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RESEARCH ARTICLE

INVESTIGATING THE DEVELOPMENT AND ACCESS TO HEALTHCARE SERVICES ACROSS IRANIAN PROVINCES

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ABSTRACT

BACKGROUND:

A country's health status and the accessibility by its people to various healthcare services represent important indicators of development. This study investigated the development of Iranian provinces and measured accessibility to healthcare services within them.

METHODS:

The study extracted data from the country's statistical yearbook over five years (2015-2019) and analyzed the data through multi-criteria decision-making (MCDM) techniques. More specifically, numerical taxonomy was used to measure the level of development in each province, the CRITIC method helped to calculate the weights of the indicators, and the combined compromise solution (CoCoSo) method was employed to rank the Iranian provinces.

RESULTS:

The findings of taxonomy analysis demonstrated that provinces such as East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan, and Mazandaran were among the Iranian provinces that had reached satisfactory development. The ranking of the provinces using the CoCoSo method revealed that provinces such as Semnan, Yazd, Ilam, and South Khorasan were the most privileged regions in terms of accessibility to healthcare services.

CONCLUSION:

Comparing health indicators over different years showed that, despite the progress of all Iranian provinces, there were marked differences in the distribution of healthcare services across the country.

KEYWORDS

healthcare, accessibility, development level, numerical taxonomy, CRITIC, CoCoSo

INTRODUCTION

The process of comprehensive development involves various social, cultural, economic, and political activities. Similarly, human development, as an essential criterion for achieving general development, depends on the health status of human communities. The reason for this is that development in the health sector is a basic driver of development in other areas. The health status of any

country is considered to be an important indicator of its development. The health sector itself in any society is assessed based on the different health resources is provided and the accessibility to such resources. Therefore, it would be very important to ensure a fair distribution of health and medical resources, while facilitating people's fair access to healthcare services [1, 2].

Health performance sector indicators can only be improved if services rely on advanced equipment and facilities. However, a lack of facilities and human resources, along with an improper distribution of them, could lead to major challenges facing the health sector in developing countries [3]. Despite the importance of a fair and proper distribution of facilities in different geographical areas, there are conspicuous differences between urban and rural areas in terms of their access to health resources. Meanwhile, even states or provinces in a country may show many inequalities in the availability/accessibility of healthcare services. Many studies have addressed the quality of facilities and the ways of enhancing indicators of development in the health sector.

For instance, in Iran studies have explored such provinces as Kerman, Zanjan, Kurdistan, Sistan and Baluchestan, and Khorasan Razavi [1, 4-7], while some investigations compared conditions in different provinces [8]. The findings in these studies, along with the surveys conducted in other countries [9-11], have shown that health services/facilities are usually concentrated in urban areas while revealing considerable differences regarding access to healthcare resources among cities and even states/provinces. Such inequalities could significantly affect the efficiency of a healthcare system [12].

A properly designed development plan for the health system must first evaluate the status of the community in terms of the availability of health facilities and perfromance indicators. Meanwhile, it would be particularly important to determine the healthcare development levels of different provinces because the information about a provinces' medical resources and capacities helps remakably to formulate proper national and regional plans.

The purpose of this study was to investigate the status of health indicators and to rank Iranian provinces through multi-criteria decision-making (MCDM) techniques, by using data for the period 2015-2019. The study emphasizes that identifying and ranking the regions based on health indicators can make it possible to unveil the distribution status of these indicators and provide a reliable basis for planning the equitable distribution of health indicators in the future.

MATERIALS AND METHODS

This study was an applied, descriptive survey that drew on cross-sectional data to analyze 18 significant healthcare indicators in the provinces of Iran. The access indicators used in this study were from the three specific categories of: human resources; medical centers; and equipment actively utilized in healthcare. The complete list of indicators is in Table 3. The data were collected from the statistical yearbooks of Iran between 2015 and 2019. The data were then analyzed through multiple criteria decision-making[1] methods, namely taxonomy analysis, the CRiteria Importance Through Intercriteria Correlation[2] method, and the combined compromise solution[3] method. As this study relied on MCDM analysis methods, no sampling method was employed and the whole target population was examined.

