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The impact of suicide rates on admissions to emergency medical services and the role of education and employment

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ABSTRACT

Objectives: In this research, it was aimed to evaluate the impact of suicide rates on admissions to emergency medical services (EMS) and the role of education and employment.

Methods: In the research, the Ministry of Health of the Republic of Turkey parameter of cases per EMS between 2002 and 2022, deaths due to suicide, education and employment data from the World Bank Turkey Report were used.

Results: Mean cases per EMS in Türkiye for 2002-2022 time period had 1,512.30±560.82 (range: 653-2,428). Mean suicide mortality range was 2.51±0.32 (range: 2.20-3.20). Mean school enrollment rates were 95.45±2.70 ranged from 87.90 to 98.52. Mean employment rate was 44.08±2.12 (range: 41.15-47.37). Cases per EMS was significantly correlated with suicide mortality (r=-0.777; P<0.01), school enrollment (r=-0.832; P<0.01) and employment rate (r=0.704; P<0.01). Year controlled partial correlation analysis results showed that there was a significant correlation between cases per EMS and employment rate (r=0.653; P<0.01). School enrollment and employment on cases per EMS, effect of suicide mortality on cases per EMS was statistically significant (B=-2121.23; P<0.01). Effects of school enrollment and employment on cases per EMS were insignificant (P>0.05).

Conclusions: EMS units are very effective in reducing suicide mortality rates at both the correlation and regression levels. This effectiveness is similar across different education and employment groups. To reduce suicide mortality, it is necessary to focus on EMS access rather than EMS effectiveness.

Keywords: Emergency medical services, suicide, education, employment

Emergency services or Emergency Medical Services (EMS) are public units that have very important functions in terms of public health [1]. The fact that patients in emergency departments are in a position that requires acute and urgent intervention shows that the services provided there are not only a public health service, but also a human right to life [2, 3]. For this reason, the use of EMS has been the subject of both field studies and many scientific research from past to present [4, 5]. The common point of these studies is the increase of EMS effectiveness and at the same time the reduction of the population falling under EMS [6, 7]. For this, it is necessary to focus on diseases and health conditions related to EMS.

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One of the issues related to individuals' right to life within the social structure is suicide cases [8, 9]. Although suicide is seen as an individual ending his life voluntarily, since individuals who commit suicide generally do not have a healthy mental state, suicide is actually a result of an illness, not a decision made by individuals [10, 11]. Suicide events may not always result in death. With early intervention, it may be possible to intervene and protect the lives of individuals who commit suicide. Studies on the causes of suicide in the literature mostly examine the reasons for suicide under headings such as adolescence, family and relationship problems, and financial problems [12, 13]. However, regardless of the reason, it can be stated that individuals have an unhealthy mental state in common with all suicides. In terms of the health system, early intervention is an issue that is more emphasized than the causes of suicide cases. Because the causes of suicide vary widely, a multidisciplinary study and evaluation is needed to find the causes and early diagnosis. In today's increasingly multidisciplinary studies, the reflection of the causes of suicide cases on the healthcare system is a subject of interest. The two most important factors in suicide cases in a social sense are education and employment, which are indicators of economic status and also indicators of individual identity [14, 15]. Although studies have been conducted on suicide cases, studies on suicides by EMS are not sufficient. Therefore, this study aimed to analyze multivariately the relationship between the number of cases in emergency departments and suicide-related mortality and the effects of education and employment on this relationship [16, 17].

METHODS

Research Model

The research was designed with a mixed model, including descriptive scanning and relational scanning models. Based on this model, in the first stage, cases per EMS, morale due to suicide, education and employment rates were depicted for Türkiye. Then, the relational screening model was used to investigate the relationships between the variables.

Data Set

In the research, the Ministry of Health of the Republic of Turkiye parameter of cases per EMS between 2002 and 2022, deaths due to suicide, education and employment data from the World Bank Turkey Report were used. Parameters used in the research were given as below:

Variables

Dependent variable was sases per emergency service-Ministry of Health statistics. Independent variable was suicide mortality rate (per 100,000 population). Controlling variables were school enrollment, primary (% net) employment to population ratio, 15+, total (%) (modeled ILO estimate).

Statistical Analysis

Research data were described with mean, standard deviation, median and range values. Kolmogorov Smirnov test was used for normality test of research parameters. Pearson's and year-controlled partial correlation analyzes were used for relationships between variables. Due to linearization biases [19, 20], Linear Model with logit transformation to non-normal parameter in the model analysis was used. In this study, Pearson correlation, year controlled partial correlation and the General Linear Model were used. To identify the basic correlations between variables, Pearson correlation was used; however, to determine the actual relationship between the independent variables and EMS admissions, the effect of the year variable was controlled through partial correlation analysis. Furthermore, the General Linear Model (GLM), which is also used in other similar studies, was employed to examine linear relationships among variables. All analyzes were carried out in SPSS 25.0 for windows program, with a 95% confidence interval and a 0.05 significance level.

