

The Study of Children and Adolescents' Access to Hospitals and Emergency Centers in Kermanshah, West of Iran

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Abstract

Background: The enjoyment of different walks of life of health care is one of the top priorities. To this end, access is a precondition for the establishment of justice in human societies. Given that keeping the health of some groups in societies is of special importance due to their special age-physical conditions, the present study aimed to investigate the access of children and adolescents under 19 years old to hospitals and emergency centers in Kermanshah, Iran.

Materials and Methods:

In this descriptive-analytic and cross-sectional study, the statistical population comprised the children and adolescents under 19 residing in Kermanshah, Iran. Moreover, all public and private hospitals and emergency centers located in Kermanshah were studied. To evaluate the spatial deployment pattern of hospitals and emergency centers as well as correct and true access to them, all data and information were evaluated using the Network Analyst and Arc-GIS Software.

Results: The results of the present study demonstrated that about 37% of the children and adolescents under 19 had appropriate access to hospitals and emergency centers. In terms of the status of access during 5, 10, and 15 minutes of driving, 42.90%, 80.27% and 89.28% had proper access to hospitals, respectively. Moreover, in terms of access through walking and driving, the 15-19 age group had the most access, as opposed to the 0-4 age group without access.

Conclusion: In Kermanshah, the access of children and adolescents under 19 to hospitals and emergency centers using vehicles was in a desirable condition, an indication of the success of implementing some post-revolutionary health plans and reducing deprivation and eliminating inequalities across various regions. However, it should be noted that there were problems in terms of access to hospitals and emergency centers through walking, which requires taking actions by authorities in Kermanshah.

Key Words: Adolescents, Access, Children, Emergency, Iran, Hospital.

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1- INTRODUCTION

The significance of the right to health care is because of conducting social activities and creating equal opportunities in societies. To this end, access is a precondition for the establishment of justice in human societies (1). In this regard, the United Nations has also emphasized the reduction of child mortality, gender equality, and women's empowerment (2, 3). According to the World Health Organization (WHO), the population under the age of 19 years old is defined as 'child' (4, 5). More to the point, on a yearly basis, over 1.6 million children are at risk due to lack of appropriate access to health facilities worldwide (6). There are also high rates of unmet health care in Asian countries, too (7, 8). For instance, the unmet health needs of Iranian households varies from 3.6% in Tehran to 31.3% in villages based in Sistan and Baluchestan province (9).

Moreover, 7% of children suffer from developmental disorders (10-13), which can be reduced to a large extent through providing appropriate health services. After the victory of the Islamic revolution in Iran, especially from 1985 onwards, all citizens were provided with the right to health care along with the equitable distribution of health services in the country's constitution. Currently, with over four decades passing from the design and implementation of the health care networks in the country, different health care centers have been established in different parts of Iran, thereby offering service to the public. In the fifth development plan of Iran, the health improvement program was commenced by the Ministry of Health. Moreover, the implementation of the health promotion plan began in 2014 along with the emphasis placed on the program by policymakers and health planners in the country with three approaches: equity in access to health services, improving the

quality of services, and financial protection of people (14, 15). After launching the program, the objectives of this plan were reported to be met well in different cities (16-18). It is important to note that the issue of access to health services in developing countries is a matter of considerable interest. According to a survey conducted in poor Islamic countries, such as Mali and Senegal, every 15 to 20 thousand people do not have access to more than one doctor. In general, what is emerging as a problem is the inadequate distribution of health services in third world countries. This is particularly important in terms of citizens' access to health care services.

The realization of the concept of justice in treatment requires reducing the barriers to access to the required services, which, if ignored, can lead to inefficiencies in provision of services and inequalities in access (12, 13). Access is composed of two elements: the time element (travel time between two points), and the space element that reflects the distribution of the intended activity. In fact, optimal access refers to providing the right services at the right time and in the right place (19).

