Examination of the welfare indices of Iran's border and central regions from the perspective of spatial justice

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In Iran, border regions are particularly important for the growth and spread of prosperity and welfare because of the country's diverse population and the ethnic territories that continue to exist in neighbouring nations. Because border regions and provinces constitute the country's outer boundary and external connection areas, it is imperative to classify and compare these areas with internal regions from the standpoint of spatial justice in terms of the welfare index. This will help us understand the association between the quality and distribution of services and facilities and the social welfare of border regions and provinces. This study compared the welfare index for spatial justice between border and internal provinces using a descriptive analytical method, library sources, official statistics, Shannon entropy model and TOPSIS model. Furthermore, it employed the inverse distance weighting (IDW) interpolation method in the geographic information system (GIS) software to demonstrate the spatial distribution of welfare in both border and internal provinces. The study considered the highest and lowest distance between the scores and the average scores. Regarding the lowest level of welfare index, the internal provinces show far better conditions than the border provinces. For the criterion of the distance between the lowest and the highest in the border and internal provinces, the conditions of the latter are better than those of the former.

Keywords:
welfare,
spatial justice,
central provinces,
border provinces,
Iran

Regional Statistics, Vol. 14. No. 5. 2024: 945–969; DOI: 10.15196/RS140506

Introduction

Spatial justice is referred to as a critical discourse that aims to eliminate discrimination and reduce poverty, social segregation and domination. This type of spatial justice conceptualisation in the city requires the recognition of actors of power in different social and political arenas as well as the analysis of power relations, structures and processes that generate space. There is a good plethora of research on the role of spatial justice in the distribution of public facilities (Tsou et al. 2005: p. 454.), for example, the significance of spatial justice when there is a mismatch between population and public services (Chang−Liao 2011: p. 361.), or when low income is combined with income poverty as caused by less access to goods and services provided by the public sector. The fair distribution of facilities in the space can increase the quality of life in the short term and promote sustainable development in the long term. One of the most important signs of spatial justice is the balanced spatial distribution of services (Gray 2002: p. 27.). Unfair distribution of services may not only lead to disturbance of the balance of population in the space but also shapes the space in a socially and economically unfair manner (Varesi et al. 2008: p. 144.). The goal of spatial justice is the fair distribution of facilities and services among different regions with regard to their basic needs, so that no region would be granted a significant spatial advantage over another in terms of having valuable resources and the principle of equal access for everyone is respected (Harvey 1996: p. 97.). In fact, the quality and distribution of services and facilities are inseparably associated with social welfare. They cannot be separated from marginal issues such as the inequality of citizens and personal freedoms. It should be noted that even the most beautiful places and the best of them in terms of living conditions cannot be enjoyable and useful for the well-being of residents if they lack or have weak access to resources and facilities (Chapman 2007: p. 123.). Welfare is one of the important social issues and the goal of many socio-economic planning. Many experts consider justice as subject to the provision of public welfare. In this regard, John Rawls (as cited in Zahedi−Lavasani 2016: pp. 44−45.), based on his theory of justice, considers a welfare function for society that is different from other functions. In Iran, spatial injustice is an important feature of spatial organisation, which is formulated on a core–periphery structure from the local to the national scale (Ghaderi Hajat−Hfeznia 2020: p. 357.). Considering the importance of the border regions, which actually make the outdoor connection areas of the country and form its external wall, it is imperative to classify and compare the border and external provinces in terms of welfare index with regard to spatial justice Iran is a country with long borders with its neighbours. Out of the 31 provinces in the country, 16 are border provinces and 15 are non-border provinces. The present study aimed to compare the situation of the internal and border provinces in terms of welfare with respect to spatial justice.

Literature review

Iran has faced significant challenges related to spatial justice in recent years. The welfare indices of Iran's border and central regions from the perspective of spatial justice are crucial for understanding and addressing the disparities in the country. The issue of regional inequality within Iran has gained considerable attention, with researchers focusing on various aspects such as pollution control (Kanada et al. 2013), housing indices (Ghalehteimouri et al. 2021a), tourism development strategies (Safdari Molan et al. 2021), drought monitoring (Pouyan et al. 2023), rainwater harvesting (Tahvili et al. 2021), groundwater quality assessment (Hosseininia–Hassanzadeh 2023), urban climate justice (Karbalaei Saleh et al. 2021), spatial justice in access to healthcare centres (Dargahi–Shamloo 2023), vulnerability assessment and spatial analysis of socio-economic and housing inequality (Zanganeh et al. 2023) and accessibility to urban facilities (Suleimany 2023). These studies collectively contribute to the understanding of spatial justice and welfare indices in Iran, emphasising the need for comprehensive policies and strategies to address regional disparities and enhance the welfare of the country's border and central regions. This implies that the problem of spatial justice spans more than just particular areas; rather, it involves wider differences in national development. In conclusion, the body of research indicates that spatial justice in Iran is an urgent issue, particularly in light of the welfare indices of the country's border and central areas. The selected studies highlight the importance of taking spatial justice into account when addressing issues connected to desertification, social inequality, accessibility to urban facilities and development of rural areas.

Materials and methods

This study employed a descriptive analytical method, relying on library resources and relevant official statistics. The geographical scope of the research is the country of Iran, including its 31 provinces. The required data, which show the operational characteristics of the research indicators, were extracted from the atlas of welfare of 100 Iranian cities published in 2022 by the Ministry of Cooperatives, Labour and Social Welfare. The data were entered into tables, and then Shannon's entropy model was used to evaluate the relative importance of the criteria and their relative weights. After calculating the weights of the criteria, the TOPSIS model was used to rank the provinces. The GIS software developed and maintained by Esri company was used to draw the maps. The required indicators in this research are presented in Table 1.

Table 1

Research indicators

Subsidised population, subsidised households, subsistence households, female-headed households, households with government employee members, pensioner households, households with a trade licence, households without a member with a fixed income, households without a car, households in the bottom three deciles, households covered by the relief and welfare committee, households in extreme poverty and households with disabled members.

The initial Iranian ID card was issued in December 1918, coinciding with the establishment of the administrative structure and modern state of Iran. The ID card records essential information such as the individual's date and place of birth as well as details of their parents. This seemingly routine measure, despite facing numerous obstacles and challenges, represented a significant change in the Iranian policy system. It is essential to register the identity of citizens to enable the state to understand the contextual characteristics of its population and implement appropriate policies. However, individual identification is just the first step towards facilitating contextual policymaking. Many executive policies require household information to be recorded, as the target group for these policies is families rather than individuals.

