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ORIGINAL ARTICLE

The Effect of Disasters on Applications to Health Institutions and Their Relationship with Health Literacy Level

Afetlerin Sağlık Kuruluşu Başvuruları Üzerine Etkisi ve Sağlık Okuryazarlık Düzeyleriyle İlişkisi

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ABSTRACT

Aim: This study aimed to investigate the impact of disasters on individuals' healthcare utilization and its association with health literacy (HL) levels.
Methods: A total of 209 patients aged 18 years and older, who presented to the emergency clinic, were fully conscious, and were randomly selected, were included in the study. A descriptive survey (19 questions) and the Adult Health Literacy Scale (23 questions) were administered face to face to the participants. The suitability of the data for normal distribution was evaluated with the Kolmogorov-Smirnov test. The Mann-Whitney U test was applied to groups of two, and the Kruskal-Wallis test was applied to groups of three or more. Cases where the p-value was below 0.05 were considered statistically significant.
Results: When the pre-disaster and disaster periods are compared, the rate of application to primary health care institutions has doubled. Those who do not have a chronic disease, who are ≤40 years old, and who consider themselves adequate to protect themselves from infectious diseases had high HL levels. Additionally, those with low educational and economic status also had low HL levels. 84 of the participants (40.2%) missed their follow-ups at health centers during the disaster period.
Conclusions: It shows that large-scale disasters cause significant changes in individuals' preferences for applying to health services and that the level of health literacy is an effective factor in these preferences. Considering that individuals with low health literacy levels may not benefit sufficiently from health services during disaster periods, it is necessary to increase health education regarding disasters and increase health literacy in society.

Keywords: Disasters, earthquake, health literacy, pandemic, primary health care.

ÖZ

Amaç: Afetlerin, bireylerin sağlık kuruluşları başvurusu üzerine etkisini ve sağlık okuryazarlık (SOY) düzeyleriyle ilişkisini araştırmayı amaçladık.
Gereç ve Yöntemler: Acil polikliniğine başvurusu olan, 18 yaş ve üzeri, bilinç düzeyi yerinde olan hastalardan gelişigüzel olarak araştırmayı kabul eden 209 hasta dahil edilmiştir. Katılımcılara tanımlayıcı anket (19 soru) ve Yetişkin Sağlık Okuryazarlık Ölçeği (23 soru) yüz yüze uygulanmıştır. Verilerin normal dağılıma uygunluğu Kolmogrov- Simirnov testi ile değerlendirildi. İkili gruplara Mann-Whitney U testi, üç ve daha fazla gruplara Kruskal Wallis testi uygulanmıştır. p değerinin 0,05'in altında olduğu durumlar istatistiksel olarak anlamlı kabul edilmiştir.
Bulgular: Afet öncesi ve afet dönemi kıyaslandığında birinci basamak sağlık kuruluşlarına başvuru oranı iki katına çıkmıştır. Kronik hastalığı olmayanlar, ≤40 yaş ile kendini bulaşıcı hastalıklardan korunmada yeterli gören grubun SOY düzeyi yüksek bulunmuştur. Ayrıca Eğitim ve ekonomik durumu düşük olanların SOY düzeyi de düşüktü. Katılımcılardan 84'ü (%40.2) ise afet döneminde sağlık merkezlerindeki takiplerini aksatmıştır.
Sonuçlar: Büyük ölçekli afetlerin bireylerin sağlık hizmetlerine başvuru tercihlerinde belirgin değişikliklere neden olduğunu ve sağlık okuryazarlık seviyesinin bu tercihler üzerinde etkili bir faktör olduğunu göstermektedir. Sağlık okuryazarlık düzeyi düşük bireylerin afet dönemlerinde sağlık hizmetlerinden yeterince yararlanamayabileceği göz önüne alındığında, afetlere yönelik sağlık eğitimlerinin artırılması ve toplumda sağlık okuryazarlığının yükseltilmesi gerekmektedir.

Anahtar Kelimeler: Afetler, birinci basamak sağlık hizmetleri, deprem, pandemi, sağlık okuryazarlığı.