Primarily, the indicators obtained for all the Iranian provinces (31 provinces) were analyzed using the taxonomy analysis method. Different methods have been used to assess the development level of the regions and one of the most important of them is numerical taxonomy. The numerical taxonomy divides a set into more or less homogeneous subsets and uses it as a scale for recognizing the level of economic and social development.

The taxonomy method provides the possibility to divide the data into two or more categories based on the mean or standard deviation. Therefore, in this study, we used the average and considered the lower than the average as developing, and higher as developed provinces.

It should be noted the taxonomy procedure did not consider the factor of population (population number). The provinces that showed a below-average development rate were categorized as "developing", whereas the provinces with a development rate greater than the average value were considered to be "developed" ones.

[1] MCDM

[2] . CRITIC

[3] . CoCoSo

At the next stage, the provinces were ranked in terms of their accessibility to health indicators. To this end, first, the weights of the indicators were computed using the CRITIC method. Then, the provinces were prioritized through the CoCoSo method based on their populations.

This study was approved under the ethical code IR.KMU.REC.1400.396 from the Kerman university of medical science.

Set out below, are each of the methods used and their steps are described in detail.

NUMERICAL TAXONOMY

Numerical taxonomy is one of the methods for grading different regions in terms of development and has been used in studies that investigated the level of development in terms of access to health indicators. [8, 14-16]. The steps of this method are briefly as follows:

Step 1: In the first step, a decision matrix consisting of n criteria and m alternatives was developed. In this study, the criteria were indicators in the healthcare sector and alternatives were all provinces of the country. The decision matrix is then normalized according to Equation (1), where xij is the data of each column, $\bar{x}$ is the average of each column and σ is the standard deviation of the data of each column.

$$Z_{ij}=\frac{xij-\bar{x}}{\sigma} \quad (1)$$

Step 2: In the next step, using the elements of the normalized matrix, the distances between different provinces are calculated using Equation (2). In this regard, Cio is the distance of region i from the ideal region of Zij. , Zij are the values of the normalized matrix and Zoj is the ideal value of the j indicator.

$$\mathrm{Cio} = \sqrt{\sum(\mathrm{Zij}-\mathrm{Zoj})\text{^}2} \quad (2)$$

Step 3: In this step, the shortest distance between the two alternatives is determined and the homogeneity distance is calculated based on the upper and lower limits according to Equations (3) and (4).

$$d^{+} = \bar{d} + 2\sigma_d \quad (3)$$

$$d^{-} = \bar{d} - 2\sigma_d \quad (4)$$

Also at this stage, the alternatives between the upper and lower limits are considered homogeneous. If their minimum distance is outside this range, they will be considered heterogeneous.

Step 4: In the last stage, the degree of development for each alternative is obtained. This degree is a value between zero and one, and in some exceptions, it can take more than one. The closer this value is to zero, the more developed the province will be. On the other hand, the closer this value is to one, indicates the low level of development of that alternative. [8] The degree of development can be calculated using Equation (5).

$$\mathrm{Di} = \frac{\mathrm{Cio}}{\mathrm{Co}} \quad (5)$$

In the above equation, the value of Co is obtained from the sum of the mean value of Cio and twice its standard deviation.

CRITIC METHOD

CRITIC is a method for calculating the weight of criteria in multi-criteria decision-making problems in which the importance of criteria is determined by correlation coefficients and standard deviation of data. [17] The CRITIC method has been used to determine the importance and weight of criteria in various contexts such as software selection [18] and sustainable supply chain risk management [19]. The steps for using this method are briefly described below.