RESULTS

Mean cases per EMS in Türkiye for 2002-2022 time period had 1,512.30±560.82 (range: 653-2,428). Mean suicide mortality range was 2.51±0.32 (range: 2.20-3.20). Mean school enrollment rates were 95.45±2.70 ranged from 87.90 to 98.52. Mean employment rate was 44.08±2.12 (range: 41.15-47.37). (Table 1). Pearson correlation analysis results showed that cases per EMS was significantly correlated with suicide mortality (r=-0.777; P<0.01), school enrollment (r=-0.832;

Table 1. Cases per EMS, suicide mortality, school enrollment and employment rates for Türkiye for 2002-2022 time period

	Mean±Standard Deviation	Median (Minimum-Maximum)
Cases per EMS	1,512.30±560.82	1,651.00 (653.00-2,428.00)
Suicide mortality, (per 100,000 population)	2.51±0.32	2.40 (2.20-3.20)
School enrollment, primary (% net)	95.45±2.70	95.72 (87.90-98.52)
Employment rate, 15+, total (%) (modeled ILO estimate)	44.08±2.12	44.71 (41.15-47.37)

EMS= emergency medical services, ILO=international labour organization

P<0.01) and employment rate (r=0.704; P<0.01). Year controlled partial correlation analysis results showed that there was a significant correlation between cases per EMS and employment rate (r=0.653; P<0.01) (Table 2). According to General Linear Model for effects of suicide mortality, school enrollment and employment on cases per EMS, effect of suicide mortality on cases per EMS was statistically significant (B=-2121.23; P<0.01). Effects of school enrollment and employment on cases per EMS were insignificant (P>0.05) (Table 3).

DISCUSSION

In this study, the relationship between EMS headcount and suicide deaths and the role of education and employment in this relationship were analyzed. In the study, using data from the Turkish Ministry of Health and the World Bank, it was seen that the relationship between people per EMS and suicide-related mortality was statistically significant and negative. It was revealed that the effect of control variables, education and employment, was significant in the correlation analysis, but statistically insignificant in the regression analysis [18, 19]. EMSs are one of the most socially important units within a healthcare system. The lives of individuals are a constitutional and inherent right, a value above countries and societies [20, 21]. EMS units, on the other hand, are the units with the highest number of positions and positions related to individuals' rights to life within the healthcare system [22, 23]. In this regard, EMS units are of vital importance both in protecting vital health conditions and in reducing the negative effects of advanced health problems in the acute phase. Suicide cases are one of the most important issues in the health services provided by EMS units. Suicide is a behavior in which individuals want to end their lives voluntarily, but usually unconsciously or due to a different illness such as depression [24, 25]. The approach to suicide cases in emergency departments generally varies depending on the type of suicide, its degree, its effects and the patient's current physical examination. Although suicide cases committed by methods such as poisoning, taking drugs, cutting arms and wrists generally have lower mortality in

Table 2. Pearson and year controlled correlation analysis results for relationship between cases per EMS, suicide mortality, school enrollment and employment rate

	Pearson's correlation		Year controlled partial	
	r	P value	r	P value
Suicide mortality, (per 100,000 population)	-0.777**	0.000	0.164	0.559
School enrollment, primary (% net)	-0.832**	0.000	-0.282	0.309
Employment rate, 15+, total (%) (modeled ILO estimate)	0.704**	0.001	0.653**	0.008

EMS= emergency medical services, ILO=international labour organization
**P<0.01

Table 3. General linear model for effects of suicide mortality, school enrollment and employment on cases per EMS

	Unstandardized coefficients		Standardized coefficients	t	P value	95.0% confidence Interval for B	
	B	Std. error	Beta			Lower bound	Upper bound
(Constant)	204.62	3187.00		0.06	0.950	-6739.25	7148.49
Suicide mortality	-2121.23	342.46	-0.532	-6.19	0.000	-2867.38	-1375.08
School enrollment	-19.78	23.29	-0.11	-0.85	0.412	-70.52	30.96
Employment	113.75	27.99	0.49	4.06	0.002	52.76	174.75

EMS= emergency medical services

the early period, the time until admission to EMS units is of vital importance in these suicides [26, 27]. In general, the World Bank and the World Health Organization do not separate suicides according to their causes and effects, but rather according to their mortality levels.