In recent years, various organisations in the country, including municipalities, the Ministry of Roads and Urban Development, the Welfare Organisation, the Relief Committee, the Social Security Organisation, the Ministry of Health, the Ministry of Education and charities, have been summoned. However, much of this data is unstable, inactive and limited to the organisation that produced and collected it. This lack of accessibility has resulted in a lack of coordination, overlapping activities, deviations and a waste of the country's budgetary resources. Despite this, the creation of national citizenship IDs and databases has a long history worldwide.

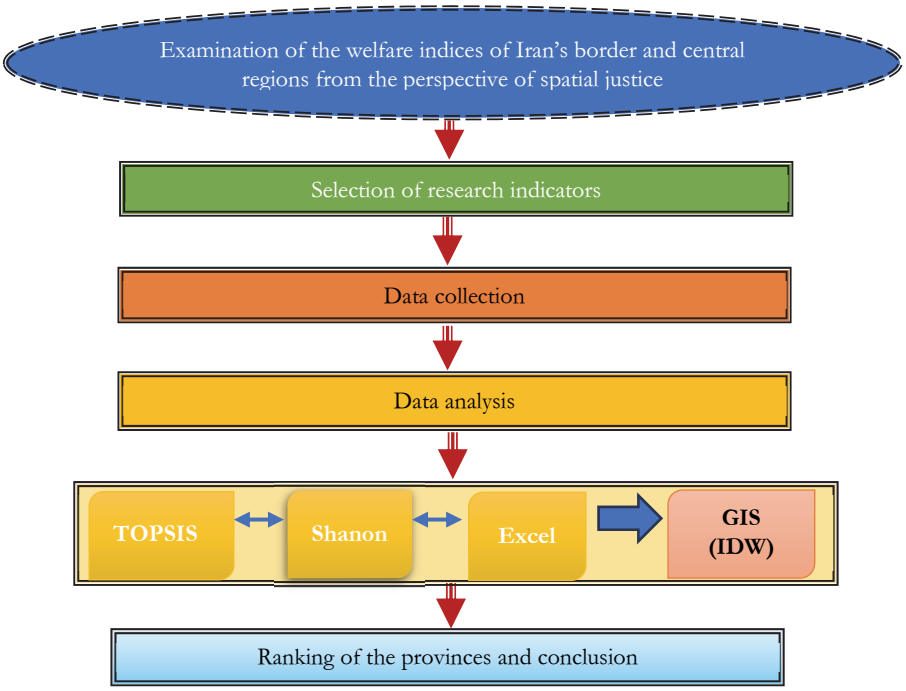
Norway recorded demographic data in 1964, whereas Sweden recorded business data in 1963 and Denmark began recording real estate data and citizen status in 1977. Household records, income and employment status have been tracked for over 50 years.

The Iranian welfare database, established by the Ministry of Cooperation, Labour and Social Welfare, has provided a reliable infrastructure for identifying poverty and inequality levels in the country. The database records income, assets and socio-economic characteristics from over 60 sources, enabling the government to support households without pension insurance, cars and female households. The database also considers the location of each person, demonstrating the distribution of poverty, prosperity and inequality in cities. A welfare map is presented for 100 cities in Iran, including 24 indicators of poverty and social welfare for each province and city. The data show that the poverty rates in Tehran are lower than the national average but higher in Sistan and Baluchistan. The atlas can be addressed using spatial justice, a relative concept that balances opportunities, advantages, riches and political and

administrative power with the fundamental needs of the populace. The method of conducting the present research is shown in Figure 1.

Figure 1

Research method



Theoretical framework

Spatial/geographical justice

A few decades ago, the phrase 'spatial justice' was not commonly used, and even now, when discussing justice and democracy in modern nations, geographers and planners tend to steer clear of the concept. According to Soja (2009), the spatial aspect of justice is essentially either disregarded or incorporated into other notions related to it, such as territorial justice, environmental justice, urban injustice or even the just city and society. The fair and equitable distribution of resources, opportunities and rewards within a certain place or territory is referred to as spatial justice. It entails ensuring that every person and community has equitable access to facilities, services and public areas (Feitosa et al. 2021, Jian et al. 2021). An essential component of urban planning and policymaking is spatial fairness.

To address and correct the geographical inequities and inequalities that exist within cities and regions, spatial justice is a critical component of urban planning and

policymaking (Madanipour et al. 2022). When allocating and designing public areas, it entails taking into account elements including accessibility to the desired possibilities, social aspects, diversity, cost and safety (Wall 2021). In post-pandemic cultures, where the need for inclusive and accessible public spaces has increased, the idea of spatial justice is particularly pertinent (Young 2021). The intersection of social justice − which refers to the geographical or physical dimensions of justice − and space is known as spatial justice.

One aspect of spatial justice is the equitable distribution of opportunities and valued resources within society; this can be viewed as both a process and an outcome. For instance, the processes that result in these outputs or the geographical structure or distribution can be deemed fair or unjust (Soja 2009: p. 4.). Stated differently, spatial justice refers to the equitable and democratic allocation of social obligations and advantages in many spatial dimensions. By recognising that space is socially produced and that this production impacts social connections, spatial justice enhances social justice (Bromberg et al. 2007: p. 3.).

Using the terms 'liberty' and 'equal opportunity' as a starting point, Rawls (1971) contended that all distributions must be entirely equal unless they favour the most vulnerable members of society and that all fundamental social needs should be met in an equitable manner. When opportunities, advantages, income and political and executive authorities are distributed in a way that meets residents' basic needs, it is said to be practicing spatial or geographical justice. Decision-makers may create environments that support everyone's well-being and pleasure, regardless of their location or social group, by prioritising spatial justice.

Spatial/geographical injustice

Six defects − equal concern, dignity, equality of opportunity, control, political fairness and equitable economic distribution − can result from inequality, which is a negative phenomenon. People's ambitions for success in cutthroat marketplaces can be negatively impacted by inequality, which can result in dehumanising status disparities. In addition, it affects the poor's access to resources and the media, giving the wealthy an intolerable degree of influence over their lives. Huge wealth and income discrepancies have the potential to compromise political justice, and compensation gaps between managers and employees raise concerns about the equitable allocation of money (Scanlon 2018: pp. 1−8.).

