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Call-outs for Pre-hospital Emergency Health Services and Determination of Factors Associated with case Outcomes in Türkiye: Analysis of the Pre-Pandemic Five-Year Period

Türkiye'de Hastane Öncesi Acil Sağlık Hizmetleri Başvuruları ve Vaka Sonuçları ile İlişkili Faktörlerin Belirlenmesi: Pandemi Öncesi Beş Yıllık Dönem Analizi

Neriman NALDÖKEN[1], Deniz ACUNER[2]

ABSTRACT

The aim of the research is to determine the frequency of use of pre-hospital emergency health services by region in Turkey, to compare them according to some variables, and to determine the factors associated with case outcomes. Since the use of emergency healthcare services showed extraordinary differences during the pandemic period, the five-year period before the pandemic was examined.

For this purpose, secondary data received from the General Directorate of Emergency Health Services of the Ministry of Health were grouped according to the statistical region classification of TÜİK; The frequency of use of emergency health services by region and year was examined, the case frequency was compared according to some variables (age, gender, reason for call, crime scene, preliminary diagnosis, case outcome) and the case results (death, transfer, on-site intervention) were compared according to some variables (number of personnel), number of ambulances, number of station, case age group, call reason, crime scene) were determined. Independent sample t test, independent sample one-way analysis of variance and correlation analysis were used in the research.

As a result of the research; It has been determined that the frequency of pre-hospital emergency cases is increasing, and cases that are over 60 years old, due to illness, occurring at home and resulting in transplantation are encountered more frequently. Additionally, a negative relationship was found between the number of emergency medical stations, the number of ambulances and the number of paramedics/EMTs and the fatality of cases. It has been determined that the location of the emergency incident and the reasons for the call are also related to the outcome of the incident. In this context, it is recommended to increase pre-hospital emergency health services resources (emergency aid station, ambulance, health manpower) in terms of quality and quantity.

Keywords: Pre-hospital Emergency Health Services, Outcomes of Emergency Cases, Frequency of Emergency Cases, Distribution of Emergency Cases.

ÖZET

Araştırmanın amacı, Türkiye'de hastane öncesi acil sağlık hizmetlerinin bölgelere göre kullanım sıklığının belirlenmesi, acil çağrıların bazı değişkenlere göre karşılaştırılması ve vaka sonuçları ile ilişkili faktörlerin saptanmasıdır. Pandemi döneminde acil sağlık hizmetlerinin kullanımı sıra dışı bir farklılık gösterdiğinden pandemi öncesindeki beş yıllık dönem incelenmiştir.

Bu amaçla Sağlık Bakanlığı Acil Sağlık Hizmetleri Genel Müdürlüğünden alınan ikincil veriler TÜİK'in istatistiksel bölge sınıflamasına göre gruplandırılmış; acil sağlık hizmetlerinin bölgelere ve yıllara göre kullanım sıklığı incelenmiş, vaka sıklığı bazı değişkenlere göre (yaş, cinsiyet, çağrı nedeni, olay yeri, ön tanı, vaka sonucu) karşılaştırılmış ve vaka sonuçlarının (ölüm, nakil, yerinde müdahale) bazı değişkenler (personel sayısı, ambulans sayısı, istasyon sayısı, vaka yaş grubu, çağrı nedeni, olay yeri) ile ilişkisi belirlenmiştir. Araştırmada bağımsız örneklem t testi, bağımsız örneklem tek yönlü varyans analizi ve korelasyon analizi kullanılmıştır.

Araştırma sonucunda; hastane öncesi acil vaka sıklığının giderek arttığı, 60 yaş üstü, hastalık nedenli, evde oluşan ve nakille sonuçlanan vakalarla daha sık karşılaşıldığı belirlenmiştir. Ayrıca, acil sağlık istasyonu sayısı, ambulans sayısı ve paramedik/ATT sayısı ile vakaların ölümle sonuçlanması arasında negatif yönlü ilişki bulunmuştur. Acil vakanın oluş yeri ve çağrı nedenlerinin de vaka sonuçları ile ilişkili olduğu belirlenmiştir. Bu kapsamda hastane öncesi acil sağlık hizmetleri kaynaklarının (acil yardım istasyonu, ambulans, sağlık insan gücü) nitelik ve nicelik açısından artırılması önerilmektedir.