Step 1: In the first step, a decision matrix containing n indicators and m alternatives is developed and normalized using Equation (6) where xij is the value of each element of matrix, x min and x max are the minimum and maximum values of the matrix in each column, respectively.

$$\mathrm{rij}=\frac{\mathrm{xij}-\mathrm{x\ min}}{\mathrm{x\ max}-\mathrm{x\ min}} \quad (6)$$

Step 2: Then, the value of c for each column of the decision matrix is determined according to the Equation (7), where rij shows elements of the normalized decision matrix, σ is the standard deviation of the data of each column and m is the number of indicators.

$$c = \sigma\sum_{i=1}^{m}(1-\mathrm{rij}) \quad (7)$$

Step 3: Finally, the value of c calculated for each column of the matrix is divided by the sum of the values of c, in order to obtain the final weight of each indicator, which is shown in Equation (8).

$$w = \frac{c}{\sum_{i=1}^{m} c} \quad (8)$$

COMBINED COMPROMISE SOLUTION (COCOSO) METHOD

CoCoSo is a technique for prioritizing a set of alternatives by the combination of simple additive weighting and an exponentially weighted product model. The CoCoSo method provides simpler and easier steps and eliminates the weaknesses of other MCDM methods such as TOPSIS or COPRAS (26). This method has been used in various contexts such as supplier selection [21, 22] and health sector evaluation [23]. The steps of this method are briefly reviewed below.

Step 1: First, a decision matrix, including indicators and alternatives, is formed and normalized According to Equation (9) and (10) where xij is the value of each element of the matrix, x min, and x max are the minimum and maximum values of the matrix in each column, respectively. This normalization is different for the cost and benefits indicators. It should also be noted that in this study, all indicators were of a benefit nature.

$$rij = \frac{xij - x\,min}{x\,max - x\,min} \quad \text{for benefit indicators} \quad (9)$$

$$rij = \frac{x\,max - xij}{x\,max - x\,min} \quad \text{for cost indicator} \quad (10)$$

Step 2: In the next step, two values S and P are calculated according to Equations (11) and (12). S value is obtained according to the grey relational generation approach, whereas P value is determined based on the WASPAS multiplicative attitude. Also, the value of w is obtained from weight calculating methods (in this study, the CRITIC method). In addition, the rij values are elements of the normalized decision matrix.

$$S = \sum_{j=1}^{n} (wj\ rij) \quad (11)$$

$$P = \sum_{j=1}^{n} (rij)^{wj} \quad (12)$$

Step 3: Then, the values of Ka, Kb and Kc are calculated for each alternative using S and P values through Equations (13) to (15). Equation (13) shows the arithmetic mean of Weighted product method (WPM) and weighted sum method (WSM), Equation (14) depicts a sum of relative scores of the two methods in comparison to the best, and Equation (15) expresses the balanced compromise of WSM and WPM scores. Furthermore, λ is chosen by decision-makers, which is usually 0.5 (2).

$$Ka = \frac{P+S}{\sum (P+S)} \quad (13)$$

$$Kb = \frac{S}{\min S} + \frac{P}{minP} \quad (14)$$

$$Kc = \frac{\lambda\,(S)+(1-\lambda)(P)}{\lambda\,(\max S)+(1-\lambda)(\max P)} \quad (15)$$

Step 4: Lastly, the previous values are integrated as the sum of geometric and arithmetic means to determine a final K value according to Equation (16). Higher value of K indicates the superiority of that alternative.

$$K = (Ka * Kb * Kc)^{1/3} + \frac{1}{3}(Ka + Kb + Kc)$$

RESULTS

After the information about the health system in the provinces was collected over the five year period from 2015 to 2019, taxonomic analysis was used to evaluate the degree of development of each province. Based on this method, a value closer to zero would point to a more developed provincial status. In contrast, a value closer to one would indicate lower levels of development in a given province. To conduct a more precise analysis, the average development of the entire country was calculated and was considered to be a measure of development. According to Table 1, during these five years provinces such as East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan and Mazandaran exhibited a status higher than the national development average and were thus categorized as "developed" provinces. Meanwhile, Ilam, North Khorasan, Semnan, and South Khorasan showed the lowest level of development (see Table 1).