According to every study in this field, spatial injustice is a multi-faceted, intricate idea with two main axes: distribution of opportunities (access to social, physical and virtual infrastructures) and quality of life (from two social and physical dimensions) (Martínez 2009: p. 309.). The unjust and unequal allocation of opportunities and resources in space is referred to as spatial injustice. It is the outcome of social and spatial inequalities, both of which are made worse by decentralised administration and

market reform. Drawing from social philosophy, political economy, economic geography and finance theory, the idea of spatial justice is multi-disciplinary (Nebrat 2020). According to Topaloglou (2020), place-based solutions that prioritise communities and decentralisation have the ability to mitigate spatial injustice and attain equitable resource distribution. The contractarian principle, which territorialises John Rawls' second principle for achieving social justice and incorporates Amartya Sen's concept of capability deprivation, serves as a guiding principle for addressing spatial disparities (Rauhut 2019). In general, interdisciplinary approaches and interventions are needed to address the complex problem of spatial injustice to develop more inclusive and equitable spatial settings (Callan et al. 2021). When opportunities, benefits, income and political executive power are not fairly distributed in relation to the fundamental needs of the populace, it is referred to as spatial or geographical injustice. The uneven and polarised distribution of comprehensive development indicators (political, social, cultural, health, education and security) in geographical locations and spaces (micro and macro) with related indicators is a reflection of these conditions.

Welfare

The term 'welfare' as used by many economists is a point of disagreement. Some experts have defined it in terms of only material properties neglecting the spiritual dimension, and some have only emphasised its spiritual aspect. Throughout the history of economics, welfare has been associated with words such as well-being, pleasure, satisfaction, ophelimity, fulfilment of substantive needs, happiness and capability. Of course, if we consider the wealth of non-economic traditions, many other words can be added, particularly words that cannot be summed up only in the material life of a person. Adopting each of the above definitions as a means to produce goods and services differently in a community that is also facing limited resources means employing a different mechanism in allocating and distributing resources. If welfare is defined in terms of materialism and hedonism, it is completely wise that economics serve individual interests, wealth maximisation, physical pleasures and sensual satisfactions. However, if well-being is defined as over-material and consoling elements that include spiritual goals and humanity, then economics is bound to discuss these goals and how to recognise them. These goals may include issues such as brotherhood, socio-economic justice, peace of mind, happiness, family and social order. One of the recent questions in economics in relation to human welfare is whether self-interest as the only motivating force in economics is sufficient to exhaustively correspond to welfare (Mousavi Samrin 2014: p. 6.). In fact, social welfare refers to an economic, social and political situation that can preserve human dignity and the responsibility of society members towards each other and improve their capabilities. The word 'welfare' refers to a state of health, happiness, prosperity,

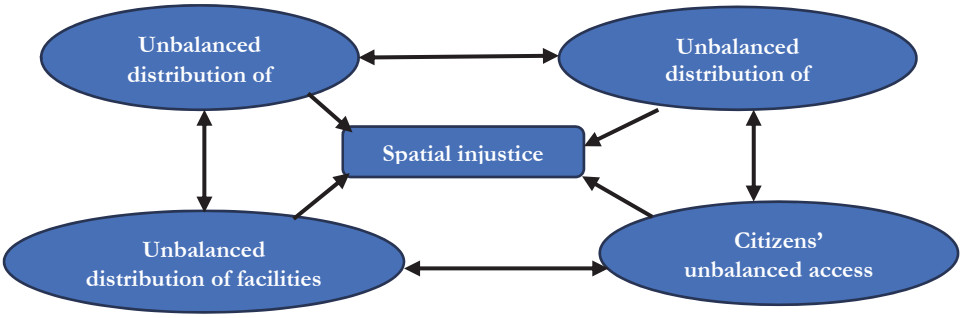
well-being and assistance, particularly in the form of money, food and other essentials that are provided to the needy. The word was first used as an infinitive 'To well fare', which means being good and having fun. The word 'social' implies the connection of welfare with society and dealing with the dangers that we face in our social life. In general, this concept refers to a state of appropriateness (Midgley 1997: p. 4.). There are several definitions for welfare. In the 18th century, Jeremy Bentham and David Hume defined welfare as the benefit or desirability and good and happiness. It is considered a quantitative category that can be measured with money and related to a person's hopes and aspirations, and it is defined in terms of a person's preferences and desires. John Rawls (1971) also defined welfare as the fair distribution of resources. Sometimes social well-being is considered to be in a very broad sense and is defined as happiness, satisfaction of preferences and needs, liberation and relative comparisons that a person has in terms of his well-being with others (Fitzpatrick 2004: pp. 31−35.). With the rise of syndicates and work organisations as well as the creation of labour laws and rights in industrial environments aimed at securing the interests of workers, the issues of secondary needs and personal security were raised in addition to primary needs for all individual and occupational risks. Thus, the industrial welfare approach replaced the welfare of the individual, family and local groups. With the emergence of modern societies characterised by urbanisation, the nuclear family and a complex and macro-economic system, new attitudes of social welfare gradually appeared. The concept and content of social welfare has changed a lot in the last few decades. In the 1970s, social welfare referred to a set of organised laws, programmes and services which aimed at providing the minimum basic needs of the population of the country (Zahedi Asl 1994).

Social justice and welfare

Justice, as defined in the Qur'an, is the absence of poverty and the ability of the poor to achieve wealth and abundance. It is crucial to define spatial justice, considering the trinity of opportunity, wealth and power and their resulting mechanisms. Spatial justice is essential for achieving welfare in geographical spaces, regardless of geographical and identity differences. Political geography studies highlight the impact of unequal power relations in space on spatial justice. Unbalanced distribution of valuable space elements leads to unequal distribution of facilities and services, blocking citizens' equal access to power and creating isolation. Spatial injustice substantially affects the balanced and unbalanced distribution of services, both as output and driving force. The issue is depicted in Figure 2.