Anahtar kelimeler: Hastane Öncesi Acil Sağlık Hizmetleri, Acil Vaka Sonuçları, Acil Vaka Sıklığı, Acil Vakaların Dağılımı.

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1 Dr., Neriman NALDÖKEN, Sağlık Yönetimi, Gençlik ve Spor Bakanlığı Sivas Tecer Yurt Müdürlüğü, nerimannaldoken@hotmail.com, ORCID: 0000-0003-2749-4146

[2] Dr. Öğr. Üyesi, Deniz ACUNER, Sağlık Yönetimi, Işık Üniversitesi MYO İlk ve Acil Yardım Programı, e-posta, ORCID: 0000000215077049

İletişim / Corresponding Author: Neriman NALDÖKEN

e-posta/e-mail: nerimannaldoken@hotmail.com

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INTRODUCTION

All people have constitutional rights to benefit from health services and to have their health rights protected. It can be said that the state bears responsibility for the use of this right. Situations in which the state is obliged to do so are; providing the necessary health services, establishing health institutions that will provide health services and supervising this system.[1]

Throughout life, human health always faces various dangers and risks due to the development of unexpected situations. Negative situations that usually occur suddenly require a quick and conscious intervention. Such interventions, applied correctly and on time, are of vital importance in ensuring that human health is affected by negative situations with minimal damage. Effective and timely intervention of expert teams in traffic accidents, earthquakes, terrorist attacks and similar emergencies is of great importance in taking the situation under control and protecting human health. For this reason, emergency health services are in a very important position for public health.[2]

Emergency Health Services is a public health service that helps the patient maintain his or her vital functions with emergency care at the scene and safely transports the patient to the emergency room as soon as possible, in cases such as illness or injury that threaten the vital functions of the individual and require urgent intervention.[3] Emergency medical aid includes the intervention provided by healthcare professional teams using the necessary medical tools, equipment and medications. All of these services provided to sick individuals in need of Basic Life Support and Advanced Life Support are defined as emergency treatment.[4]

Emergency health services; As a form of delivery of health services, it is the provision of emergency care to people who need emergency/immediate assistance in case of emergency, disease or accident in the pre-hospital area and ensuring their successful transfer to the clinic. As one of the basic building blocks of today's health systems, the main purpose of these services is to reduce the mortality rates, especially due to major injuries, chronic diseases and acute health problems. While in the past, infectious diseases were among the causes of mortality and morbidity worldwide, today, in parallel with technological developments, the leading causes of adult death in developed or developing countries are cardiovascular diseases, trauma and accidents, chronic diseases such as cancer, and suicide cases. Pre-hospital emergency health services are of great importance in reducing the death rates due to sudden injuries and chronic diseases, therefore, the importance given to these services is increasing in the world and in Türkiye.[5]

Emergency health services refer to a form of healthcare delivery that involves providing immediate care in pre-hospital settings to individuals in need of urgent assistance due to emergencies, illnesses, or accidents, and ensuring their successful transportation to a clinic. One of the fundamental cornerstones of modern healthcare systems is to primarily aim at reducing mortality rates and ratios attributed to major injuries, chronic illnesses, and acutely occurring health issues. In the past, infectious diseases were among the leading causes of mortality and morbidity across the world. However, today, in tandem with technological advancements, developed or developing countries are now experiencing leading causes of adult mortality such as cardiovascular diseases, traumas and accidents, chronic illnesses like cancer, and cases of suicide. Pre-hospital emergency healthcare services play a crucial role in reducing mortality rates and ratios due to sudden-onset injuries and chronic illnesses, so the importance attributed to these services is increasing both globally and in Turkiye.[5]

Türkiye; It is a country where many emergencies such as earthquakes, floods, accidents and emergency distribution are common.[6] For these reasons, the structure of the organization of emergency health services will be of great importance systematically and permanently. It is obvious that death and

disease rates will decrease with the effective and efficient operation of the emergency health system.

The importance of this study aims to determine the regional differences in the use of pre-hospital emergency healthcare services, to determine the relationship between the use of emergency healthcare services and the reasons for admission and case outcomes and to make recommendations on correct and effective use.

The aim of the research is to determine the frequency of use of pre-hospital emergency health services by region in Turkey, to compare them according to some variables, and to determine the factors associated with case outcomes.

MATERIALS AND METHODS

Research type

The study is retrospective, descriptive and relationship-seeking.