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INTRODUCTION

The pandemic process, which started to be seen in the world at the end of 2019 and was officially announced in March 2020, is defined as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), and the disease name is Coronavirus Disease-2019 (COVID-19) (1).

SARS-CoV-2 is transmitted mainly from person to person via droplets. It can be seen in different clinics in individuals, ranging from asymptomatic disease to severe viral pneumonia that can result in respiratory failure or death. Advanced age and comorbidities are seen as risk groups for COVID-19. When people in this group are infected, the disease is seen as more severe clinically (2,3). According to the latest data on the COVID-19 pandemic, there have been nearly 7 million deaths in the world and over a hundred thousand deaths in our country (4). Another devastating disaster seen in our country, like the pandemic, was the February 6 Kahramanmaraş earthquakes.

Earthquakes are one of the most unpredictable and effective geological events that have the potential to have a devastating effect on built structures and people in the world. Considering the frequency of earthquakes among natural disasters, it is the third most common, with 552 (8%) events in the past 20 years (5). Although it is a low rate among natural disaster events, tens of thousands of people lose their lives, fall under rubble, and become homeless due to the destruction potential and consequences. For this reason, earthquakes are one of the most deadly natural disasters (5,6).

Destructive earthquakes measuring 7.7 and 7.6 on the Richter scale occurred in Kahramanmaraş and its surroundings on February 6, 2023. Services in health institutions may have been interrupted as a result of adverse living conditions in collective living spaces such as tent cities and container cities created after earthquakes, infrastructure damage in basic living units, destruction of buildings, and health workers working in the region being affected by the disaster.

In our research, we aimed to investigate the impact of disasters such as the pandemic and the devastating Kahramanmaraş earthquakes on individuals' applications to health institutions and their relationship with the health literacy (HL) levels of the people in the region.

MATERIALS and METHODS

Our study was conducted prospectively on patients admitted to Kahramanmaras Sütcü İmam University hospital. Patients were evaluated after approval was obtained Kahramanmaras Sütcü İmam Universty Ethics Committee (Decision No: 05-06/01-2025). The study was conducted under the principles of the Declaration of Helsinki. In our study, no sample calculation was made, and 209 patients who applied to Kahramanmaras Sütçü İmam University emergency clinic, who were 18 years of age and above and who were conscious, were randomly included. Our data was collected over a period of one month. Individuals who had difficulty communicating, who did not apply to a health institution, who were under the age of 18, or who had an active psychotic disorder were not included in our study. After the participants who met the appropriate criteria to participate in the study were verbally informed, it was aimed to obtain their consent through an

informed consent form. To be implemented in our research, literature information was scanned in accordance with its purpose, and a face-to-face survey form consisting of a total of 42 questions, including a descriptive survey consisting of 19 questions and the Adult Health Literacy Scale (AHLS) consisting of 23 questions, was applied.

The first part of the survey to be applied to the participants consists of the "Personal Information Form," which consists of questions about their sociodemographic characteristics, CV, health insurance status, health institution preferences before and during the disaster, chronic disease status, and protection against infectious diseases. The second part consists of questions about the Adult Health Literacy Scale (AHLS), which consists of 23 questions.

AHLS is a scale with a total of 23 questions, consisting of health information, medication use, organ location, and names. The scale consists of 13 yes/no questions, 4 multiple-choice questions, 4 fill-in-the-blank questions, and 2 matching questions. Scale score varies between 0 and 23. As the score obtained from the scale increases, the HL level increases. It has been demonstrated that AHLS is a valid and reliable scale for assessing health literacy and can be used safely in adult individuals. (7).

The data were evaluated in the SPSS package program. Descriptive statistics are given as number (n), percentage, mean, median, and standard deviation (SD). The suitability of the data for normal distribution was evaluated with the Kolmogorov-Smirnov test. A chi-square test was applied to compare categorical data. To compare numerical data, the Mann-Whitney U test was applied to groups of two, and the Kruskal-Wallis test was applied to groups of three or more. The post hoc Bonferroni test was applied for subgroup comparisons. In statistical analysis, the type-1 error level will be accepted as 0.05, and cases where the p-value is below 0.05 are considered statistically significant results.