Although there are no sufficient studies in the literature on the relationship between suicide and EMS, it can be stated that suicide rates in general will cause lower mortality with EMS intensity, use and effectiveness. In our study, there was a statistically significant and negative relationship between person per EMS and suicide-related mortality in Turkey. This shows that mortality decreases statistically significantly in suicide cases that are referred to EMS units and that EMS units work effectively in suicide cases. On the basis of the findings, it seems that EMS density is negatively correlated with suicide related deaths. However, this study is only cross correlational and does not establish causality. The relationship between the presence of EMS and lower suicide mortality rates may be confounded by other socioeconomic and health policy factors. Therefore, for defining the specific function of EMS in suicide prevention, longitudinal or experimental research is required. Studies are not clear on whether education is a significant factor among the factors affecting suicide cases. Highly educated people may also have high levels of depression and high suicidal tendencies. However, it is possible to state that the relationship between economic income and suicide is negative. In general, suicide rates also increase in individuals with low income and problems making ends meet. In terms of emergency service use, as employment increases, the use of EMS will also increase, as reasons such as work accidents and similar reasons and getting reports will increase. As education increases, individuals will become more conscious, more sensitive about health, and as a result, EMS applications will decrease. This was also valid in our study, and there was a statistically significant and negative relationship between EMS use and schooling. The relationship between employment and EMS use was statistically significant and positive. It is possible to state that, in general, the findings are compatible with the literature and expectations. Regression analysis results showed that the effect of deaths by suicide on EMS use was statistically significant, but the contribution of education and employment was not significant. Although there may be many reasons for this situation, it is possible to state that if applied to EMS units, a positive and mortality-reducing intervention is made to suicide cases, and this is applied to all education and employment groups.

Limitations

The most important limitation of the study is that the data on suicide rates applying to EMS units is not sufficient and therefore, general population suicide mortalities are used. Although this situation is insufficient to fully reveal the effectiveness of EMS units on suicide, it is a tolerable limitation since the study is a pioneer in the field. This study is based on suicide rates from the general population and does not involve direct collection of data from EMS admitted suicide cases. Therefore, the results of this study do not allow for a definitive conclusion regarding the direct effect of EMS interventions on suicide cases. Future work

should also concentrate on collecting more detailed information about suicide attempts that are admitted to EMS. Another important limitation of the research is the limited data set. Research data has been compiled since 2002, but even in 2024, the latest data for 2021 could be accessed. The last data collected for this study was in 2021. At the time of writing, the latest up to date data was not readily available hence the study might not be up to date with the current situation. This shows that there is a need for better and more timely sharing of data by the relevant public institutions. The Ministry should focus on ensuring more effective, rapid and effective data sharing in this regard. One major limitation of this study is that there is no direct data on suicide cases admitted to EMS. Instead, general suicide mortality rates were used. Future studies should utilize direct EMS records and individual case data to better assess the impact of EMS on suicide cases.

Contributions of the Research to the Field and Literature

The most important contribution of the research to the field is that it shows that the effectiveness of EMS units in suicide cases is sufficient, and that ensuring access to EMS units is important rather than EMS intervention effectiveness. In this regard, research results are important in terms of providing data and resources to the field. The contribution of the research to the literature is that it is among the pioneering studies in this field and provides guidance on issues that are not much mentioned in the literature. Although there are limited studies on EMS density and suicide cases, there are not enough studies examining suicide mortality together with education and employment.

CONCLUSION

According to the results obtained in the study, EMS units are very effective in reducing suicide mortality rates both at the correlation level and at the regression level. This effectiveness is similar across different education and employment groups. To reduce suicide mortality, it is necessary to focus on EMS access rather than EMS effectiveness.

Ethical Statement

The primary reason for not obtaining ethical approval in this study is that the data used were entirely sourced from publicly available and reliable sources. The data used in the study were obtained from the Ministry of Health of the Republic of Turkey and the World Bank Turkey Report. These sources provide publicly accessible statistical data available to everyone. Additionally, the study did not use individual patient data or personal information, nor did it involve experimental applications requiring direct contact or intervention with individuals. All statistical data analyzed in the study are anonymized, and it is impossible to identify any individual's identity. According to national and international ethical guidelines, ethical approval is mandatory only for studies involving the processing of personal data, biomedical interventions, or direct human participants. Since only public databases were used in this study, ethical approval was not required. Furthermore, scientific neutrality and ethical standards were strictly adhered to during the research process, and there were no commercial, financial, or personal conflicts of interest that could influence the outcomes of the research.

Authors' Contribution

Study Conception: EB; Study Design: EB; Supervision: EB; Funding: EB; Materials: EB; Data Collection and/or Processing: EB; Statistical Analysis and/or Data Interpretation: EB; Literature Review: EB; Manuscript Preparation: EB and Critical Review: EB.

Conflict of interest

The author disclosed no conflict of interest during the preparation or publication of this manuscript.

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Editor's note

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