Research population and sample

The population of the research comprises pre-hospital emergency healthcare service data from all over Turkiye. No specific sampling method was employed in the study, and data from the years between 2014 and 2019 were utilized. Considering that the COVID-19 pandemic, which began in early 2020, affected Turkiye starting from March 2020, it was deemed that including the data from 2020 in the study might lead to distortions, and therefore, the data from 2020 was not included in the analysis.

In order to facilitate planning at national or regional level, the Nomenclature of Territorial Units for Statistics (NUTS) was created in accordance with the Decision of the Council of Ministers published in the Official Gazette No. 24884 dated 22 September 2002.[7]

As in many areas, resource planning and allocation for the provision of health services are also made taking this classification into account.

After receiving data from the General Directorate of Emergency Health Services of the Ministry of Health for the research, they were grouped according to TURKSTAT's NUTS. TURKSTAT NUTS list is shown in Table 1.

Table 1. Regions Of Provinces According To TURKSTAT NUTS

Code	Level 1
TR1	İstanbul
TR2	West Marmara
TR3	Aegean
TR4	East Marmara
TR5	West Anatolia
TR6	Mediterranean
TR7	Central Anatolia
TR8	West Black Sea
TR9	East Black Sea
TR10	Northeast Anatolia
TR11	Middle East Anatolia
TR12	Southeast Anatolia

Research materials and data collection method

The material used in the research consists of secondary data. The data of the study were obtained from the database created by the field teams, under the coordination of the General Directorate of Emergency Health Services of the Ministry of Health, by transferring the forms they filled out to the Ministry system. These data were initially obtained in their original form and then regrouped to be suitable for TURKSTAT NUTS.

Research variables

The analyses conducted within the scope of the research and the selected variables for these analyses consist of two parts. In the first part, the disparities in emergency healthcare services in Turkiye were analyzed based on these variables, while in the second part, the relationship between the variables and case

outcomes was examined. The variables of the research are given in Table 2.

Table 2. Research Hypotheses, Variables, And Analysis Methods.

Research Hypotheses	Variables		Analysis Methods
H1: There is a statistically significant difference in the use of pre-hospital emergency healthcare services in Turkiye with respect to the selected variables.	• The distribution of cases by gender as a percentage of the total cases • The distribution of cases by age groups as a percentage of the total cases • The distribution of cases by reasons for emergency calls as a percentage of the total cases • The distribution of cases by case location as a percentage of the total cases • The distribution of ambulance team pre-diagnoses as a percentage of the total cases • The distribution of intervention outcomes as a percentage of the total cases		• Independent samples t-test • One-way ANOVA test
	Independent Variables	**Dependent Variable**	**Analysis Methods**
H2: There is a relationship between the resources used in pre-hospital emergency health services, reasons for admission, and case outcomes.	• Age groups of cases as a percentage of total cases • Number of emergency health stations per 100,000 population • Number of ambulances per 100,000 population • Number of active working staff per 100,000 population • Reasons for emergency calls as a percentage of total Cases • Case locations as a percentage of total cases	• Intervention outcomes as a percentage of total cases	• Pearson Correlation Analysis

Data analysis

The data was categorized according to TURKSTAT's statistical regional classification. It was then analyzed using Microsoft Excel 2013 and SPSS 23 software, employing methods such as frequency, percentage, difference (independent samples t-test, one-way Analysis of Variance test), and relationship (pearson correlation) analyses. The analyses used in the research are shown in Table 2. Statistical significance was considered $p<0.05$ for the relationships between variables.

Research limitations

The research results are limited to the pre-hospital emergency healthcare services data between the years 2014 and 2019, so the results cannot be generalized to data before 2014 or after 2019. Additionally, it is assumed that there were no errors in either the reports recorded by the teams providing pre-hospital emergency healthcare services or in the process of transferring these reports into the Ministry of Health's system, as the research data was obtained from these reports. Since the use of emergency healthcare services showed extraordinary differences during the pandemic period, the five-year period before the pandemic was examined.

In addition, although the 112 Emergency Aid Teams recorded the age variable separately for each case on the form, when data was requested from the General Directorate of Emergency Health Services for the study, age groups were provided as under 20, 20-40, 40-60, and over 60. As a result, individuals aged 40 may have fallen into multiple age groups.

Ethical approval of research

The research was discussed at the meeting of the Non-Interventional Research Ethics Committee of Üsküdar University dated 28.04.2021 and was approved with the letter dated 30.04.2021 and numbered 61351342/APRIL 2021-95.