Figure 2

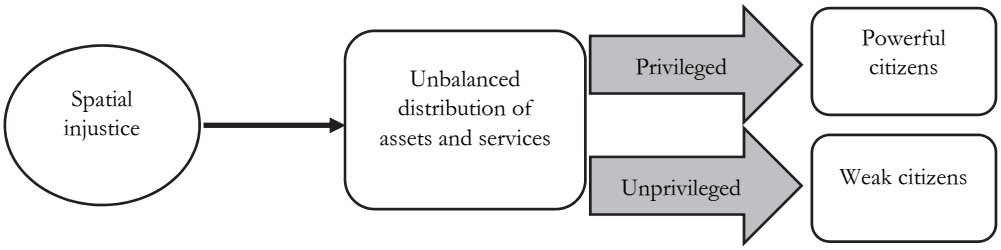
Reproduction of spatial injustice affected by unequal power relations



Spatial inequality refers to unequal political, economic and cultural conditions between citizens, mainly due to unequal participation in superior power. This leads to inequality in access to opportunities and the formation of dual social structures as well as isolation and social-spatial breaches, as the distinction between winners and losers causes tension and disorder. Figure 3 illustrates the dual pattern of power and wealth in societies and unfair spatial organisation.

Figure 3

Spatial injustice and social differences



Findings

Research setting

This study was conducted in 2021–2022, and the geographical scope of the study included the border and internal provinces in Iran. The study aimed to compare and rank the welfare index of the border and internal provinces. Figure 4 shows the spatial setting of the study.

Figure 4

Research area

Structure of TOPSIS and its implementation steps

As a multi-indicator decision-making method, TOPSIS is considered a simple but efficient method for prioritising different indicators. This method ranks N options according to the M criteria. The TOPSIS method was introduced by Hwang and Yoon in 1981 (Krohling–Campanharo 2011). The use of the TOPSIS model in Iran with a range of applications in feasibility, prioritisation and performance evaluation in a limited scope goes back to the 1990s. The TOPSIS algorithm is a very strong compensatory multi-criteria technique for prioritising options by simulating the ideal solution (Roghanian et al. 2010, Ghalehteimouri et al. 2021b, Dobos et al. 2021, Tezcan 2023).

Formation of data matrix based on option M and indicator N:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}$$

This decision-making method is well supported in mathematics. As with many scientific methods, it is extremely important to know and observe the assumptions, scope and conditions of the validity of the rules and the accuracy of the proposed formulas, the range of accuracy of the results and the conditions of the acceptability of the answers. The underlying assumptions of this method are as follows:

- each index must be uniformly increasing or decreasing,
- the indicators should be assumed to be independent of each other,
- the distance of options from positive to negative ideal is calculated as Euclidean distance.

The steps of implementing the TOPSIS technique in evaluating the welfare index of border and internal regions from the perspective of spatial justice

Step 1: at first, the data matrix is formed on the basis of options M (provinces of the country) and indicator N. In this matrix, A is the i-th option or provinces, xj represents j-th or indices and Amn is the numerical value obtained from the i-th option of j-th. It is the intersection point of i and j. Data validation takes place at this stage. The formation of the data matrix– scoring the indicators – is displayed in Table 2.

Table 2

Raw data matrix (decision matrix)

Province/indicator	I1	I2	I3	I4	I5	I6
East Azerbaijan	3,948,975	1,310,781	1,062,589	230,474	73,702	221,928
West Azerbaijan	3,374,552	1,060,383	867,410	178,532	64,523	112,187
Ardebil	1,356,649	438,946	263,437	76,414	31,192	56,986
Isfahan	4,724,243	1,583,539	1,159,952	282,773	101,884	381,675
Alborz	2,410,442	808,641	580,126	160,025	44,231	181,404
Ilam	599,323	177,634	142,151	29,987	22,492	25,396
Bushehr	965,938	283,441	204,524	52,881	23,174	44,392
Tehran	10,372,326	3,498,707	2,281,097	707,989	187,181	813,494
Chaharmahal and Bakhtiari	1,014,027	300,002	243,792	50,904	24,962	45,390
South Khorasan	789,972	244,320	206,102	41,927	22,786	34,997
North Khorasan	949,937	300,777	258,492	56,615	22,945	28,426
Khorasan Razavi	6,436,289	2,072,059	1,688,656	417,732	126,356	278,159
Khuzestan	5,044,689	1,461,857	1,160,519	261,636	96,849	247,714
Zanjan	1,076,698	348,591	285,584	56,824	25,352	52,859
Semnan	623,556	213,293	161,343	42,039	19,986	55,632
Sistan and Baluchestan	3,022,041	785,599	681,912	200,623	53,992	51,085
Fars	4,671,315	1,472,216	1,108,446	289,032	109,564	240,579
Qazvin	1,252,106	413,089	33,463	69,186	25,536	85,971
Qom	1,160,138	365,889	28,411	66,454	26,911	540,504
Kurdiseatan	1,680,879	542,163	453,471	96,511	39,602	60,894
Kerman	2,826,348	879,788	706,475	172,952	68,443	137,236
Kermanshah	2,018,296	663,187	545,965	134,830	51,228	94,356
Kohgiluyeh Boyer Ahmad	746,775	220,153	186,392	42,570	25,143	26,465
Golestan	1,922,416	618,429	516,841	114,371	41,225	74,805
Gilan	2,549,546	930,199	760,695	179,649	51,765	186,633
Lorestan	1,920,600	601,001	516,942	116,009	48,569	85,243
Mazandaran	3,129,940	1,098,560	821,905	196,745	71,567	211,187
Markazi	1,391,357	469,887	373,463	87,464	31,431	97,043
Hormozgan	1,713,279	489,516	386,057	691,689	35,527	48,075
Hamedan	1,820,048	600,489	495,588	112,214	40,694	82,453
Yazd	1,049,507	337,186	243,511	54,856	27,682	83,841

(Table continues on the next page.)

(Continued.)

