Original Article

Evidence for Policy Making: Health Services Access and Regional Disparities in Kerman

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Abstract

Background and purpose: Health indices, regarding to their role in the development of a society, are one of the most important indices at national level. Success of national development programs is largely dependent on the establishment of appropriate goals at the health sector, among which access to healthcare facilities is an essential requirement. The aim of this study was to examine the disparities in health services access across the Kerman province.

Materials and Methods: This was a cross-sectional study. Study sample consisted of the cities in Kerman province, ranked based on 15 health indices. Data was collected from statistical yearbook. The indices were weighted using Shannon entropy, then using the TOPSIS technique and the result were classified into three categories in terms of the level of development across towns.

Results: The findings showed distinct regional disparities in health services across Kerman province and the significant difference was observed between the cities in terms of development. Shannon entropy introduced the number of pharmacologist per 10 thousand people as the most important indicator and the number of rural active health center per 1000 people as the less important indicator. According to TOPSIS, Kerman (0.719) and Fahraj (0.1151) ranked the first and last in terms of access to health services respectively.

Conclusion: There are significant differences between cities of Kerman province in terms of access to health care facilities and services. Therefore, it is recommended that officials and policy-makers determine resource allocation priorities according to the degree of development for a balanced and equitable distribution of health care facilities.

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1.Introduction

Recognizing the existing situation using appropriate indicators and reducing disparities is essential. The aim of socio-economic development programs after the Iranian revolution is reduction of inequality in order to create social and economic justice in all provinces (1). Regional studies reveals that some areas have better performance than the other ones and enjoy more facilities and development level(2).GDP(Gross domestic product) and GDP per capita were the main indicators to assess development level. These indicators do not consider fairness in the distribution of health services and other social services (3). Health and development are closely linked to each other and can affect interchangeably (4). Health sector as an important social part of any country plays a decisive role in the well-being of people (5).Access to health care is crucial and is a multi-dimensional concept; physical access and financial access. Physical access is defined as geographical access to health facilities which can effect on health services usage(6). This issue has been the concern of community and health policy makers (7, 8). Regional studies in many countries reveal that specific areas have better performance and have enjoyed the modern facilities(2).After the Islamic Revolution special attention has been paid to the health sector. Iran's Constitution has defied the provision of basic needs in health care as the responsibility of the government to mobilize its resources to meet the nation's health (9). The geographical distribution of health indicators (as one of the most

important indicators of development) in the cities of Iran is heterogeneous and disproportionate (10). Iran's geographical conditions has led to the diversity and unbalanced development (11). Similar to other developing countries, some areas compare to small areas are responsible for the majority of production and national income. This means their income is at a higher level and as a result, they enjoy more public service (12).Therefore, it is necessary to define the term access to health services and then develop a comprehensive program to fix this problem. This study was conducted using TOPSIS technique (The Technique for Order of Preference by Similarity to Ideal Solution) to assess the health services access across the Kerman province. Due to the multiplicity of criteria for comparison subjects, the use of other techniques will lead to problems in decision-making. However, these things do not occur in the TOPSIS technique. TOPSIS technique as a family member in a multi-criteria decision making techniques are used to rank the different concepts of science, due to the transparent nature, mathematical logic and do not have any operational issues (13). Kerman located in southeastern Iran is considered as one of important and historical provinces. Kerman is regarded as the most important reference to the industrial, cultural, political, agricultural, academic and scientific, religious and other factors within the South-East region of Iran. The aim of this study was to provide a clear vision from the status of Kerman cities in terms of access to health services.

2. Materials and Methods

This was a cross-sectional study. The sample included all 16 towns of Kerman province which were ranked based on 15 health indices. The health indices were selected based on their availability at 2011 National Statistics Center's annual report that included some indicators of availability of healthcare human and physical resources as follows:

a) Number of laboratories per 1000 people, b) Number of rural active health house workers per1000 people, c) Number of general practitioners per 1000 people, d) Number of specialists per 1000 people, e) Number of paramedics per 1000 people, f) Number of active inpatient beds per 1000 people, g) Number of rural active health houses per 1000 people, h) Number of pharmacies to 1000 people, i) Number of pharmacologist per 10 thousand people, j) Number of dentists per 1000 people, k) Number of rural active health centers per 1000 people, l) Number of urban health centers per 1000 people, m) Number of radiology centers per 1000 people, n) Number of rehabilitation centers to 1000 people, o) Number of active treatment centers per 1000 people.

Data were collected by a data collection form made by the researcher from the above-mentioned source. These indices were weighted using Shannon entropy, then using the TOPSIS technique, according to which each town was evaluated in terms of its access to health services and finally the towns were classified into three categories in terms of the level of development.