TABLE 1. LEVEL OF DEVELOPMENT FOR PROVINCES OF IRAN

Provinces	Years				
	2015	2016	2017	2018	2019
East Azerbaijan	0.6300	0.6243	0.6369	0.6403	0.6615
West Azerbaijan	0.6844	0.7116	0.7049	0.6907	0.7360
Ardabil	0.8077	0.8216	0.8096	0.8064	0.8155
Isfahan	0.5085	0.5460	0.5333	0.5360	0.5581
Alborz	0.7653	0.7728	0.7703	0.7549	0.7698
Ilam	0.8341	0.8475	0.8449	0.8431	0.8566
Bushehr	0.8059	0.8198	0.8172	0.8183	0.8308
Tehran	0.1487	0.2163	0.2064	0.19410	0.2432
Chaharmahal and Bakhtiari	0.8043	0.8167	0.8190	0.8134	0.8207
South Khorasan	0.8151	0.8265	0.8242	0.8201	0.8327
Razavi Khorasan	0.4804	0.5061	0.4932	0.4969	0.5120
North Khorasan	0.8191	0.8332	0.8274	0.8259	0.8449
Khuzestan	0.6883	0.6133	0.6199	0.5996	0.6133
Zanjan	0.7928	0.8116	0.8056	0.8082	0.8076
Semnan	0.8240	0.8369	0.8339	0.8383	0.8513
Sistan and Baluchestan	0.7263	0.7380	0.7240	0.7114	0.7201
Fars	0.5510	0.5404	0.5188	0.5423	0.5522
Qazvin	0.8012	0.8091	0.8093	0.8119	0.8135
Qom	0.8105	0.8305	0.8309	0.8335	0.8427
Kurdistan	0.7796	0.7940	0.7904	0.7878	0.7916
Kerman	0.7040	0.6925	0.6793	0.6639	0.6746
Kermanshah	0.7566	0.7564	0.7502	0.7490	0.7533
Kohgiluyeh and Boyer-Ahmad	0.8361	0.8446	0.8401	0.8344	0.8375
Golestan	0.7335	0.7626	0.7560	0.7653	0.7713
Gilan	0.7018	0.7306	0.7262	0.7237	0.7377
Lorestan	0.7625	0.7829	0.7726	0.7795	0.7586
Mazandaran	0.6260	0.6458	0.6639	0.6633	0.6676
Markazi	0.7747	0.7899	0.8003	0.7889	0.7967
Hormozgan	0.7573	0.7763	0.7768	0.7907	0.8071
Hamadan	0.7422	0.7593	0.7496	0.7653	0.7765
Yazd	0.7835	0.7937	0.7901	0.7869	0.8183
Average	**0.7168**	**0.7307**	**0.7263**	**0.7253**	**0.7378**

The results also revealed that from 2015 to 2016 all 31 provinces showed an increasing development trend. However, from 2016 to 2017, the average development rate of the provinces underwent a decline. Finally, a sharp increase was demonsrated in 2018 in the development trend as the year that marked the highest rate of development (see Figure 1). In addition, the analysis clarified that the development rates of all provinces had decreased over the period of five years, although only Khuzestan and Kerman provinces showed great progress in this period.

The results also revealed that in 2015 such indicators as "rehabilitation centers" and "specialized medical doctors" had the highest weights, whereas the least important indicator was "active hospitals." In 2016, "the number of dentists" was recognized as the most important factor, followed by "general and specialized clinics." The least important indicator in 2016 was "general practitioners." In addition, the results of the analysis indicated that in 2017, "general and specialized clinics" were recognized as the most important indicator, followed by "the number of pharmacists." In the same year, "health houses" showed the lowest weight was recognized as the least important indicator. In 2018, "rehabilitation centers" was considered to be the most important indicator for the second time over the period of five years, followed by "the number of dentists." However, "the number of pharmacies" showed

the lowest weight. In the final year, 2019, the indictor "the number of nurses" displayed the highest weight and was recognized as the most important factor, followed by "urban and rural health centers." The least important indicator was "health houses" (see Table 2).