Province/indicator	I7	I8	I9	I10	I11	I12	I13
East Azerbaijan	106,837	536,248	659,654	390,831	137,693	29,048	296,032
West Azerbaijan	89,516	616,030	541,971	387,298	118,284	18,711	345,605
Ardebil	37,610	208,054	229,214	144,872	57,417	9,205	116,914
Isfahan	170,681	485,485	636,823	278,953	147,940	29,893	217,005
Alborz	57,701	293,741	326,011	117,233	46,142	11,301	102,266
Ilam	26,487	77,994	93,214	37,171	43,299	4,661	35,616
Bushehr	32,486	117,280	139,276	61,021	53,868	6,794	55,918
Tehran	217,057	1,304,209	414,181	159,004	46,302	46,302	439,715
Chaharmahal and Bakhtiari	34,775	130,993	15,369	84,390	52,087	10,956	70,983
South Khorasan	26,695	103,991	119,355	80,897	56,308	8,664	66,752
North Khorasan	24,963	166,358	177,113	115,521	62,284	8,578	100,883
Khorasan Razavi	170,981	1,102,500	1,071,059	679,189	242,394	48,536	594,374
Khuzestan	94,717	655,016	851,547	434,823	188,670	27,946	358,726
Zanjan	34,137	145,244	167,785	99,138	39,403	8,954	78,119
Semnan	23,385	60,906	91,266	37,083	21,241	5,767	27,424
Sistan and Baluchestan	37,811	575,072	526,227	420,844	216,973	16,632	403,651
Fars	116,429	687,823	702,305	335,455	231,139	45,171	315,106
Qazvin	31,488	152,538	195,616	93,639	50,563	9,206	76,180
Qom	28,630	148,021	164,393	72,720	29,097	7,624	61,307
Kurdiseatan	59,037	296,791	280,915	194,610	86,799	9,554	169,153
Kerman	79,055	418,579	393,344	263,976	153,374	21,337	233,874
Kermanshah	56,848	347,607	33,471	185,554	110,274	15,516	169,934
Kohgiluyeh Boyer Ahmad	23,088	109,898	135,085	69,840	59,656	63,096	63,227
Golestan	52,669	323,356	354,886	23,275	102,552	24,706	191,573
Gilan	83,871	446,111	478,781	286,971	153,725	19,795	241,582
Lorestan	46,321	308,825	348,693	194,194	127,977	22,118	169,782
Mazandaran	127,025	422,681	522,620	218,787	111,277	22,802	183,111
Markazi	47,945	167,109	220,032	103,079	57,599	12,608	82,784
Hormozgan	29,723	279,297	284,167	164,961	104,879	13,154	155,583
Hamedan	50,550	282,872	314,050	191,199	69,247	15,826	153,624
Yazd	39,902	83,404	110,122	44,707	33,160	11,076	37,297

Source: Iranian welfare atlas (2019).

Step 2: standardisation of the data and forming the standard matrix (or descale the data) through the following relationship:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}$$

Point: to express the relative importance of criteria, it is necessary to determine their relative weight. There are many methods, such as analytic hierachy process (AHP), analytical network process (ANP), Shannon's entropy, expert weighting and adjustment, which are used according to the needs. Because the decision matrix has various indicators, it is necessary to know the importance or weight of each of these indicators in decision-making. The weight of each indicator expresses its relative importance compared with other indicators. Conscious and proper selection of

weights is of great help in reaching the desired goal. Weighting of factors can be done as follows:

(a) Using the knowledge of experts: data are analysed according to the experts and specialists' opinion.

(b) Using data knowledge: data knowledge relies on the information in the problem itself. Using the answers in the problem and calculating the degree of dependence of each factor on the answer, the weight of each factor can be determined.

(c) Modified method (simultaneous use of expert knowledge and data knowledge): in this method, weight is assigned to each of the factors according to the results. The weighting of indicators is displayed in Table 3.

Table 3

Weighting of indicators using Shannon's entropy weight method

Indicator	Rank	Amount
1. Subsidised population	10	0.055822139
2. Subsidised households	11	0.053622
3. Subsistence households	5	0.100265
4. Female-headed households	14	0.0009
5. Households with government employee members	9	0.063789
6. Pensioner households	13	0.0183463
7. Households with a trade licence	6	0.08109
8. Households without a member with a fixed income	7	0.074533891
9. Households without a car	3	0.124017
10. Households in the bottom three deciles	1	0.175038
11. Households covered by the relief and welfare committee	2	0.150014
12. Households with disabled members	12	0.039918
13. Households in extreme poverty	4	0.101134

As shown in Table 3, the indicators households in the bottom three deciles, households covered by the relief and welfare committee, households without a car, households in extreme poverty and subsistence households ranked first to fifth in terms of the entropy index. In other words, these indicators have had a great impact on the distribution of the welfare index in the provinces of the country. Conversely, female-headed households, pensioner households, households with disabled members, subsidised households and subsidised population ranked the last five important indicators in terms of entropy index. In other words, these indicators have not had a great impact on the distribution of the welfare index in the provinces of the country owing to their low level of dispersion.

Weighted matrix: it refers to the determination of the weight of each indicator. The more important indicators have higher weights. In fact, the matrix (v) is the product of the standard values of each index in its respective weights.

$$V_{ij} = \begin{bmatrix} w_1 r_{11} & w_2 r_{12} & \dots & w_n r_{1n} \\ w_1 r_{21} & w_2 r_{22} & \dots & w_n r_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ w_1 r_{m1} & w_2 r_{m2} & \dots & w_n r_{mn} \end{bmatrix}$$

Step 3: determination of the positive and negative ideal solutions

Determining the distance of the i-th alternative from the ideal alternative (the highest performance of each index), which is represented by (A^*).

$$A^* = \left\{ (\max_i v_{ij} \middle| j \in J), (\min_i v_{ij} \middle| j \in J' \right\}$$

$$A^* = \left\{ v_1^*, v_2^*, ..., v_n^* \right\}$$

Determining the distance i-th of the minimum alternative (A^-) (the lowest performance of each index) as follows:

$$A^- = \left\{ (\min_i v_{ij} \middle| j \in J), (\max_i v_{ij} \middle| j \in J' \right\}$$

$$A^- = \left\{ v_1^-, v_2^-, ..., v_n^- \right\}$$

Step 4: determination of the distance of each option from the positive and negative ideals

Distance from the positive ideal:

Determining the distance criterion for ideal alternative (S_i^*) and minimum (S_i^-) alternative

$$d_j^+ = \sqrt{(\sum_{j=1}^m v_{ij} - v_j^+)^2} \qquad d_j^- = \sqrt{(\sum_{j=1}^m v_{ij} - v_j^-)^2}$$

Step 5: determination of the coefficient that is equal to the distance of the minimum alternative, divided by the sum of the distance of the minimum alternative S_i^- and the distance of the ideal alternative (S_i^*), which is calculated from the following relationship.

$$CL_1 = \frac{d_j^-}{d_j^- + d_j^+}$$

The proximity of each option to the ideal solution is measured by the distance of the desired indicator from 1. The closer this index is to 1, the more it indicates superiority.