RESULTS AND DISCUSSION

Between 2014 and 2019, the total number of pre-hospital emergency healthcare service cases in Turkiye amounted to 30.450.998. The distribution of these cases per 100,000 population by year and region is presented by year and region is presented in Table 3 below.

Table 3. The Number Of Cases By Year And Region (Per 100,000 Population) (2014-2019)

Region	Region Code	Number Of Cases (Per 100.000 Population)					
		2014	2015	2016	2017	2018	2019
İstanbul	**TR1**	871,43	3764,61	4596,35	5193,73	5487,33	5590,68
West Marmara	**TR2**	1556,25	7271,37	8244,66	8643,17	8915,38	9179,89
Aegean	**TR3**	2829,81	5717,97	6808,74	7108,16	7604,90	7867,40
East Marmara	**TR4**	3250,57	6351,71	7110,99	7450,48	7681,61	7609,07
West Anatolia	**TR5**	4374,22	6197,18	8490,10	7676,89	7952,30	8043,65
Mediterranean	**TR6**	1094,86	5945,81	7234,56	7524,51	8087,84	8199,47
Central Anatolia	**TR7**	2894,69	6813,17	8693,62	9150,32	9712,99	10045,54
West Black Sea	**TR8**	2142,31	7591,12	8457,92	8647,51	9014,95	9459,40
East Black Sea	**TR9**	2173,96	8885,67	9621,39	10213,35	10403,65	11095,32
Northeast Anatolia	**TR10**	2385,96	7530,80	8098,06	8552,59	8806,84	9323,68
Middle East Anatolia	**TR11**	1696,30	6974,22	7157,77	7750,61	8055,18	8522,55
Southeast Anatolia	**TR12**	1457,99	5496,65	6421,62	6275,52	6671,79	6987,66
Total*		**2108,11**	**5909,88**	**6998,61**	**7229,61**	**7606,87**	**7808,82**

*In Turkiye, the total number of pre-hospital emergency healthcare service cases was 30.450.998 between 2014 and 2019.

It can be observed that the number of cases per 100,000 population increased during the years between 2014 and 2019.

According to the research, there was no statistically significant difference found between the usage of emergency healthcare services among women (45.07±9.69%) and men (45.10±10.96%) (Table 4). When reviewing similar studies in the literature, it was observed that in the study conducted by Kapçı and colleagues (2014) in Isparta in the period of January-July 2013 with 3,416 cases, the percentage of women was 44.8% and men's was 55.2%.[8] In the study conducted by Yaylacı and colleagues (2013) in Istanbul in the period of April-October 2009 with 114 cases, the percentage of women was 57%, while men's was 43%.[9] Additionally, in the study carried out by Tözün and colleagues (2012) in Eskişehir in 2008, with 21,647 cases, the percentage of women was 46.3%, and men's was 53.7%.[10] Similarly, in the study conducted by Kawakami and colleagues (2007) in Japan in 2006 with 2,029 cases, the percentage of women was 54.8%, while men's was 44.9%.[11] In the study carried out by Marinovich and colleagues (2004) in Canada in the period between April 2000 and March 2001 with 6,189 cases, the percentage of women was 55%, and men's was 45%.[12] Furthermore, in the study conducted by Ong and colleagues (2009) in Singapore in the period from January to June 2006 with 31,896 cases, the percentage of women was 40%, while men's was 60%.[13] Although there are differences in percentage between women and men in all conducted studies, it is not statistically significant, and this research also has similar results.

The results of comparing the case frequency according to variables (age, gender, reason for call, case location, preliminary diagnosis, case outcome) are given in Table 4.

Table 4. Comparison Of The Percentages Of Variables In The Total Cases (%) (2014-2019)