FIGURE 1. AVERAGE LEVEL OF DEVELOPMENT BETWEEN 2015 – 2019

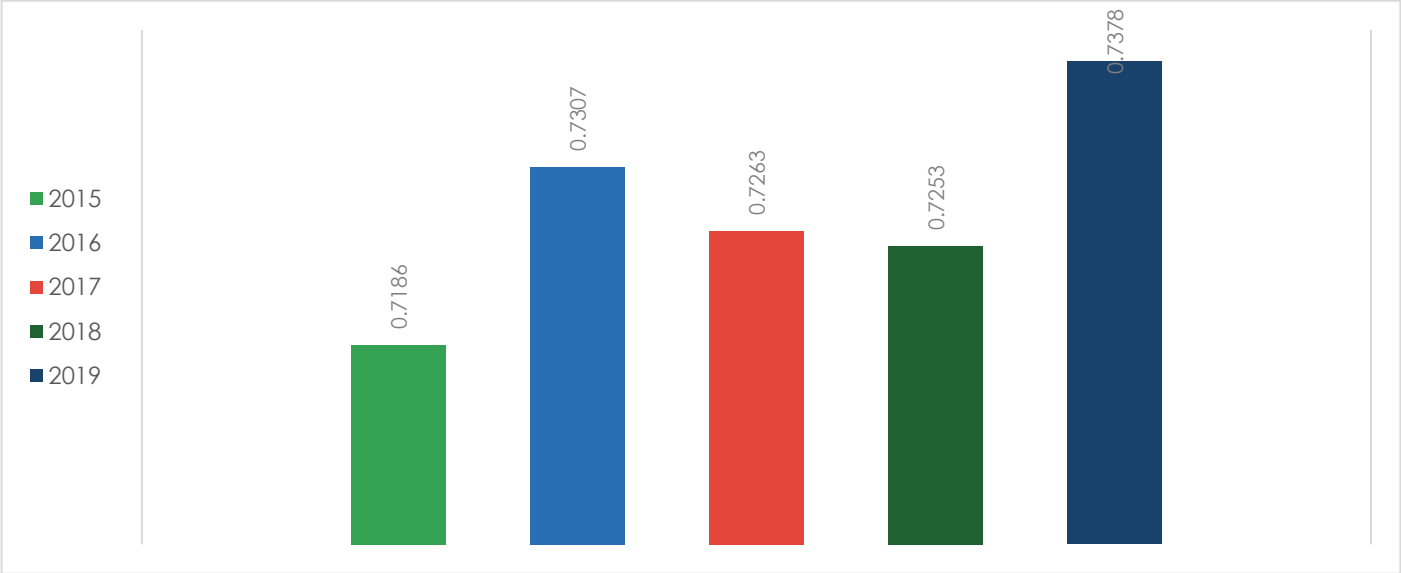


TABLE 2. WEIGHT COEFFICIENTS OF HEALTH INDICATORS PER CAPITA FOR EACH PROVINCE

Indicators	2015	2016	2017	2018	2019
General Practitioners	0.0523	0.0456	0.0526	0.0413	0.0530
Specialists	0.0526	0.0548	0.0566	0.0737	0.0577
Pharmacists	0.0440	0.0487	0.0585	0.0451	0.0545
Dentists	0.0522	0.0738	0.0534	0.0637	0.0551
Doctor of Philosophies	0.0755	0.0640	0.0557	0.0607	0.0552
Nurses	0.0380	0.0563	0.0573	0.0610	0.0668
Mamas	0.0553	0.0460	0.0539	0.0481	0.0533
Active Hospitals	0.0352	0.0504	0.0561	0.0518	0.0561
Active Beds	0.0570	0.0541	0.0577	0.0649	0.0532
Medical Laboratories	0.0626	0.0711	0.0576	0.0641	0.0565
Rehabilitation centers	0.0755	0.0502	0.0562	0.0742	0.0560
Nuclear Medicine Centers	0.0408	0.0485	0.0548	0.0516	0.0540
Pharmacies	0.0429	0.0538	0.0554	0.0382	0.0554
General and Specialized Clinics	0.0660	0.0732	0.0598	0.0645	0.0548