Based on the method used, the ranking of the country's provinces according to the selected indicators is presented in Table 3.

Table 4

Relative closeness of evaluated alternatives to the ideal solution

Province	Closeness to ideal	Welfare index
Khorasan Razavi	0.784288883	0.22
Fars	0.731500055	0.27
Kohgiluyeh Boyer Ahmad	0.667102705	0.33
Tehran	0.649834703	0.35
Khuzestan	0.5874602	0.41
East Azerbaijan	0.564290841	0.44
Isfahan	0.562859763	0.44
Sistan and Baluchestan	0.510587399	0.49
Kerman	0.489097292	0.51
Gilan	0.479127116	0.52
West Azerbaijan	0.475062682	0.52
Mazandaran	0.473069573	0.53
Golestan	0.471760973	0.53
Lorestan	0.467195164	0.53
Kermanshah	0.402348081	0.60
Hamedan	0.383233164	0.62
Hormozgan	0.376437884	0.62
Kurdistan	0.343782513	0.66
Markazi	0.333544741	0.67
Alborz	0.325197452	0.67
Ardebil	0.313381307	0.69
Chaharmahal and Bakhtiari	0.312600585	0.69
North Khorasan	0.305241253	0.69
Yazd	0.299674507	0.70
Qazvin	0.299473886	0.70
South Khorasan	0.294615676	0.71
Zanjan	0.294385094	0.71
Bushehr	0.276051057	0.72
Qom	0.275737599	0.72
Semnan	0.249566666	0.75
Ilam	0.249422758	0.75

As shown in Table 4, Ilam ranks next to Qom and Semnan with a welfare score of 0.75. Here, the population of the provinces, population of the lower three deciles and population of extreme poverty in these provinces can be mentioned as an effective component. Therefore, the welfare index of less populated provinces is better than that of more populated provinces.

Data analysis

Welfare and deprivation of border provinces

In this section, the status and ranking of 16 border provinces of 31 provinces, as displayed in Table 5 and the Figure 5, are discussed.

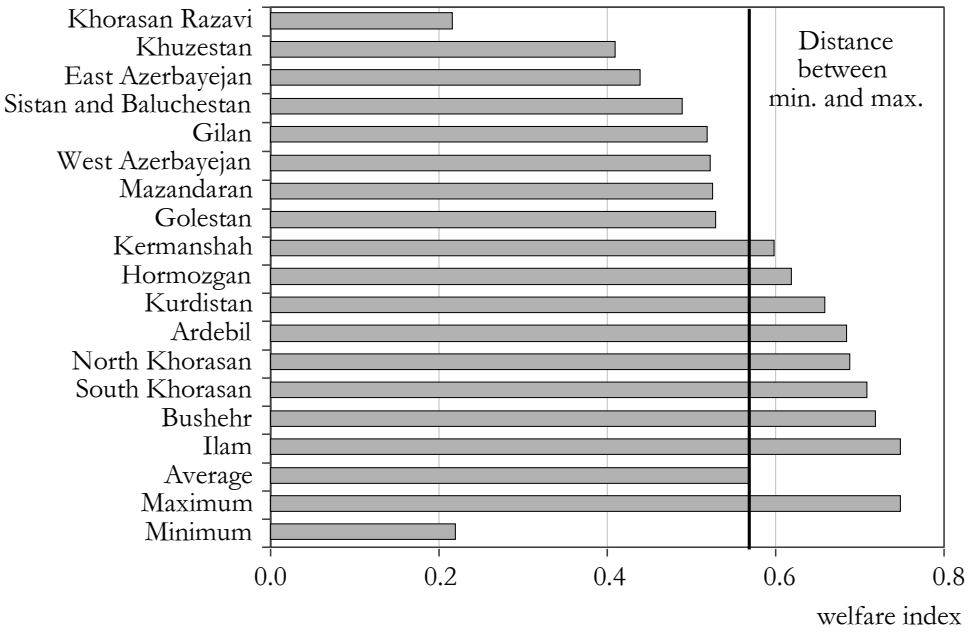
Table 5

Situation of the border provinces in terms of welfare

Province	Welfare index	Province	Welfare index
Khorasan Razavi	0.215711117	Kurdistan	0.656217487
Khuzestan	0.4125398	Ardebil	0.686618693
East Azerbaijan	0.435709159	North Khorasan	0.694758747
Sistan and Baluchestan	0.489412601	South Khorasan	0.705384324
Gilan	0.520872884	Bushehr	0.723948943
West Azerbaijan	0.524937318	Ilam	0.750577242
Mazandaran	0.526930427	Average	0.568316988
Golestan	0.528239027	Maximum	0.750577242
Kermanshah	0.597651919	Minimum	0.215711117
Hormozgan	0.623562116	Distance between min. and max.	0.534866125

Figure 5

Situation of the border provinces in terms of welfare



Regarding the border provinces, based on the findings, it can be said that the average welfare index is equal to 0.568316988. The highest value of welfare index in the border provinces belongs to Ilam province, which has an index value of 0.750577242. The provinces of Bushehr, South Khorasan and North Khorasan rank next. The lowest value of welfare index belongs to Khorasan Razavi with the index value of 0.215711117, and Khuzestan, East Azerbaijan and Sistan and Baluchistan rank next. The distance between the lowest and the highest values of welfare for border provinces was calculated as 0.534866125.

Welfare and deprivation of internal provinces

In this section, the status and ranking of 15 internal provinces of 31 provinces, as displayed in Table 6 and Figure 6, are discussed.