Shannon entropy method included the following steps (14):

First, the raw data matrix was normalized according to the formula:

$$P_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}}$$

"P_{ij}" is the normalized value of the index "j" in the "i-th"rank; "r_{ij}" is the initial index value; and "m" is the number of options available to the ranking. Then "E_j"(entropy per index) of "P_{ij}", for each index was calculated:

$$E_j = -K \sum_{i=1}^{m} (P_{ij} \times LnP_{ij}) \qquad K = \frac{1}{Ln(n \times m)}$$

"n"is the number of variables and "m" the number of places which are compared with. Accordingly, the degree of uncertainty or standard deviation (d_j) for each of the indices is obtained:

$$d_j = 1 - E_j$$

Finally, the weight of each indicator (W_j) is calculated as follows:

$$W_j = \frac{d_j}{\sum_{j=1}^{n} d_j}$$

TOPSIS is done in the following steps (22):

First, the maximum (x_j^+) and minimum (x_j^-) values of each index are identified. Then, using the following equation, normalization takes place.If the positive and negative indices are intended to be combined reversing the negative aspects into positive aspects should be done as follows:

$$r_{ij} = \frac{x_{ij}}{x_j^+} x_{ij} > 0 \quad r_{ij} = \frac{x_j^-}{x_{ij}} x_{ij} < 0$$

The standard weighted matrix based on the following equation is obtained:

$$v_{ij} = r_{ij} \times w_j$$

The positive ideal and negative ideal solutions for each of the indices are determined by the following procedure:

$$A^+ = \left[v_1^+, v_2^+, \ldots, v_j^+, \ldots v_n^+ \right] A^-$$
$$= \left[v_1^-, v_2^-, \ldots, v_j^-, \ldots v_n^- \right]$$

The positive ideal index is equal to its maximum, and the negative ideal in every index, the index is equal to the minimum. Distance of each option compared with ideals of positive and negative, are as follows (S_i^+, S_i^-):

Distance option i from the positive ideal:

$$S_i^+ = \sum_{j=1}^n \left| v_{ij} - v_j^+ \right| = \sum_{j=1}^n D_{ij}^+$$

Distance option i from the negative ideal:

$$S_i^- = \sum_{j=1}^n \left| v_{ij} - v_j^- \right| = \sum_{j=1}^n D_{ij}^-$$

For calculation of relative closeness of each alternative to the ideal we should combine the values of S_i^+ and S_i^-:

$$C_i^+ = \frac{S_i^-}{S_i^+ + S_i^-}$$

The ranking is done based on the decreasing values of C_i^+, means that the highest C_i^+ is considered as the most developed, and the lowest C_i^+ as most undeveloped.

3. Results

Encompassing more than 11 percent of Iran's area, Kerman is the largest province of Iran. The objective of this study was to use TOPSIS technique for appraising health services access in cities of Kerman province and to aware the policy maker in order to reduce differences in the cities.

First, using Shannon entropy techniques, weight and ranking indices for determining the degree of development of Kerman cities is derived (Table 1).

Table 1. Titles, ranking and weighing indices to determine the degree of development

Code	Indices	Weight	Rank
1	Number of laboratory per 1000 people	0.0663	8
2	Number of rural active health house workers per 1000 people	0.0638	11
3	Number of general practitioner per 1000 people	0.065	9
4	Number of specialist per 1000 people	0.0691	5
5	Number of paramedical per 1000 people	0.065	10
6	Number of active beds of treatment centers per 1000 people	0.0688	6
7	Number of rural active health house per 1000 people	0.062	14
8	Number of pharmacy to 1000 people	0.0634	12
9	Number of pharmacologist per 10 thousand people	0.0756	1
10	Number of dentist per 1000 people	0.0697	2
11	Number of rural active health center per 1000 people	0.0618	15
12	Number of urban health centers per 1000 people	0.0621	13
13	Number of radiology centers per 1000 people	0.0693	4
14	Number of rehabilitation centers to 1000 people	0.0693	3
15	Number of active treatment centers per 1000 people	0.0687	7

As Table 1 shows, among the 15 indices of health, the number of pharmacologists per 10 thousand people with weight of 0.0756 and number of rural active health centers per 1000 people with weight of 0.0618 had the highest (1th) and lowest (15th) ranks respectively.

Using TOPSIS technique, Kerman towns were compared in terms of access to health services. In order to define a priority measure and for a better understanding of the status to health services access in Kerman, 16 towns were assessed and ranked into three categories (Table 2).