RESULTS

The average age of the participants (n = 209) was 41.03±14.32. The age range of the participants is a minimum of 18 and a maximum of 78 years. The female rate in our research is 58.9%. There are 91 participants with secondary school or lower education level, 26 high school-health vocational high school graduates, and 82 participants with associate degree, bachelor's degree, and doctorate degree. 149 of the participants are married; 38 of them do not have health insurance or have a green card.

HL levels were analyzed according to sociodemographic survey categories. Post hoc Bonferroni results were recorded in subgroup comparisons. Accordingly, the HL level of the >40 age group was found to be low, and there was a significant difference ($p<0.05$). Considering the educational status, there is a significant difference between the illiterate-primary school and high school, associate's degree, bachelor's degree, and master's/doctoral degree groups ($p<0.05$). Additionally, a significant difference was detected between the secondary school and undergraduate graduate groups ($p<0.05$). According to the economic level, there is a significant difference between the group whose income is more than its expenses and the group whose income is equal to its expenses, and between the group whose

income is more than its expenses and whose income is less than its expenses ($p<0.05$). When looking at health insurance, there is a significant difference between green card and SSK, pension funds ($p<0.05$). There is also a significant difference between SSK and pension funds ($p<0.05$). (Table 1). HL levels and their comparison according to sociodemographic survey questions are shown in detail (Table 1).

HL levels were examined according to the situations of disasters affecting applications to health institutions. Accordingly, there was a significant difference in HL levels according to the health institutions preferred before and during the disaster. When subcategory comparisons are examined, there is a significant difference between public hospitals and private hospitals/clinics according to the application centers before the disaster ($p<0.05$). According to the application centers during the disaster period, a significant difference was detected between the health center/PHC and the private hospital/clinic-university hospital ($p<0.05$). (Table 2). In addition, the HL level of the group without chronic disease and the group that considered themselves sufficient to protect themselves from infectious diseases was found to be high, and there was a significant difference ($p < 0.05$) (Table 2).

Regression analyses were conducted to examine the effects of gender, income, and educational level on HL. No significant differences were observed between gender categories ($p = 0.766$). Similarly, no significant differences were found based on income status ($p = 0.143$). However, when analyzed according to educational level categories, a significant difference was detected ($p = 0.000$).

The reasons for applying to health facilities but being postponed due to disaster periods were investigated with open-ended answers. The disease group with the highest postponement rate was cardiovascular diseases (6.70%). Also noteworthy is the high rate of gastrointestinal and dental diseases. The results are shown in Table 3.

The question to which the participants gave the highest correct answer in the AHLS was the question of symptoms of low blood pressure. The lowest correct answer rate was for the question about cancers seen in women. More than half of the participants answered incorrectly the questions asking about body temperature values, female and male cancers, Turkish meanings of medical departments, and organ names. In addition, 54.5% of the participants said that they had difficulty using and understanding health-related resources. Details are shown in Table 4.

DISCUSSION

In this study, the effects of the COVID-19 pandemic and the February 6, 2023, Kahramanmaraş earthquakes, which are large-scale disasters, on individuals' behavior in applying to health institutions and their relationship with their health literacy levels were evaluated. The findings of our study show that individuals' preferences for accessing health services change during disaster periods and that the level of health literacy can be an important determinant of these preferences.

The Effect of Disasters on Applying Behavior to Health Institutions

According to the results obtained, it was determined that individuals applied to

Table 1. AHLS mean score and subgroup comparisons according to participants' sociodemographic survey questions