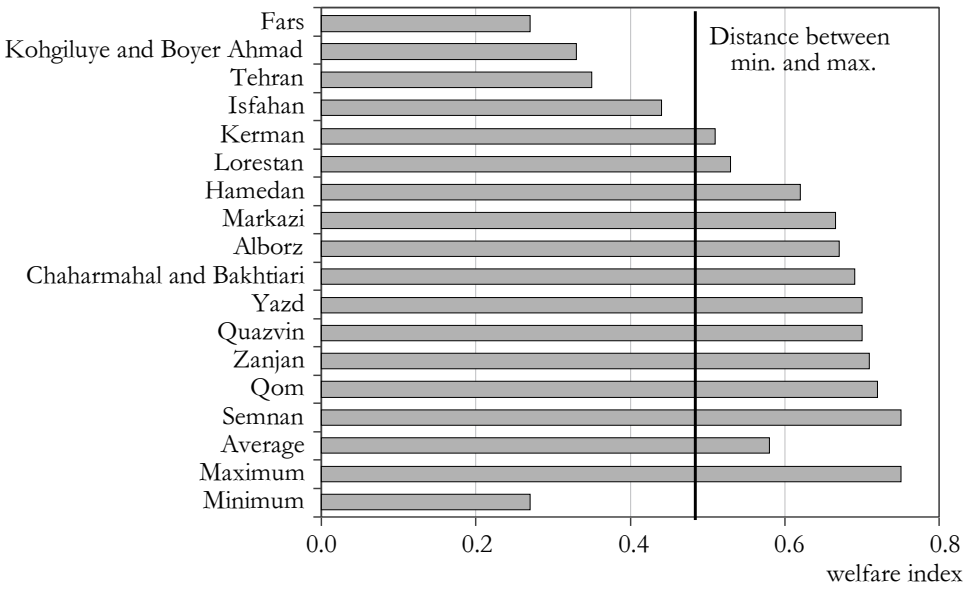
Table 6

Situation of the internal provinces in terms of welfare

Province	Welfare index	Province	Welfare index
Fars	0.268499945	Yazd	0.700325493
Kohgiluye and Boyer Ahmad	0.332897295	Qazvin	0.700526114
Tehran	0.350165297	Zanjan	0.705614906
Isfahan	0.437140237	Qom	0.724262401
Kerman	0.510902708	Semnan	0.750433334
Lorestan	0.532804836	Average	0.577266442
Hamedan	0.616766836	Maximum	0.750433334
Markazi	0.666455259	Minimum	0.268499945
Alborz	0.674802548	Distance between min. and max.	0.481933389
Chaharmahal and Bakhtiari	0.687399415		

Figure 6

The situation of the internal provinces in terms of welfare

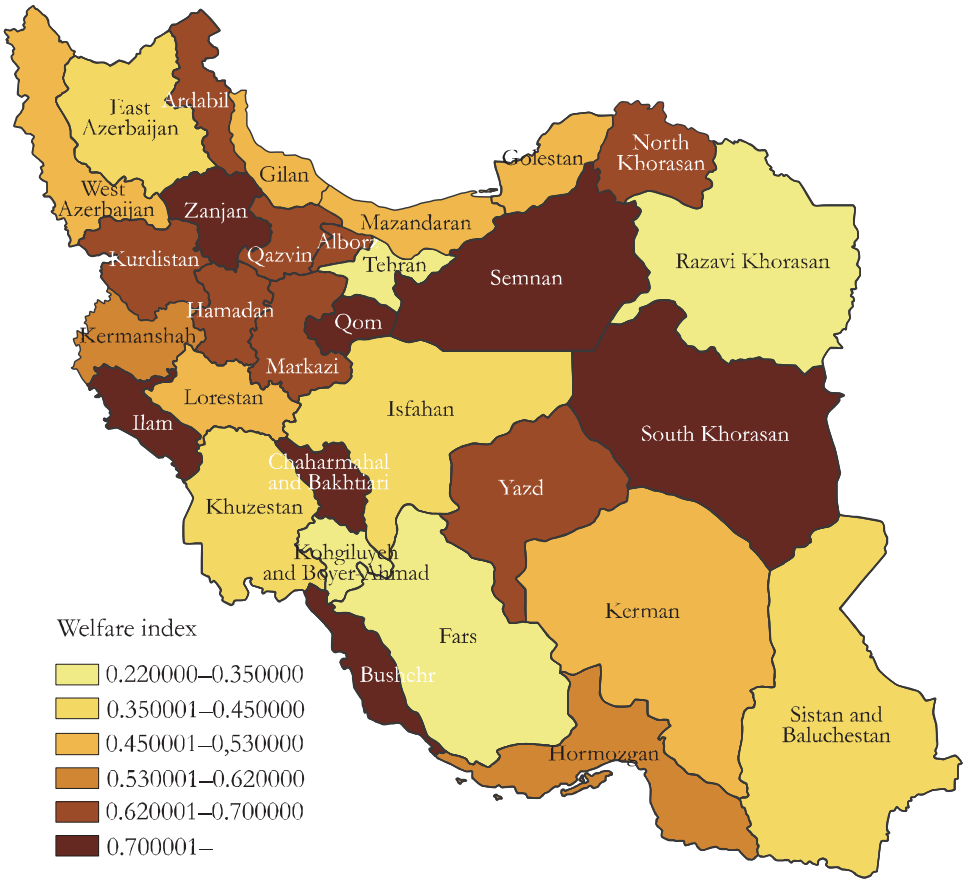


Regarding the internal provinces, based on the findings, it can be said that the average welfare index is equal to 0.577266442, with Semnan having the highest index value of 0.750433334 among the central provinces. Qom, Zanjan and Qazvin rank next. The lowest welfare index value belongs to Fars, which is 0.268499945, followed by Kohgiluyeh and Boyerahmad, Tehran and then Isfahan. The distance between the

lowest and the highest values of welfare for the internal provinces is calculated as 0.481933389. Figure 7 shows the spatial distribution of welfare in the border and internal provinces.