In the present study, the spatial dimension of access (geographic access) was considered. To this end, geographic information system (GIS) can be used as a suitable tool through providing accurate statistics and interpretation of the existing situation (19-23). Various studies have been conducted in this respect. For example, access to hospitals in Nigeria (24), access to hospitals based in Zanjan province-Iran (25), the status of the Iranian provinces in terms of access to health services (26), the citizens access to drug stores in Jahrom County, Fars province-Iran (27), and access to laboratories in Qom province- Iran (28). It should be noted that no studies have been undertaken about the access of children and adolescents under 19 to the services

provided by hospitals and emergency centers yet. On the other hand, Kermanshah is faced with diseases such as Human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) (29, 30), cancer (31), and other problems such as poverty (32), high fertility (33), low quality of life (34), child mortality (35-37), and lack of proper access to treatment centers (38-41). This indicates that conducting the present research is necessary both in terms of the novelty of the subject under study and the target group in Kermanshah Metropolis. Therefore, the present study aimed to investigate the access of children and adolescents under 19 years old to hospitals and emergency centers in Kermanshah, Iran.

2- MATERIALS AND METHODS

2-1. Study Design and Population

The data of the present study were collected from the latest published statistics on the population and housing census announced by the Statistical Centre of Iran in 2011 (Due to the fact that the statistical blocks of Kermanshah in 2016 were not published, the statistical blocks of 2011 were used). Additionally, the people involved in the present study had expertise in pediatrics, urban planning, and GIS. Moreover, a default extension in ArcGIS Software, called 'Network Analyst,' was used to perform the network analyses. In this study, the statistical population comprised the children and adolescents under 19 residing in Kermanshah (N=244,178). Moreover, all public and private hospitals and emergency centers located in Kermanshah city were studied. In this study, first, the spatial and population data of Kermanshah Metropolis and the addresses of Kermanshah-based hospitals were gathered through the Statistical Centre of Iran and the Kermanshah

University of Medical Sciences, respectively.

2-2. Methods

In this descriptive-analytic and cross-sectional study, the access of individuals to hospitals and emergency centers was considered in two separate sections. In the first scenario, access to hospitals and emergency centers through walking was considered based on a standard time. Given that the speed of a pedestrian in normal mode is between 0.75 to 1.25 m/s in the technical calculations of transportation (42), one m/s was considered the average speed of a person. According to the standard radius of access defined for hospitals and emergency centers (1,500 meters), a 25-minute walking time was regarded as the basis for children and adolescents under the age of 19 (27, 28, 33, 38, 43).

In the second scenario, access to hospitals and emergency centers was calculated considering a real time through real passages (simulated in GIS environment). The criterion was driving time (5, 10 and 15 minutes). To calculate the speed of vehicles, the roads of Kermanshah were first classified into three main types: 1) main arteries with a maximum speed of 60 km, 2) streets with a maximum speed of 50 km, and 3) local routes with a maximum speed of 30 km. Then, the level of access to health centers was calculated using the driving time (5 minutes, 10 minutes and 15 minutes) with vehicles in the streets of Kermanshah.

2-3. Measuring Tools

In this research, the quantitative models (Network Analyze), and Arc-GIS Software Version 10.3 were used. The geographic information system (GIS) is software whereby the geographic data are generated, processed, analyzed, and managed. In other words, it is a computerized system for managing and

analyzing geographic data, which is capable of collecting, storing, analyzing and displaying the geographic information. The Network Analyst Model, as its name implies, is used to perform analyses on networks. Moreover, items such as the average travel time, one-way streets, overhead bridges and underground passages and dead-end streets are understandable for this model.

It also enables the analysis of geographic phenomena that have network design (rivers, streets, highways, water lines, telephone lines, sewage, electricity, gas, etc.). Some of the most important features of the network analysis model are to find the optimal routes and the closest equipment and facilities, to allocate facilities, to determine the range of services and the access routes and to determine the density or pressure on the network (44).

2-4. Ethical Consideration

The present study was approved by the Research Council and Ethics Committee at Kermanshah University of Medical Sciences under the registration number: 96226.

2-5. Inclusion and Exclusion Criteria

The inclusion criterion was children under the age of 19 years old, while those over 19 were excluded from the study.

2-6. Data Analyses

To evaluate the geographic access, all of the collected data and information were entered into the environment of ArcMap-GIS, and the layers of hospitals were created through developing a geodatabase in the environment of ArcCatalog-GIS.

