

Research Paper

Measuring the Biopsychosocial Health of Emergency Medical Technicians in Tehran, Iran



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Citation Delshad V, Khankeh H, Ebadi A, Bidzan M, Ghaedamini Harouni Gh, Stueck M. Measuring the Biopsychosocial Health of Emergency Medical Technicians in Tehran, Iran. *Health in Emergencies and Disasters Quarterly*. 2025; 10(2):107-114. <http://dx.doi.org/10.32598/hdq.10.2.38.5>

<http://dx.doi.org/10.32598/hdq.10.2.38.5>

Article info:

Received: 04 Dec 2023

Accepted: 29 Jul 2024

Available Online: 01 Jan 2025

ABSTRACT

Background: Emergency medical technicians (EMTs) should have good socioeconomic status and health status so that people in need can benefit from their services. The present study aims to measure the biopsychosocial health of EMTs in Tehran, Iran.

Materials and Methods: This is a descriptive cross-sectional study. The study population consists of the EMTs from six regions of Tehran, Iran. Of these, 563 EMTs were included in the study. Stueck et al.'s health cube battery (HCB) tool, which has six domains of individual resources, external resources, workload, stress consequences, biocentric performance, and socioeconomic status, was used to collect data online. The physiological reactions (blood pressure, pulse rate, and oxygen saturation) were assessed based on three levels of socioeconomic status (low, moderate, and high). The data analysis was performed in Excel and SPSS software, version 22.

Results: The mean age of participants was 31.88±43.6 years, and their mean work experience ranged from 1 to 30 years (mean=14.7±73.5 years). The mean score for biocentric performance was higher than that of other domains. The mean levels of physiological reactions were within the normal range. Overall, 50% (n=281) had moderate socioeconomic status. There was no significant difference in terms of physiological conditions among the three socioeconomic groups.

Conclusion: The EMTs with better socioeconomic status have better performance and physiological status. There is a need for more attention to the socioeconomic status of EMTs in Tehran, which has a direct impact on their performance and an indirect effect on their physiological health.

Keywords:

Health status, Socioeconomic status, Performance, Emergency medical technicians (EMTs)

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Introduction

Given the broad scope of health, its determinants are also diverse and include genetic, personal, environmental, lifestyle, and service quality factors [1]. Age, gender, job, social class, nutrition status, etc. play an important role in the health and well-being of people. Choosing a particular job often exposes individuals to risk factors of diseases tailored to the selected job. In addition, it indirectly affects social class, nutrition, housing status, and other activities of the person [1]. Most of people spend at least one-third of their life at work [2]. A person's job has a role in shaping his/her social identity, meeting the needs in life, and creating social relationships. Changes in employment status, salary, benefits, position, etc. can put pressure on and cause stress and anxiety in individuals [3]. One of the fundamental problems that has arisen in recent decades due to the modernization of lifestyle, increased competition, and changes in occupational relationships is occupational stress. It is associated with reduced job satisfaction, anxiety, fatigue, depression, insomnia, errors, lack of concentration and calmness, difficulty thinking and decision-making, and serious physical problems in individuals [4]. Absenteeism, reduced job commitment, decreased performance and efficiency, increased incidence of accidents and unsafe work practices, increased complaints, and negative effects on employee recruitment are among the effects of occupational stress on the organization [5].

Pre-hospital emergency is one of the most stressful areas of the health system [6]. Occupational stress can negatively affect the health and well-being of emergency medical technicians (EMTs). They are often exposed to high levels of work-related stressors and traumatic situations. One of the main stressors for EMTs is high workload or work pressure. They have to make quick decisions to save the lives of injured people. The unpredictable nature of emergency calls, long working hours, and lack of breaks can also contribute to high occupational stress level in EMTs. In addition, they may face violent behaviors and critically ill patients and their families and witness distressing scenes, which can have a negative impact on their mental health. Moreover, shift work and irregular working hours can disrupt their sleep patterns and contribute to fatigue and exhaustion [7].