Emergency Centers	0.0711	0.0499	0.0526	0.0500	0.0532
Primary Healthcare Centers	0.0522	0.0469	0.0532	0.0539	0.0546
Health Centers	0.0745	0.0630	0.0569	0.0413	0.0587
Health Houses	0.0523	0.0499	0.0520	0.0521	0.0521

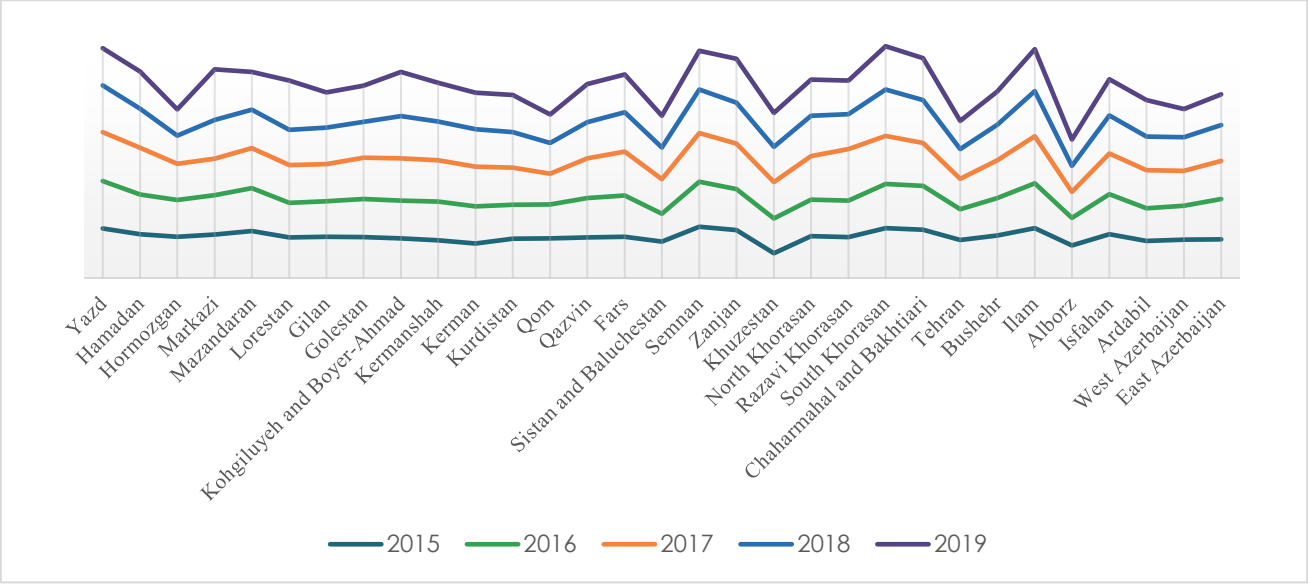
The provinces were then prioritized using the CoCoSo method. In this method, higher K values pointed to higher ranks, which showed the provinces' access to the indicators of the health sector in proportion to their populations. On this account, such provinces as Semnan, Yazd, and Central Khorasan Razavi were in a better situation than the other provinces. Table 3 lists the details of all provinces.

Figure 2 also illustrates the ranks of the provinces according to the health indicators. The results revealed that over the five years investigated in this study, in 2015 Khuzestan and Alborz were among the least developed provinces in Iran, respectively.