	Category	n(%)	AHLS mean score	Std. Deviation
Age	40 and under	118(56.7)	15,35	3,37
	>40	90(43.3)	11,50	4,26
	p*		<0.05*	
Educational Status	Illiterate - Primary school	80(38.2)	10,45	3,75
	Secondary school	21(10.0)	12,86	3,82
	High school	24(11.5)	14,54	3,37
	Health vocational high school	2(1.0)	15,50	,71
	Pre-license	15(7.2)	15,47	1,92
	License	55(26.3)	17,09	1,98
	Master's/PhD	12(5.7)	16.83	2.92
	p**		<0.05**	
Economic Status	Income is less than expenses	77(36.9)	12,35	4,60
	Income equal to expense	85(40.6)	13,75	3,81
	Income more than expenses	47(22.5)	15,74	3,41
	p**		<0.05**	
Health Insurance Status	No health insurance	4(1.9)	12,50	5,74
	Green card	34(16.3)	10,12	4,31
	Pension fund	64(30.6)	15,77	3,36
	BAĞ-KUR	27(12.9)	13,15	3,81
	SSK	78(37.3)	13,72	3,90
	Private health insurance	2(1)	16,00	,00
	p**		<0.05**	
Marital status	Married	149(71.3)	13,42	4,08
	Single-Divorced	60(28.7)	14,33	4,52
	p*		0.063*	
Gender	Female	123(58.9)	13.40	4.31
	Male	86(41.1)	14.09	4.07
	p*		0.305*	

* Mann-Whitney U

** Kruskal Wallis

AHLS: Adult Health Literacy Scale

Table 2. Characteristics of disasters affecting applications to healthcare institutions, AHLS mean score and comparison

Questions that disasters affect applications to healthcare institutions	Answer Status	n(%)	AHLS (Mean score ± Std. Deviation)	p
What was your first choice of health institution if you got sick before disasters (COVID-19, Earthquake)?	Health centers/ASMs	54(25.8)	14,00±3.97	<0.05**
	Public hospital	85(40.7)	12,78±4.38	
	University hospital	35(16.7)	13,94±4.74	
	Private hospital/clinic	35(16.7)	15,14±3.15	
What was your first choice of health institution if you got sick during disasters (COVID-19, Earthquake)?	Health centers/ASMs	108(51.7)	12,39±4.58	<0.05**
	Public hospital	46(22.0)	14,43±3.49	
	University hospital	23(11.0)	15,70±3.32	
	Private hospital/clinic	32(15.3)	15,53±2.90	
Before disasters (COVID-19, Earthquake), how many times a year did you go to health institutions on average?	0	3(1.4)	13,33±5.51	0.622**
	1-2	46(22.2)	13,85±4.40	
	3-5	77(37.2)	14,04±4.16	
	6-10	25(12.1)	13,36±3.83	
	>10	56(27.1)	13,09±4.29	
On average, how many times a year did you visit health institutions during disasters (COVID-19, Earthquake)?	0	13(6.3)	13,38±3.80	0.720**
	1-2	86(41.5)	13,72±4.48	
	3-5	72(34.8)	13,89±4.07	
	6-10	15(7.2)	12,27±4.22	
	>10	21(10.1)	13,86±4.21	
Do you have any chronic diseases?	Yes	94(45.0)	12,39±4.76	<0.05*
	No	115(55.0)	14,74±3.39	
Have you had a health problem that required you to apply to a health facility due to disasters (COVID-19, Earthquake), but you postponed the application?	Yes	97(46.4)	13,08±4.72	0.098*
	No	112(53.6)	14,21±3.67	
Have you postponed having your or your child's screening test due to disasters (COVID-19, Earthquake)?	Yes	26(12.4)	13,46±4.69	0,821*
	No	183(87.6)	13,72±4.16	
Have you postponed getting yourself or your child vaccinated due to disasters (COVID-19, Earthquake)?	Yes	10(4.8)	13,00±4.57	0.585*
	No	199(95.2)	13,69±4.23	
Do you find yourself sufficient to protect yourself from infectious diseases?	Yes	138(66.0)	14,79±3.58	<0.05*
	No	71(34.0)	11,51±4.58	

* Mann-Whitney U
** Kruskal Wallis
AHLS: Adult Health Literacy Scale

Table 3. Diseases that require applying to a health facility but where the application is postponed due to disasters

	n	%
Heart diseases/palpitations/hypertension	14	6,70
Upper respiratory tract infection	8	3,83
Headache	4	1,91
Lower back pain	3	1,43
Stomach diseases/abdominal pain	8	3,83
Dental diseases/Toothache	8	3,83
Joint/knee pain	3	1,43
Muscle aches	3	1,43
Gynecological diseases	3	1,43
Urinary Tract Infection	1	0,48
Hand/foot diseases	5	2,39
Eye diseases	3	1,43
Ear diseases	2	0,96
Thyroid gland diseases	4	1,91
Psychiatric diseases	2	0,96
Diabetes mellitus	3	1,43
Shortness of breath	2	0,96
Mass	2	0,96
Fainting	1	0,48
Varicocele	1	0,48
Polycystic ovary syndrome	1	0,48
Gallbladder disease	1	0,48
Nose deviation	1	0,48
Allergy	1	0,48
Total	**84**	**40.2**