Then, the location of hospitals were identified on the statistical blocks using the network Analyze, and the rules related to network analysis were applied to the passages using the features of this model. Furthermore, the individual's range of access to hospitals and emergency services was determined using the defined time.

3-RESULTS

According to the statistics, 13 public and private hospitals were based in Kermanshah. Moreover, the statistics of access to hospitals and emergency centers through walking and driving are presented in **Table.1**. Accordingly, in terms of walking, out of the 244,178 people, about 91,292 people (37.38%) had good access, whereas 152,886 (62.62%) were without any access to hospitals (**Figure.1**).

In terms of access to hospital services, the results were as follows: with five minutes of driving (42.90% with access and 57.10% without access), with 10 minutes of driving (80.27% with access and 19.73% without access), with 15 minutes of driving (89.28% with access and 10.72% without access) (**Figure.2**).

According to **Table.2**, in terms of access through walking, the 15-19 age group had the most access (38.70%), as opposed to the 0-4 age group without access (63.67%). On the other hand, the 15-19 age group had the most access to hospitals during five and 10 minutes of driving (44.26% and 80.73%, respectively), as opposed to the 0-4 age group without access (58.15% and 20%, respectively). As for 15 minutes of driving, the 10-14 age group had the most access (89.75%), as opposed to the 0-4 age group without access (11.11%).

Table-1: The Population of Children and Adolescents under 19 with and without Access to Hospitals and Emergency Centers in Kermanshah

Hospital	Children and adolescents under 19 Years	Access through walking		Access through driving					
				5 minutes		10 minutes		15 minutes	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
	Population with access	91292	37.38%	104744	42.90%	196016	80.27%	218002	89.28%
	Population without access	152886	62.62%	139434	57.10%	48162	19.73%	26176	10.72%
	Total Population	244178	100%	244178	100%	244178	100%	244178	100%