TABLE 3. K VALUE ACCORDING TO THE COCOSO METHOD FOR EACH PROVINCE

Provinces	Years				
	2015	2016	2017	2018	2019
East Azerbaijan	1.8630	1.9550	1.8433	1.7210	1.4896
West Azerbaijan	1.8516	1.6398	1.6891	1.6137	1.3628
Ardabil	1.7819	1.5856	1.8360	1.6203	1.7727
Isfahan	2.1143	1.9246	1.9746	1.8392	1.7443
Alborz	1.5715	1.3281	1.2581	1.2566	1.2725
Ilam	2.4121	2.1609	2.2786	2.1770	2.0239
Bushehr	2.0454	1.8118	1.8335	1.7095	1.6147
Tehran	1.8342	1.4801	1.4759	1.4328	1.3618
Chaharmahal and Bakhtiari	2.3365	2.1047	2.0711	2.0750	2.0248
South Khorasan	2.4031	2.1394	2.3138	2.2531	2.0839
Razavi Khorasan	1.9778	1.7645	2.4762	1.6957	1.6270
North Khorasan	2.0145	1.7753	2.0960	1.9554	1.7389
Khuzestan	1.1937	1.6809	1.7590	1.6981	1.6400
Zanjan	2.3118	1.9806	2.1933	1.9783	2.1235
Semnan	2.4738	2.1722	2.3486	2.1019	1.8773
Sistan and Baluchestan	1.7607	1.3436	1.6651	1.5402	1.5238
Fars	1.9846	1.9927	2.1218	1.9015	1.8208
Qazvin	1.9587	1.9093	1.9079	1.7422	1.8478
Qom	1.9100	1.6359	1.4865	1.4845	1.3848
Kurdistan	1.8985	1.6362	1.7872	1.7285	1.7852
Kerman	1.6667	1.7853	1.9240	1.8151	1.7589
Kermanshah	1.8235	1.8701	1.9920	1.8703	1.8769
Kohgiluyeh and Boyer-Ahmad	1.9140	1.8288	2.0273	2.0471	2.1397
Golestan	1.9752	1.8465	1.9934	1.7256	1.7433
Gilan	1.9908	1.7115	1.8035	1.7563	1.6961
Lorestan	1.9540	1.6739	1.8207	1.7098	2.3737
Mazandaran	2.2728	2.0665	1.9353	1.8486	1.8349
Markazi	2.0977	1.9068	1.7575	1.8684	2.4521
Hormozgan	1.9949	1.7694	1.7525	1.3520	1.2729
Hamadan	2.1123	1.9234	2.2568	1.8806	1.7935
Yazd	2.3896	2.2930	2.3624	2.2561	1.8004

FIGURE 2. K VALUE FOR EACH PROVINCE BETWEEN 2015 – 2019



DISCUSSION

Because the development of the health sector basically contributes to the expansion of other sectors in a society, policymakers must take into account and substantially investigate regional (e.g., provincial) developments. The present study ranked Iranian provinces from the perspective of health indicators using taxonomy analysis and the CoCoSo method.

The findings of the taxonomy method used, which did not factor in the effect of population on the weights of health indicators, helped to categorize the provinces into two groups in terms of their health sector development. The first group included provinces with development levels greater than that of the national average, including East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan, and Mazandaran.

Although during the period 2015-2019 the provinces achieved different ranks, they were all included in the first category. The second category consisted of the provinces that were less developed than the national average level, among which Ilam, North Khorasan, Semnan, and South Khorasan were the least developed ones. The observations of Kazemi et al. showed that Fars, Isfahan, Gilan, Tehran, Khorasan Razavi, and Khuzestan were among highly or relatively developed provinces; this finding was consistent with the results of the present study [8].