Table 2. Kerman cities ranking in the degree of development

Rank	City name	Coefficient of development	Degree of development
1	Kerman	0.719	
2	Rafsanjan	0.5957	**Developed**
3	Ravar	0.574	
4	Baft	0.5126	
5	Zarand	0.5123	
6	Bardsir	0.4438	
7	Bam	0.4126	**Developing**
8	Shahr-e Babak	0.4104	
9	Sirjan	0.3978	
10	Jiroft	0.3469	
11	Kahnuj	0.2783	
12	Faryab	0.2226	
13	Arzouyeh	0.1851	**Under developed**
14	Narmashir	0.156	
15	Reygan	0.1316	
16	Fahraj	0.1151	

The results show that the highest and lowest degrees of development based on TOPSIS technique in Kerman province, belonged to Kerman (0.7190) and Fahraj (0.1151) respectively. Results indicate that in terms of access to health services, Kerman, Rafsanjan and Ravar can be regarded as developed, while Kahnuj, Faryab. Arzouyeh, Narmashir, Reygan and Fahraj are categorized as underdeveloped. Other cities (Baft, Zarand, Bardsir, Bam, Shahr-e Babak, Sirjan and Jiroft) were in the category of developing. The findings show a large gap between Kerman towns in terms of access to health services.

4. Discussion

The quality and accessibility of health services is one of the most important indicators for developing countries owing that having a healthy life is a right for all and is a prerequisite for the realization of sustainable development (15). In this study we tried to examine the disparities in health services resources across Kerman Province and consequently, identify priorities for the development. 15 indicators were selected and analyzed using Shannon entropy and TOPSIS technique.

The Shannon entropy results showed that the number of pharmacologists per 10 thousand people was the most important indicator, and the rural active health centers per 1000 people had the least importance. The results are consistent with study of TahariMehrjardi et al (16). The results indicate that number of pharmacologists per 10 thousand people had an uneven distribution across the cities of Kerman; while Kerman city had an score of 0.374, other cities such as Bardsir, Reygan, Sirjan, Shahr-e Babak, Faryab, Narmashir and Fahraj suffered from lack of pharmacologists with a score Similar uneven distribution was found about other human resources; while number of dentists per 1000 people was 0.145 in Rafsanjan, Arzouyeh, Reygan, Faryab and Narmashir had no dentists. Also number of rehabilitation centers per 1000 people was 0.055 in the city of Kerman, while Reagan, Faryab, and NarmashirFahraj County had no such facilities (zero).

Health services should be accessible for all people in the Farthest and poorest parts of the country; however some services, such as specialist and active bedscan only delivered at larger cities and cover the suburbs.

Smaller cities with a population lower than the service for population threshold only can be provided with mobile services or only on special weekdays (15).

The results of this study show that access to healthcare facilities was very different among people in the Kerman Province. 18.75 % of the cities (Kerman, Rafsanjan and Ravar) were in the level of development; 43.75 % (including seven cities: Baft, Zarand, Bardsir, Bam, Shahr-e Babak, Sirjan and Jiroft) were in developing level, and 37.5 of cities (including 6 cities: Kahnuj, Faryab, Arzouyeh, Narmashir, Reagan and Fahraj) were under developed in terms of their access to healthcare services. Kerman city took the most and Fahraj city the least access to the health care facilities. In Zangiabadi`s studies (17) in Kurdistan, Nastaran(18) and Zarrabi(19) in Isfahan, Rafi'iyaan(4) at the Metropolis of Mashhad, Mousavi(20) in Kermanshah and Farhadyan(21), Amini(2) and Zarrabi(15) in all provinces were similar in conclusions about differences and disparities in the health services access. Also other studies at national level have shown uneven access to healthcare and other public facilities(22).

Therefore, planners and policy-makers should focus their efforts on disparities in access and solving. In order to reduce the uneven access to healthcare services across cities and making it as an equitable distribution the authorities may need to develop first, a comprehensive and coordinated plan as a large-scale centralized and top-down approach, and second, (ii) a local and micro plan in small spatial scale (23).

Finally, it is suggested that government's investments and its support from the private sector should be based on local needs and social justice which can result in solving regional disparities and elimination of inequalities (24).

In terms of access to facilities we are certain that there are gaps and inequalities among the provinces and cities across the country. One of the possible reasons for this situation is governments' planning approaches through last 50 years. Because the decision

making have been according to center-periphery model; most facilities located in large towns and cities, especially the capitals of the provinces, and very poor situation in other regions (25).

In order to reduce the gap between the cities' access to health care and making distribution of services equitable, development of health indicators in poor cities (such as Kahnuj, Faryab, Arzouyeh, Narmashir, Reagan and Fahraj), and then developing ones (Baft, Zarand, Bardsir, Bam, Shahr-e Babak, Sirjan and Jiroft) is recommended. Furthermore, it is suggested that in the first stages of city development, authorities have special notice to development of short term health policies and programs which could result in expansion of critical health services and equity in access. At the next stage, authorities may pay attention to the development of necessary services in developing and deprived cities over a medium-term plan (5 years). Finally all cities spatial development in long term (10 year plan) could make access to health services quite equitable. Thus in order to reduce the access difference across Kerman Province, a hierarchical order based on the spatial hierarchy will occur.

Acknowledgments

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