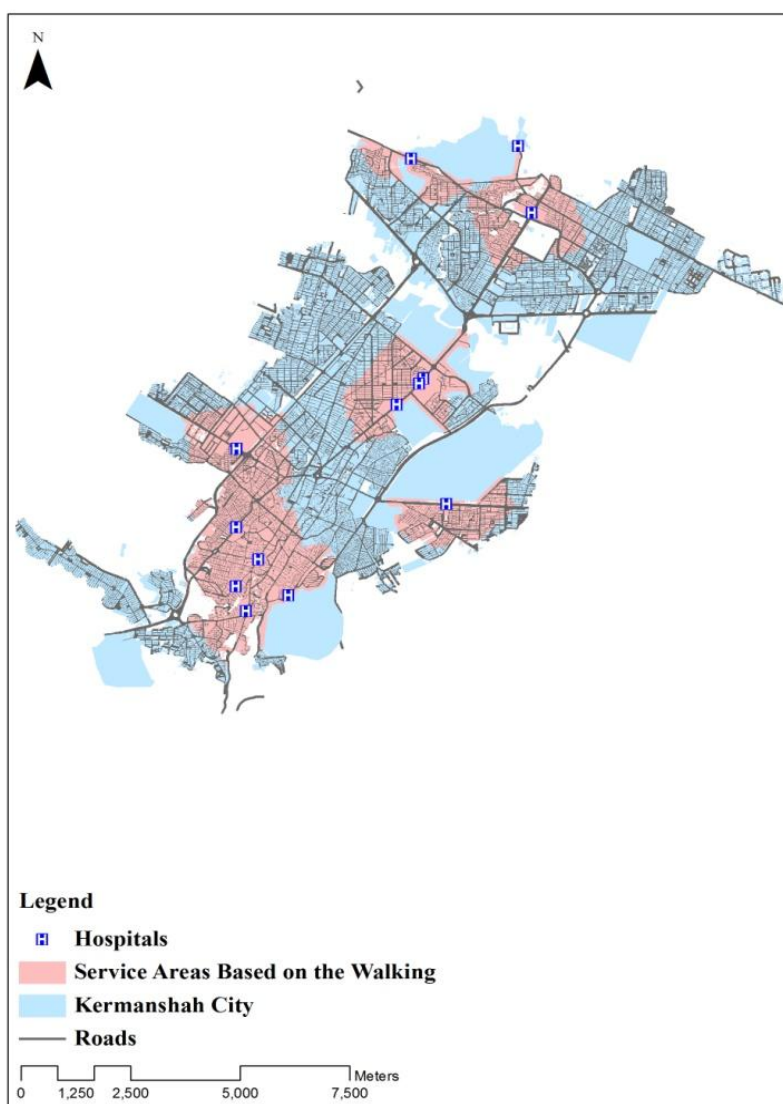


Fig.1: The Range Covered by Hospitals in Terms of Walking.
Source: (Iran Statistical Center, 2011 and Authors Calculations)

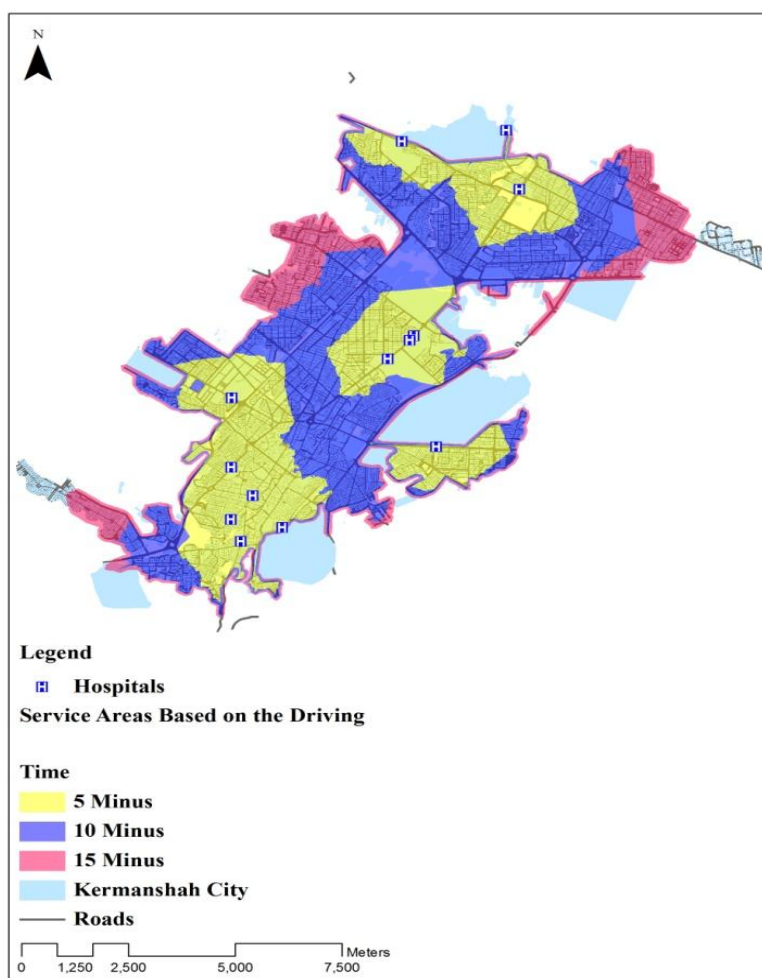


Fig.2: The Range Covered by Hospitals in Terms of Driving.
 Source: Iran's Statistical Center, 2011 and Authors Calculations.

Table-2: The Population of Children and Adolescents under 19 with and without Access to Hospital Centers in Kermanshah in Different Age Groups

Age groups	Access through walking				Access through driving											
	Population with access		Population without access		5 minutes				10 minutes				15 minutes			
	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)
0-4	21078	36.32	36956	63.67	24284	41.84	33750	58.15	46426	79.99	11608	20	51581	88.88	6453	11.11
5-9	19742	36.70	34044	63.29	22711	42.22	31075	57.77	43051	80.04	10735	19.95	47953	89.15	5833	10.84
10-14	21109	37.36	35386	62.63	24171	42.78	32324	57.21	45294	80.17	11201	19.82	50706	89.75	5789	10.24
15-19	29363	38.70	46500	61.29	33578	44.26	42285	55.73	61245	80.73	14618	19.26	67762	89.32	8101	10.67
Total Population	91292	100	152886	100	104744	100	139434	100	196016	100	48162	100	218002	100	26176	100