However, Kazemi et al identified Mazandaran, Kerman, West Azerbaijan, and East Azerbaijan as underdeveloped provinces, which clashed with the results of the present study [8]. The reason for such a difference in the results could be attributed to period during which the studies were conducted. More specifically, from 2012 to 2019 (when the last statistical yearbook was published), such provinces as East Azerbaijan, West Azerbaijan, Kerman, Gilan, and Mazandaran showed significant progress in terms of their health indicators, managed to achieve above-average ranks, and could be considered to be "developed" provinces.

Amini et al. [24] stated that Isfahan and Tehran had high ranks in relation to their facilities of the health sector and their healthcare status was good. However, Ardabil, Qom, Sistan and Baluchestan, and Kohgiluyeh and Boyer-Ahmad were among the underdeveloped provinces in terms of access to healthcare facilities. This observation was consistent with the findings of the present study.

At the next stage, the weights of the indicators were measured through the CRITIC technique. The results revealed that the most important indicators showed different values over the period of five years, and "the number of rehabilitation centers" for two years was considered to be the main indicator. In their study in 2018, Shahraki et al. introduced "the number of rehabilitation centers" as one of the most influential indicators in the healthcare development of a province [16]. In 2017, "the number of pharmacists" was considered to be one of the most important indicators. Tahari et al. observed that "the number of pharmacists" was more important in the development of the health sector than other research indicators [25].

The provinces were ranked through CoCoSo method. As the results showed, among the 31 provinces under investigation, Semnan, Yazd, Ilam, and South Khorasan exhibited the best status over the period of five years, while Khuzestan and Alborz showed the worst status. In other words, the provinces that gained the highest weights through the CRITIC technique indicators had a better status than the other provinces and enjoyed better conditions in the final CoCoSo-based ranking.

The results of this study revealed a significant difference between the Iranian provinces in terms of their health facility development levels. Overall, the results of most studies exploring this field also indicated that the health sector resources were inadequately distributed [16, 26, 27]. The healthcare system has a an undeniably important function in promoting fairness and reducing inequalities regarding access to healthcare services in any society. Health is an issue that not only affects development directly, but also it indirectly impacts other organizations in the course of development. In addition, the Iranian Constitution emphasizes that competent bodies must provide necessary health facilities at a community level.

STRENGTHS AND LIMITATIONS

Focusing on the latest information available in the health sector and using ranking methods, the present study sought to determine the differences between Iranian provinces in terms of their healthcare development levels and access to health services. This study used precise techniques to prioritize the data and provided invaluable findings.

However, the statistical yearbook is published late and access to up-to-date results was not available. Also, due to the increase in details, we could not analyze all the published details. Therefore, conducting studies with more detailed analysis or a comparative study to compare the statistical indicators of different countries rely on other MCDM techniques is suggested.

CONCLUSION

To improve the distribution of health services and reduce related inequalities across regions (e.g., states/provinces), policymakers must use reliable information and have a clear understanding of the status of health indicators in the regions they investigate. The reason for this is that development plans and decisions concerning new measures require a scientific analysis of the information available. Given such issues, the present study ranked Iranian provinces in terms of their access to health indicators and the distribution of healthcare services (development). After collecting the data from the statistical yearbooks published between 2015 and 2019, the study conducted taxonomy analysis on the data.

The results showed that East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan, and Mazandaran were among developed provinces. Furthermore, the provinces were ranked through the CoCoSo method, and as a result of which, it was clarified that Semnan, Yazd, Ilam, and South Khorasan were the provinces with highest degree of access to health indicators.

The results of comparing the data of different years indicated that, despite the progress of all provinces, there were still many differences in relation to the distribution of services across Iran. Therefore, healthcare policymakers/authorities must prioritize plans that would reduce inequality in these regions and would allocate more funds to them for the purpose of development.

ABREVIATION

- MCDM Multi-criteria decision-making
- CoCoSo Combined compromise solution
- CRITIC CRiteria Importance Through Intercriteria Correlation

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CONFLICT OF INTEREST:

The authors declared no conflict of interest.

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