Variable		Average (%)	Standard Deviation	Test Value	p
Gender	Women	45,07		t=0,023	0,568
	Men	45,10			
Age Groups**	Under 20	17,42	4,66	F=284,249	0,001*
	20-40	24,40	3,55		
	40-60	20,63	1,59		
	Over 60[4]	37,53	6,97		
Emergency Call Reasons	Accident	14,53	8,62	F=1882,387	0,001*
	Violence	2,57	1,66		
	Fire	0,34	0,36		
	Deployment	2,74	2,92		
	Disease	77,00	11,55		
	Other	2,80	2,05		
Emergency Case Locations	Residence	49,37	2,35	F=3993,699	0,001*
	Workplace	27,07	3,75		
	Open area	17,92	3,69		
	Traffic	4,48	1,16		
	Other	1,14	1,49		
Pre-Liminary Diagnosis Of Ambulance Teams	GID	2,04	0,48	F=1664,877	0,001*
	TD	2,06	0,46		
	CVD	12,6	2,47		
	Newborn	0,74	0,37		
	Gynecological Diseases	2,56	1,92		
	Infectious Diseases	1,04	0,29		
	Poisoning	1,53	0,42		
	Respiratory System	6,25	1,01		
	Neurological	2,60	0,55		
	Psychiatric	6,86	1,17		
	Metabolic	1,33	0,32		
	Trauma	7,45	3,42		
	Unspecified Trauma	10,51	3,87		
	Other	42,33	6,02		
Intervention Outcome Status	Transport	78,32	4,52	F=11663,69	0,001*
	On-site Intervention	5,23	5,23		
	Deployment Cancellation/ No Casualties	4,34	4,34		
	False Alarm	0,33	0,16		
	Death	1,04	0,33		
	Treatment Refusal	9,61	2,85		
	Other	1,10	1,32		

* Significance level is p<0,05 ** Age groups were used as provided by the Ministry of Health.

The study found that individuals between the ages of 40 and 60 (20.63±1.59%) and those over 60 (37.53±6.97%) accounted for approximately 58% of the use of emergency healthcare services (Table 4). When reviewing similar studies in the literature, it was observed that, in the study conducted by Kıdak and colleagues (2009) in İzmir in the years between 2004 and 2005 with 102,905 cases, 48.1% of the total cases were over 45 years old.[14] In the study conducted by Sarı (2020) in Denizli in 2018 with 9,500 cases, 48.6% of the total cases were over 50 years old.[15] Additionally, in the study carried out by Zenginol and colleagues (2011) in Gaziantep in the years between 2006 and 2008 with 69,820 cases, it was observed that 39.2% of the total cases were over 45 years old.[16] On the other hand, Pakdemirli and colleagues (2021), in their study conducted in 2021, reported that

20% of the patients who presented to the emergency department in Turkiye were 65 years old or older.[17] Similarly, in the study conducted by Victor and colleagues (1999) in 1996 in London, out of a total of 2,601 cases, it was observed that 50.4% were over the age of 45.[18] Studies have consistently shown the significance of age as a determining factor in the utilization of emergency healthcare services, with an increase in utilization corresponding to advancing age. Considering the progressively aging population in Turkiye, it is believed that the age criterion should be taken into consideration in the planning of emergency healthcare services.

In the study, it was found that emergency calls were predominantly related to medical issues (77±11.55%) (Table 4). When similar studies in the literature were examined, it was found that in the study conducted by Menendi and Girişgin (2022) in Konya between 2019 and 2020 with 3,731 cases, 59.5% of the total cases were attributed to medical problems.[19] In the study by Tözün and colleagues (2012) in 2008 with 21,647 cases in Eskişehir, it was reported that 72.6% of the total cases were due to medical causes.[10] Similarly, Zenginol and colleagues (2011) found that in their study conducted with 69,820 cases in Gaziantep between 2006 and 2008, 54.6% of the total cases were related to medical causes.[16] Similarly, in the study conducted by Olia and colleagues (2002) in Italy in 2002 with 1,027 cases, it was found that 46% of the total cases were related to non-traumatic causes.[25] In the study by Burt and colleagues (2006) in the United States in 2003 with 16,200,000 cases, it was observed that 59.3% of the cases were due to illnesses.[24] The findings of this study are consistent with the literature. The high frequency of calls due to illness may be attributed to the aging population.

The study concluded that the majority of emergency cases occurred at residences (49.37±2.35%) (Table 4). In similar studies from the literature, Menendi and Girişgin's research (2022) in Konya between 2019 and 2020 with 3,731 cases indicated that 80.9% of total cases were transported to the hospital from home or the incident site.[19] Similarly, Kıdak and colleagues (2009) research conducted in Izmir between 2004 and 2005 with 102,905 cases found that 45.8% of total cases occurred at home.[14] Furthermore, another study conducted by Özbudak and colleagues (2021) in Izmir between 2016 and 2017 with 557 cases highlighted that 89.6% of total cases took place at the incident site being the home.[20] The literature supports the results of this research. Accordingly, it is believed that this trend is due to the fact that people spend most of their time at home outside of working hours.