4- DISCUSSION

The present study aimed to investigate the access of children and adolescents under 19 years old to hospitals and emergency centers in Kermanshah, Iran. The results of the present study demonstrated that out of the 244,178 children and adolescents under 19 years old, about 37% had appropriate access to hospitals and emergency centers. In contrast, 62% of this population lacked proper access to such services. This finding was consistent with the results of studies conducted by Allison and Manski (2007) about the access of children to dental care services (45), and Reshadat et al. (2016) about the access of citizens to health services (33, 46). Hospitals are one of the facilities to which special attention should be paid, and issues such as spatial planning and attention to proper access to these facilities should be taken into consideration for women of reproductive age. It should be noted that lack of adequate distribution of hospital services could lead to ever-increasing problems for citizens in terms of access to these centers. In terms of the status of access during five, 10, and 15 minutes of driving, 42.90%, 80.27% and 89.28% had proper access to hospitals, respectively.

It is worth mentioning that more than half of the population of children and adolescents under 19 years old lacked adequate access to hospitals with five minutes of driving, which was consistent with the results of a study done by Ibrahim (2013), in which it was concluded that 70% of the inhabitants of Kebbi province in Nigeria lacked access to hospital services (24). The appropriateness of access to hospital services has been stressed in a myriad of studies because inappropriate access causes ineffective prevention of diseases, lack of public health care, and increased congenital mortality (47, 48).

The results of the present study showed that there was a good access to hospitals through driving within 10-15 minutes. This finding was concurrent with the results of studies conducted by Reshadat et al. (2018), in which the access of 0-14 year-old girls to health centers and laboratories was investigated (39). The difference between these two studies was in the statistical population. In other words, the statistical population of the present study comprised the children and adolescents under the age of 19 years old. In a study conducted in China, it was shown that 69-79% of the Chinese lacked access to health services in rural and urban areas, an indication that Iran is better than China in this respect. This study was different from the present study because Hu et al. (2013) used the Buffering Method in GIS to study the access of residents of rural and urban areas in China (49), while the network analysis was used in the present work to study the access of urban residents of Kermanshah, Iran.

Moreover, in terms of access through walking and driving, the 15-19 age group had the most access, as opposed to the 0-4 age group without access. In addition, except for the 15-minute period with the highest number of population with access in the 10-14 age group, the number and percentage of the population lacking access indicated that access to hospital services through driving was accompanied by developments. This finding was consistent with the results of a study performed by Reshadat et al. (2015), in which the decreasing trend in the 0-14 age group without access to health centers was stressed (38). The presence of the most population without access in the 0-4 age group is significant, because it is an indication of the necessity of planning for providing the right and fastest services in the shortest possible time and supplying equipment in newly built hospitals to help this age group who are vulnerable and

have high rates of visiting the emergency centers (50). Given that one of the important goals in the post-revolutionary social-economic programs of Iran was the reduction of deprivation and elimination of inequalities between different regions, the ecological, human and natural structure of healthy cities will be damaged in case of ignoring this issue, and the management system of urban health will also be inefficient in spite of allocating large amounts of funding. Therefore, it is suggested that the status of vulnerable people's access and application of applied tools (GIS) be considered in future policies for the construction of new hospitals. One of the limitations of the present study was the lack of statistical blocks of 2016, which left the authors of the present study with no other choice but to use the statistical blocks of 2011 instead.

5- CONCLUSION

In Kermanshah city, the access of children and adolescents under 19 years old to hospitals and emergency centers using vehicles was in a desirable condition, an indication of the success of implementing some post-revolutionary health plans and reducing deprivation and eliminating inequalities across various regions. However, it should be noted that there were problems in terms of access to hospitals and emergency centers through walking, which requires taking actions by authorities in Kermanshah.

6- CONFLICT OF INTEREST: None.

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