in the context of low-income/middle-income countries.

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