In the study, it was found that the initial diagnoses by the ambulance teams were predominantly categorized as “other” (%42.33±6.02), followed by cardiovascular system diseases (%12.6±2.47) (Table 4). The high proportion of cases categorized as “other” in initial diagnoses is noteworthy. Since there is no available data to verify the accuracy of these initial diagnoses, it is challenging to provide a definitive interpretation. However, considering that most ambulance teams do not have a physician on board, it is believed that the recording or reporting of initial diagnoses may not always be highly accurate. The statistically significant difference found between ambulance pre-diagnosis and hospital emergency department diagnosis in the studies conducted by Menendi and Girişgin (2022) supports this notion.[19] Especially in ambulance teams, it is worth considering that the organization is predominantly composed of paramedics, and due to the fact that paramedics receive education at the associate degree level, they may face limitations in diagnostic coding. Elevating paramedic education to the bachelor's degree level could lead to more effective interventions in both pre-diagnosis and in providing more successful outcomes for cases. Another perspective on the high proportion of “other” pre-diagnosed cases among the total cases could be attributed to unnecessary referrals and utilization by individuals who do not actually require emergency medical services. These might have been coded as “other” by the ambulance teams.

When similar studies in the literature were examined, it was found that in the study conducted by Benli and colleagues (2015) in 2013 in Karabük with 21,878 cases, the highest proportion of total cases was trauma pre-diagnosed cases, accounting for 26.33%.[21] The second most common pre-diagnosed cases were related to the Cardiovascular System (CVS), constituting 19.45%.[21] Similarly, in the study conducted by Kıdak and colleagues (2009) covering the years 2004 and 2005 in Izmir with 102,905 cases, it was observed that the highest proportion of total cases was related to CVS pre-diagnosed cases, at 20.2%.[14] Furthermore, in the study conducted by Zenginol and colleagues (2011) in Gaziantep between 2006 and 2008 with 69,820 cases, it was noted that the highest proportion of total cases was trauma, accounting for 32%, followed by CVS pre-diagnosed cases at 15%.[16] Similarly, Langhelle and colleagues (2004), in their study involving five Northern European countries, reported that in Norway in 2001, the highest proportion of cases was related to trauma, accounting for 41%, followed by CVS pre-diagnosed cases at 27%.[22] CVS pre-diagnosed cases often take the lead in many studies, which is consistent with the findings of this study.

In the study, it was found that emergency cases mostly resulted in transport (%78.32±4.52) (Table 4). In similar studies in the literature, Oktay and Kayışlıoğlu (2005) reported that cases in Tekirdağ between 2001 and 2003 resulted most frequently in transport with 66%.[23] Similarly, Tözün and colleagues (2012), in their 2008 study in Eskişehir with 21,647 cases, found that cases mostly resulted in transport to any hospital with 61.3%.[10] Zenginol and colleagues (2011), in their study with 69,820 cases in Gaziantep between 2006 and 2008, observed that cases mostly resulted in transport with 62.5%.[16] Similarly, in a study conducted by Burt and colleagues (2006) in the United States in 2003 with 16,200,000 cases, it was observed that 70.6% of the cases were transported to a hospital or doctor's office.[24] Olia and colleagues (2002), in their study in Italy with 1,027 cases in 2002, found that 74.3% of the total cases were transported to a hospital.[25] Similar to the results of this study, emergency cases mostly result in transports. The transport of cases to the nearest hospital is viewed positively as it enables individuals to receive medical treatment at a more equipped facility, thus increasing their chances of survival.

As the total number of emergency medical stations in the study increased, the rate of cases resulting in transport increased, while the mortality rate decreased (Table 5). In Turkiye, there are three types of Emergency Medical Services Stations. Type A station is a unit that operates on a 24-hour basis, is affiliated with the chief physician of the provincial ambulance service, and provides only ambulance services. If there is a doctor in the team, it is referred to as Type A1; if not, it is referred to as Type A2. These stations are not integrated with any hospital or healthcare institution. Their duty is to respond to cases provided by the Command and Control Center, administer necessary interventions, and then transport the patient to the nearest hospital. After handing over the case, they return to the station as soon as possible. B type stations provide Emergency Health Services within a healthcare institution approved by the governorship. Those integrated with hospitals are referred to as B1 type stations, while those integrated with primary healthcare institutions are called B2 type stations. These teams are affiliated with their respective institutions, and so the necessary materials and equipment are provided by these institutions. The team works on assignments given both by their affiliated institution and the Command and Control Center.[26] C type stations are temporary Emergency Medical Service stations that are established on need and do not have permanent features. They are assigned based on programs organized by historical, touristic, or large visitor groups. The selection of personnel working in these teams is based on volunteering.[27] The increase in the number of emergency health stations is likely to lead to a higher probability of faster intervention in cases, which can eventually result in a decrease in the mortality rate of cases. According to the findings obtained in the study, in the Istanbul region, which has the