Table 4. Detailed analysis of answers to AHLS questions

Adult Health Literacy Scale Questions	Answer	n	%
Which of the following are symptoms of low blood pressure?	False	17	8,1%
	True	192	91,9%
Which of the following are symptoms of increased blood pressure?	False	75	35,9%
	True	134	64,1%
Do you weigh yourself regularly?	False	71	34,0%
	True	138	66,0%
Do you know whether your weight is within normal values for your height?	No	48	23,0%
	Yes	161	77,0%
What should be the body temperature for adults to have fever?	False	140	67,0%
	True	69	33,0%
What can be done first in case of fever at home?	False	53	25,4%
	True	156	74,6%
Which of the following are reliable methods for preventing pregnancy?	False	86	41,1%
	True	123	58,9%

Table 4 Cont. Detailed analysis of answers to AHLS questions

Adult Health Literacy Scale Questions	Answer	n	%
Your doctor has recommended that you take antibiotics twice a day. If you take the first tablet at 8 am, at what time do you take the second one?	False	97	46,4%
	True	112	53,6%
You took the first dose of a vitamin medication that your doctor recommended you take every two days on Tuesday. On which day will you receive your second dose?	False	102	48,8%
	True	107	51,2%
When should you take a medicine that your doctor recommends you take on an empty stomach?	False	62	29,7%
	True	147	70,3%
After eating, you feel burning in your stomach, bloating, and indigestion. In this case, which of the following clinics can you apply to?	False	41	19,6%
	True	168	80,4%
When you go to the toilet, you feel burning and pain while urinating. In this case, which of the following clinics can you apply to?	False	62	29,7%
	True	147	70,3%
Correct matching of female cancers	False	202	96,7%
	True	7	3,3%
Correct matching of male cancers	False	199	95,2%
	True	10	4,8%
Clinical descriptions of sections	False	108	51,7%
	True	101	48,3%
Do you know what your patient rights are when receiving health care?	No	89	42,6%
	Yes	120	57,4%
Do you have difficulty applying to a health institution or receiving services related to your health problems?	No	85	40,7%
	Yes	124	59,3%
Do you know how to make an appointment at the hospital?	No	43	20,6%
	Yes	166	79,4%
Do you have difficulty explaining your health problem to the doctor/nurse?	No	47	22,5%
	Yes	162	77,5%
Can you comfortably ask questions to the doctor/nurse about your health condition?	No	34	16,3%
	Yes	175	83,7%
Do you follow health-related news?	No	39	18,7%
	Yes	170	81,3%
Do you have difficulty reading and understanding health-related brochures?	Yes	114	54,5%
	No	95	45,5%
Organ names	False	133	63,6%
	True	76	36,4%

AHLS: Adult Health Literacy Scale

health centers/ASMs and public hospitals more in the pre-disaster period, but these preferences changed during the disaster periods. It was determined that after the Kahramanmaraş earthquakes and the pandemic, the tendency towards public hospitals and university hospitals decreased, and the tendency towards health centers/FHCs increased. This shows that disasters have a direct impact on health systems and change individuals' strategies for accessing health services.

It is emphasized in the literature that there are changes in the dynamics of applications to health services during disaster periods. For example, it has been stated that after natural disasters, individuals tend to turn to emergency services due to trauma-related injuries and exacerbation of chronic diseases (8-10). However, in the COVID-19 pandemic, it has been shown in many studies that individuals avoid applying to healthcare institutions due to fear of infection, and especially chronic disease management and routine check-ups are disrupted (11-13). Similarly, in our study, it was observed that applications to health centers/ASMs increased and applications to university hospitals and state hospitals decreased during the pandemic. These results show that health application dynamics change in disasters and epidemics and require different strategies in disaster management.