Adequate health levels, as well as a low level of occupational stress, can definitely reduce the incidence of occupational hazards [8]. Therefore, assessing the risk of occupational stress and its management is important

to reduce the adverse psychological consequences of occupational stress [9]. Several studies have identified the effects of trauma and occupational stress on the mental health of EMTs [10-13]. It has been demonstrated that organizational and occupational factors such as workload, job tasks, work shifts, little time to rest, and organizational supervision have a negative impact on EMTs [14-16]. For example, a study in Brazil showed that 90% of EMTs had emotional fatigue [17]. A study in Sweden showed that uncertain conditions of pre-hospital emergency services led to stress in EMTs [18]. In a study in the United States, EMTs perceived that life-threatening clinical conditions such as respiratory, cardiac, and trauma problems in children cause stress and anxiety in them [19]. In Iran, there are also studies on the stress level of EMTs. For example, Iranmanesh et al. in 2013 showed that 94% of EMTs had moderate post-traumatic stress disorder [20]. Delshad et al., in 2021, reported that biopsychosocial, occupational, and behavioral factors can affect the health of EMTs [1]. It is obvious that individuals who provide pre-hospital emergency services should be healthy in terms of biopsychosocial aspects so that patients can benefit from their quality services [21]. Addressing the occupational stress of EMTs is essential, not only for their own health and well-being but also for the effective delivery of emergency medical services to the patients. Therefore, this study aims to evaluate the biopsychosocial health of EMTs.

Methods

This is a descriptive cross-sectional study. The study population consists of the EMTs from six regions of Tehran, Iran, including north (n=266), south (n=334), east (n=312), west (n=363), central (n=286), and suburban (n=84) (total number=1645). Convenience sampling was used for selecting participants. The data collection tool was the health cube battery (HCB) developed by Stueck et al. based on the bio-centric health management model [22]. It is a self-assessment tool with 126 items for psychobiological risk assessment with domains of individual resources, external resources, workload, stress consequences, bio-centric performance, physiological reactions, and socioeconomic status. Since all participants were professionals with at least a university degree and had medical equipment for emergency services, their physiological reactions (e.g. blood pressure, pulse rate, and oxygen saturation) were self-assessed based on the guidelines. The calibration of assessment devices was done during field visits with the help of an emergency medical services supervisor, and the measurement of symptoms was assessed with the help of the emergency

Table 1. Reliability test results (internal consistency and test re-test reliability) for each domain of the Persian HCB

Subscale	No.	Cronbach's α	ICC	95% CI	
				Upper Bound	Lower Bound
Individual resources	11	0.74	0.71	0.85	0.42
External resources	8	0.77	0.83	0.91	0.67
Workload	9	0.7	0.81	0.91	0.6
Stress consequences	22	0.89	0.8	0.89	0.6
Biocentric performance	64	0.89	0.78	0.92	0.1
Biocentric Borders`	9	0.89	0.86	0.93	0.72
Socioeconomic status	3	0.71	0.83	0.91	0.67

ICC: Intraclass correlation coefficient.

department and the managers from different regions and health centers. The HCB questionnaire was first translated using the forward-backward method based on the World Health Organization's (WHO) translation and adaptation guideline [23]. Then, its face validity was assessed based on the opinions of 10 EMTs, and the content validity was assessed based on the opinions of 36 experts in pre-hospital emergency medical services, including psychologists, psychiatrists, psychiatric nurses, and emergency and disaster specialists. They were asked to assess the clarity, understandability, and necessity of each item. The necessity of each item was assessed based on a 3-point Likert scale (necessary, useful but not necessary, not necessary). The items with a content validity ratio (CVR) of <0.36 (according to the Lawshe table [24]) were excluded. Table 1 presents the results for internal consistency and test re-test reliability of the Persian version of HCB. The data analysis was performed in Excel and SPSS software, version 22.

Results

The study population consists of 585 EMTs aged 20-60 years. The mean age of the population was 31.88±43.6 years, and the mean work experience in the emergency department was 14.7±73.5 years. As shown in Table 2, most of them were from the central region (40.9%), had an associate degree (59.5%), with an EMT/paramedics field of study (85.1%), and were ambulance drivers (65.3%), and male (97.9%). Of 585 people, the females and operational managers, administrative staff, air rescuers, and dispatchers (n=22) were excluded from the study. Finally, data from 563 were used in the data analysis.