least number of emergency health stations per 100,000 population, the higher mortality rate of cases compared to all other regions confirms this relationship. Similarly, the lower transport rate of cases in the Istanbul region compared to all other regions further confirms the positive correlation between these two variables.

The findings of the analysis of the relationship between case results (death, transfer, on-site intervention) and some variables (number of personnel, number of ambulances, number of stations, case age group, reason for call, case location) are given in Table 5.

Table 5. The Relationship Between Independent Variables And The Outcomes Of Intervention

Independent Variable		Intervention Outcome Status					
		Transport		On-Site Intervention		Death	
		r	p	r	p	r	p
Number of Emergency Health Station Per 100.000 Population	Total	0,747	0,001*	0,190	0,095	-0,524	0,001*
Number Of Ambulances Per 100.000 Population	Total	0,651	0,001*	0,449	0,001*	-0,568	0,001*
Emergency Call Reasons	Accident	-0,149	0,194	-0,258	0,022*	0,510	0,001*
	Violence	-0,369	0,001*	-0,182	0,111	0,492	0,001*
	Fire	-0,243	0,032*	-0,167	0,144	0,526	0,001*
	Deployment	-0,429	0,001*	0,201	0,77	0,461	0,539
	Disease	0,260	0,021*	0,228	0,044*	-0,528	0,001*
	Other	0,114	0,332	-0,311	0,006*	0,232	0,041*
Emergency Case Locations	Resident	-0,114	0,319	-0,279	0,013*	-0,062	0,592
	Workplace	0,550	0,001*	0,628	0,001*	-0,279	0,013*
	Open Area	-0,584	0,001*	-0,371	0,001*	0,552	0,001*
	Traffic	0,655	0,001*	-0,003	0,979	-0,615	0,001*
	Other	-0,267	0,018*	-0,221	0,052	-0,089	0,440
Age Group Of Cases	Under 20	0,167	0,143	0,374	0,001*	-0,531	0,001*
	20-40	-0,197	0,083	0,371	0,001*	-0,227	0,045*
	40-60	-0,472	0,001*	-0,530	0,001*	0,659	0,001*
	Over 60	0,097	0,398	-0,318	0,005*	0,320	0,004*
Number Of Active Working Personnels	Doctors	0,464	0,001*	0,118	0,305	-0,151	0,188
	Health Officers	0,434	0,001*	0,066	0,564	-0,161	0,159
	Nurses	0,453	0,001*	0,178	0,120	-0,172	0,132
	Drivers	0,753	0,001*	0,134	0,242	-0,627	0,001*
	Paramedics	0,533	0,001*	0,155	0,177	-0,571	0,001*
	EMTs	0,684	0,001*	0,205	0,071	-0,228	0,044*
	Other	-0,089	0,441	0,212	0,063	-0,064	0,575
	Total	0,715	0,001*	0,209	0,066	-0,426	0,001*

The study found that as the total number of ambulances increased, the rate of cases resulting in transport and on-site intervention increased, while the mortality rate decreased (Table 5). Ambulances are ground, air, and marine vehicles specially equipped with certain technical and medical supplies, used for patient transportation and/or emergency assistance purposes. The list of necessary equipment that should be present in an ambulance is specified in the Regulation on Ambulances, Emergency Medical Vehicles,

and Ambulance Services.[28] An increase in the number of ambulances, similar to the increase in the number of emergency health stations, can be considered reasonable. It is because it provides the ability to reach cases more quickly and deliver more accurate and effective emergency health services through its technical and medical equipment, as well as healthcare staff. Consequently, a decrease in mortality rates, along with an increase in on-site interventions and transport rates, can be expected. The findings within the scope of the study indicated that in the Istanbul region, which has the lowest number of ambulances per 100,000 population, the mortality rate of cases was higher than in all other regions, while the rates of transport and on-site interventions were lower than in other regions, which confirms the relationship.