The effects of disasters on health systems are not limited to the application behavior of individuals; many factors, such as physical damage to the health infrastructure, health workers being affected by the disaster, and lack of resources, cause disruption of health services. It is known that after the Kahramanmaraş earthquakes, there were serious problems in the provision of healthcare services due to damage to healthcare facilities, direct impact of healthcare workers from the disaster, and logistical disruptions (14). Similarly, the sustainability of healthcare services has been threatened due to hospitals being overloaded and healthcare workers being infected during the pandemic (15).

In this context, creating health systems that are resilient to disasters is of critical importance in ensuring that service delivery is not disrupted during disaster periods. Ensuring the continuity of primary health care services, especially during disaster periods, should be considered an important strategy to prevent overload in hospitals. The Ministry of Health and relevant institutions need to make health service delivery plans for disasters more comprehensive, and health personnel need to be more trained in disaster management.

The Role of Health Literacy in Disaster Periods

In our study, it was seen that the level of health literacy is an important factor in individuals' access to health services and their application preferences. It was determined that health literacy scores increased significantly with increasing education level. This result is parallel to previous studies. Health literacy refers to individuals' ability to understand, evaluate, and apply health information and plays a critical role in the process of effectively utilizing health services (16,17).

It is thought that individuals with low health literacy levels may have more difficulty accessing health services during disaster periods. Since these individuals have a low capacity to access and evaluate accurate

health information, the risk of being exposed to misinformation increases. It has been reported that the spread of misinformation, especially during the COVID-19 pandemic, negatively affects the search for healthcare services in individuals with low health literacy levels (18,19)

In our study, it was also determined that income level was directly related to health literacy. It has been determined that individuals whose income exceeds their expenses have higher health literacy scores, while individuals experiencing economic difficulties have lower health literacy scores. This finding shows that economic status is an important determinant in the process of accessing health information and benefiting from health services. Previous studies have also emphasized that low income levels can lead to inequalities in access to health services and negatively affect the level of health literacy (17,19).

Additionally, it has been observed that individuals with health insurance have higher health literacy levels. Individuals with social security can make more informed decisions about accessing health services and have better information about how to act in the health system. The fact that health insurance and economic status are determining factors in access to health services during disaster periods reveals that disaster management policies should be planned by taking these socioeconomic factors into consideration.

Improving Health Literacy and Disaster Management

Health literacy levels need to be increased to increase individuals' access to health services during disaster periods. For this reason, it is of great importance to disseminate health education programs, strengthen systems that will enable the public to access accurate health information, and implement policies that will increase access to health services during disaster periods.

It is recommended to develop and implement community-based education programs to increase the level of HL. Informing individuals before the disaster about how to access health services and in which situations they should apply to which health institutions will contribute to the more effective functioning of the health system during disaster periods.

In addition, special information and guidance mechanisms should be established for individuals with low health literacy levels in planning health services for disasters. Targeted campaigns for individuals with low health literacy, along with the expansion of mobile healthcare units during disaster periods, may also be considered. Strengthening primary health care services and effective use of mobile health units should be considered a critical strategy to increase access to post-disaster health services.

Limitations

The absence of a sample size calculation and the inclusion of only individuals presenting to the emergency department may limit the generalizability of the findings to the overall population. This has been acknowledged as one of the study's limitations.

CONCLUSION

This study revealed that large-scale disasters cause significant changes

in individuals' preferences for seeking healthcare services. It also shows that the level of health literacy is an effective factor in these preferences. Considering that individuals with low health literacy levels may not benefit sufficiently from health services during disaster periods, it is necessary to increase health education regarding disasters and increase health literacy in society.

It is also of great importance to develop policies to increase the resilience of health systems in disaster management, to prepare health institutions for disasters, and to train health workers on disaster management. It is recommended that future studies examine in more detail the long-term effects of health literacy level on access to post-disaster health services.

Conflict of Interest

Not declared. The authors have no relevant financial or non-financial interests to disclose.

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