As shown in Table 3, the mean score of the biocentric performance was higher than other domains. The mean scores of other domains were also higher than the average. However, in the domain of biocentric boundaries, the score was below average. As shown in Table 4, the mean levels of physiological conditions were within the normal range.

Table 5 presents the descriptive values of physiological conditions based on three levels of socioeconomic status (low, moderate, and high). Overall, 50% of the participants reported moderate socioeconomic status, and there was no significant difference in terms of physiological conditions among the three socioeconomic groups, although there were noticeable differences in the minimum and maximum values.

Discussion

In the present study, the health status and socioeconomic conditions of EMTs in Tehran, Iran, were investigated. According to the findings, half of them had a moderate socioeconomic status. Those with higher socioeconomic status had higher performance and better physiological conditions.

In Nino et al.'s study in 2020 on the socio-psychological conditions of healthcare workers, it was reported that healthcare workers had different physical, psychological, social, biological, and individual characteristics. Factors such as increased mental workload, job fatigue, and lack of communication had negative effects on healthcare workers' socio-psychological conditions [25]. Adam et al. in 2015, using an interpretative phenomenological analysis of stress and social health levels

Table 2. Demographic characteristics of the study population

Demographic Characteristics		No. (%)
Region	North	60(10.4)
	South	139(24.1)
	Center	236(40.9)
	East	50(8.7)
	West	72(12.5)
	Suburb	20(3.5)
	Educational level	High school diploma
Associate degree		348(5.59)
Bachelor’s degree		196(5.33)
Masters’ degree		14(4.2)
PhD		2(3)
Field of study	Nursing	36(2.6)
	EMT/Paramedics	498(1.85)
	Anesthesia technician	18(1.3)
	Nurse assistant	1(2)
	First responder	26(4.4)
	Other	6(1)
Organizational position	Ambulance driver	382(3.65)
	Motor lance	165(2.28)
	Air rescuer	7(2.1)
	Operational manager	16(7.2)
	Others (administrative staff, dispatcher, etc.)	15(6.2)

Table 3. The mean score of the HCB subscales

Variables	Mean±SD	Min	Max
Individual resources	91.32±46.5	13	48
External resources	81.27±58.5	12	40
Workload	80.36±96.4	22	50
Stress consequences	08.108±50.37	20	195
Bio-centric performance	98.198±66.16	115	252
Socioeconomic status	28.18±58.4	3	30

Table 4. The mean levels of physiological conditions

Variables	Mean±SD	Min	Max
Systolic blood pressure (mm Hg)	119.51±9.93	80	200
Diastolic blood pressure (mm Hg)	81.02±13.2	50	140
Heart rate (bpm)	82.11±12.18	50	185
Oxygen saturation level (%)	97.01±2.05	70	99

in EMTs [26], and Coxon et al in 2016, by examining the experiences of emergency operations center personnel, found that the nature of fast-paced work and job demands does not allow technicians to have physical rest and analyze incidents, which creates a vicious cycle for responders, ambulance clinical staff [27], ambulance volunteers, and dispatch personnel, resulting in an undesirable balance between work and life and poor recovery after shifts [28].

The main physical concern reported by EMTs is musculoskeletal injuries, especially back pain, due to patient handling and working in challenging environments. Other health concern is communicable diseases, which are more common in inexperienced staff. Some studies have reported that due to shift work and lack of exercise facilities in the workplace, EMTs find it difficult to maintain or improve their physical health and nutrition [29, 30], which is somewhat consistent with the present study. Most of the EMTs in our study had a moderate socioeconomic status. A study conducted in 2009 by Takeyama

et al. in Japan showed that a modified ambulance night shift system can reduce fatigue and improve the physiological function of EMTs [31]. Their results are not consistent with the results of the present study, may be due to difference in the assessment of the function variable. In this study, the function was assessed using a self-report tool, whereas Takeyama et al. [31] measured the physiological function.