Figure 7

Spatial distribution of welfare in the border and internal provinces



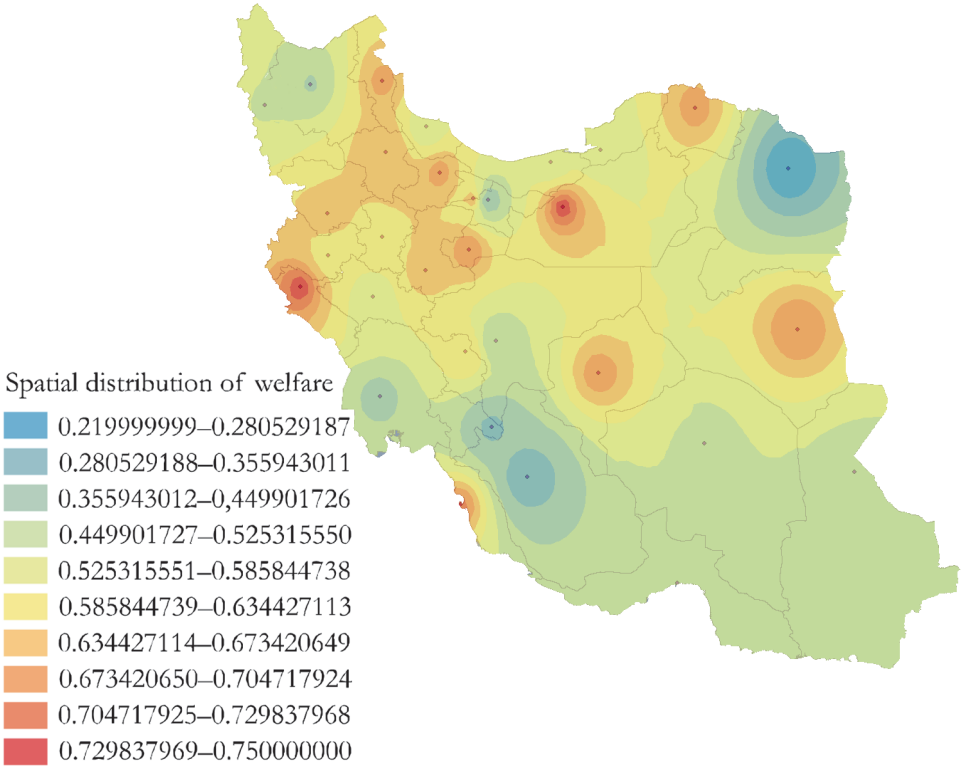
The article uses the IDW interpolation method in the GIS software to minimise analysis errors when providing regional analyses on the welfare index, despite the drawbacks of using provincial data.

One common interpolation approach is the IDW method (Thakur−Das 2022). It uses comparisons with neighbouring sites to determine the worth of an un-assessed site. The IDW method makes the assumption that when neighbours get closer together, their correlation and similarity will also grow. An inverse function of the separation between each point and its closest neighbours is used to express this notion. If the local scale levels are appropriately distributed, then this approach is advised. Local points have higher correlations and similarities than distant points,

according to all interpolation techniques. The most crucial factor to consider when evaluating the accuracy of the inverse distance interpolator is its power parameter (Jasim−Walli 2023: p. 7.). Figure 8 uses the IDW interpolation method in the GIS software to show the spatial distribution of welfare in both border and internal provinces.

Figure 8

Spatial distribution of welfare in the border and internal provinces (IDW)



Conclusion

Spatial justice (balanced and fair distribution of resources, facilities, opportunities and power) is an important driving force in the direction of homogeneous and integrated development in every country. Focusing their studies on the political dimensions of space, researchers in the field of political geography should also play an effective role in this area. Border regions are among the most important areas in a country that can represent the political management and identity of a country. With regard to their position in a country and their part in maintaining sovereignty, border areas play an important role for the government to influence their neighbouring countries.

Therefore, by examining the welfare, security and degree of access to opportunities and facilities, one can evaluate the spatial justice as caused by the success or failure of the land development programmes and the political management of the space. Border regions have various characteristics and usually exhibit differences from the internal regions of countries. Being away from the centre on the geographical, economic and political margins of the country and underdeveloped, which itself can be a result of the geographical conditions, border regions are on the forefront of the country to communicate with neighbouring countries. They also carry other features such as varying ethnic and religious characteristics, distinct human and environmental links with the other side of the borders and a different strategic and security nature. However, due to management and planning weaknesses, the production is low, the unemployment is high, the economic and social needs are not met, the migration and de-population are high and the economy is poor in these areas. Thus, it is imperative for the land development plan and realisation of development and national security to improve the material and spiritual conditions of border areas through the optimal use of all human and spatial facilities in these areas, following the theoretical foundations of the optimal sustainable spatial organisation of man, land and human activities in border areas (Parnian et al. 2018: p. 173.). Furthermore, because border security is a special priority for countries, particularly those with long borders, border regions with their sustainable growth can provide both the security of the borders and, as the starting regions of the country's sovereignty, create the ground for the expansion of the country influence in its neighbours. In the new approaches for sustainable development programmes, the development of the region depends on the combination of development movements from above and development from below, with the main role played by the people and local communities in order for all people to benefit from the benefits of the programme. In general, examining the state of border areas in a country can suggest the management in various political, security, social and cultural dimensions as well as the political organisation of the country's space and land development programmes.

For a country such as Iran, due to the mixed nature of the nation and the continued presence of ethnic territories in the neighbouring countries, border areas are places of special priority for the development and expansion of welfare. Considering the importance of these regions, knowing the state of welfare in the border regions compared with the internal regions is the subject of this study. The comparison of the internal and border provinces, based on the findings in this research, is presented in Table 6.

Table 7

Welfare in border regions compared with internal regions

	Average	Max.	Min.	Distance between max. and min.
Internal provinces	0.577266442	0.750433334	0.268499945	0.481933389
Border provinces	0.568316988	0.750577242	0.215711117	0.534866125

It can be concluded that in terms of the average situation, the internal provinces are better than the border provinces. However, as Ilam and Semnan rank the highest in terms of the level of welfare, it can be said that there is no substantial difference between the border and internal provinces in terms of the highest level of welfare index. Regarding the lowest level of welfare index, the situation in the internal provinces is far better than that in the border provinces. In this regard, it should be noted that the lowest welfare index was obtained in the border province of Khorasan Razavi, followed by Khuzestan, East Azerbaijan and then Sistan and Baluchistan. Considering the regional and internal conditions, this issue is a warning as there are possible abuses of the welfare state in these provinces. Except for Khorasan Razavi, the other three provinces are potentially susceptible, demanding the special attention of those in charge. Regarding the criterion of the distance between the lowest and the highest in the border and internal provinces, the situation in the latter is better than that in the former.

In general, according to the aforementioned four criteria, the welfare in the internal provinces is better than that in the border provinces. A point that should not be overlooked is that the current situation is the result of a long process resulting from a series of institutional, political, economic and social processes of space actors. Because the political organisation has created this spatial organisation, to improve the conditions, it is necessary for the political organisation to compensate for the existing shortcomings by considering justice-seeking approaches.

Acknowledgement

The author would like to thank the Tarbiat Modares University for the financial and moral support and all the people who have helped in the writing and editing of this paper.

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