As the calls due to accidents increased, the mortality rate of cases tended to rise; conversely, as calls due to illnesses increased, the mortality rate of cases tended to decrease (Table 5). According to the Road Traffic Accident Statistics by the TUİK (2021), out of the total 1,168,144 traffic accidents that occurred in 2019, 174,896 were accidents resulting in death or injury, and a total of 5,473 individuals lost their lives in these accidents.[29] These data indicate that approximately 14.9% of accidents resulted in death or injury. The high rate of death and injury in accidents confirms the positive relationship between accident-related calls and fatal outcomes. On the other hand, it can be considered that even for non-life-threatening health complaints, emergency medical service calls are made, and individuals may perceive the ambulance as a means to reach the hospital or the emergency departments as outpatient clinics.

The findings indicate that emergencies occurred more frequently in residential and workplace settings (Table 4). Since the majority of people spend their time in these two locations, this result is considered normal. As workplace-related incidents increased, the rates of transport and on-site intervention as outcomes for cases also rose (Table 5). Given the positive correlation between workplace incidents resulting in outcomes other than death, it can be speculated that fatal accidents have decreased, particularly in recent years, due to the increased emphasis on occupational health and safety measures. Indeed, in his study, Koçali (2021) reported that in 2014, out of 221,366 occupational accidents, there were 1,626 (0.73%) deaths, and in 2019, out of 422,463 occupational accidents, there were 1,147 (0.27%) deaths.[30] In light of these results, despite the increase in the number of occupational accidents over the years, the decrease in fatalities attributed to occupational accidents confirms the findings of this study.

The study reveals that emergency cases predominantly involved individuals aged 60 and above (Table 4). As the cases above the age of 60 increased, the rate of on-site intervention decreased, while the rate of fatalities increased (Table 5). This result may be attributed to the higher prevalence of chronic and systemic illnesses among individuals aged 60 and above. Chronic illnesses are defined by the National Center for Health Statistics as health problems lasting three months or longer, and by the World Health Organization as long-term and usually slowly progressing diseases. The World Health Organization reported that two out of every three individuals aged 65 and above living in Europe had at least two chronic illnesses.[31] This data from the World Health Organization supports the findings obtained in this study.

The study found that as the total number of active personnel increased, the rate of cases resulting in transport also increased, while the rate of cases resulting in death decreased (Table 5). The increase in the number of active personnel, along with the rise in transports and decrease in deaths, is believed to highlight the importance of intervention by individuals who are more aware and knowledgeable about emergency cases.

CONCLUSION AND RECOMMENDATIONS

In light of these findings, the following recommendations have been put forward:

In order to reduce cases resulting in death in the Istanbul region, it is suggested to increase the total number of emergency health stations per 100,000 population, with particular emphasis on A2 and B2 type emergency health stations.

In order to reduce cases resulting in death in the Istanbul region, it is recommended to increase the number of ambulances in the Istanbul region.

It is recommended to implement incentivizing measures to enable citizens to make more accurate calls for illness-related cases, particularly encouraging them to consult family physicians or hospitals during office hours.

The importance of adopting a healthy diet and engaging in regular physical activity to prevent Cardiovascular Diseases (CVDs) is emphasized by experts. For this reason, it is recommended to organize public relations campaigns that will increase the knowledge and awareness levels of citizens regarding CVDs, and educate them on the lifestyle choices necessary for the prevention of CVDs. Furthermore, citizens should be encouraged, particularly after a certain age, to undergo regular check-ups at family health centers.

To reduce the cases resulting in fatalities in the Istanbul region, it is recommended to increase the number of active personnel in the Istanbul region.

In this study, the outcomes of emergency healthcare services have been elucidated in terms of resources. However, it is evident that other factors play a crucial role in the utilization of emergency healthcare services. It is recommended to conduct detailed studies regarding these factors. Undertaking such studies on a national scale under the auspices of the Ministry of Health will be beneficial for the provision of emergency healthcare services in Turkiye.

This study was conducted using data related to emergency healthcare services between 2014 and 2019. In future studies, the time frame could be expanded, or different studies incorporating a comparative analysis may be conducted to evaluate the effects of policy changes applied to emergency healthcare services. Furthermore, a more comprehensive analysis focusing on one or more of the variables obtained in this study could assist in achieving more effective and efficient results in the production of emergency healthcare services.

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