Several studies have confirmed the importance of systolic and diastolic blood pressure as physiological variables associated with health risks [32-35]. The fatigue and stress in healthcare workers can have a negative impact on their physical and mental health. Operational factors such as performance indicators, allocations, operational standards, response time, and expectations are factors that need to be managed by EMTs in addition to clinical roles and daily challenges [28]. Most studies on the sociopsychological conditions and resilience of EMTs have shown the effects of occupational stress. The EMTs use some strategies to cope with their work-

Table 5. The mean levels of physiological conditions based on socioeconomic status

Socioeconomic Status		Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Heart Rate (bpm)	O ₂ Saturation (%)
Low (n=141, 25.1%)	Mean±SD	119.94±9.71	81.75±14.01	84.07±14.25	96.88±2.03
	Min	90	60	50	82
	Max	160	140	185	99
Moderate (n=281, 50%)	Mean±SD	119.07±10.8	80.82±13.51	81.46±11.55	97.01±2.13
	Min	80	50	53	70
	Max	200	140	150	99
High (n=140, 24.9%)	Mean±SD	120.22±7.7	80.35±11.16	81.43±11.02	97.16±1.89
	Min	100	60	58	80
	Max	150	130	121	99

BP: Blood pressure.

related problems. One strategy used is the compartmentalization or segmentation of events and associated emotions to manage emergency demands and provide emergency services, which may be effective in the short term but may have negative effects in the long term (e.g. emotional distancing from the patient). Avoidance and information-seeking strategies are often used by nurses to regain a sense of control and manage demands [35].

The effects of occupational stress on the biopsychosocial health of EMTs can have an impact on their relationships with others. According to studies, stress is associated with individual characteristics. Evaluating stress and individual characteristics is essential for developing stress management programs. The EMTs are often faced with critical situations. Their emotional, cognitive, and behavioral responses to events are different before and after such situations [36]. Delshad et al. in 2021 showed that health management, biopsychosocial, occupational, and behavioral factors can affect the promotion of EMTs [1]. The EMTs and their families are under sociopsychological pressure. There should be a balance between work and receiving proper support and training for health management. Their study are consistent with the present study in terms of the necessity of examining sociopsychological factors and their impact on EMTs' health.

Conclusion

The EMTs with better socioeconomic status can have better performance and physiological health. This highlights the need for more attention to the economic and social concerns of emergency workers, as it is considered an investment and not an expense. This investment has a direct impact on employee performance and indirect effects on their health, as well as costs such as sick leave, treatment, and replacement of workforce. It naturally affects the overall health of the community receiving emergency services.

Limitations

Due to the COVID-19 pandemic, it was not possible to assess all physiological variables. The physiological variables were assessed by a self-report tool, which was another limitation of the study. However, these limitations were partially controlled due to the large sample size and the use of standard operating procedures and random evaluations. This study was conducted in the Emergency Department of Tehran, with a high number and diversity of personnel. Given the impact of ethnicity, culture, climate, and location, it is recommended

that further studies be conducted on more biological and physiological factors in different ethnic groups in Iran.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the [University of Social Welfare and Rehabilitation Sciences](#), Tehran, Iran (Code: IR.USWR.REC.1398.145).

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

Conceptualization: Hamidreza Khankeh, Abbas Ebadi, Mariola Bidzan and Marcus Stueck; Methodology: Hamidreza Khankeh, Abbas Ebadi, Gholamreza Ghaedamini Harouni and Marcus Stueck; Software: Vahid Delshad, Abbas Ebadi, and Gholamreza Ghaedamini Harouni; Validation: Vahid Delshad and Hamidreza Khankeh; Investigation, data curation and writing: Vahid Delshad; Visualization: Vahid Delshad and Mariola Bidzan; Formal analysis: Vahid Delshad and Abbas Ebadi; Supervision and project administration: Hamidreza Khankeh, Mariola Bidzan, and Marcus Stueck

Conflict of interest

The authors declared no conflicts of interest.

Acknowledgments

The authors would also like to extend their appreciation to the staff of Pre-Hospital Emergency Medical Services at Tehran.

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