International Journal of Asian and African Studies
ISSN: 2755-340X
DOI: 10.32996/ijaas
Journal Homepage: www.al-kindipublisher.com/index.php/ijaas

IJAAS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

An inter-province Analysis of Health Infrastructure Disparities in Afghanistan

MOHAMMAD NASIRi[1], KHOJA AYOUB SEDIQI[2] and QIAMUDDIN ANDAISH[3]
[123]Faculty of Economics, Baghlan University, Afghanistan
Corresponding Author: MOHAMMAD NASIRi, **E-mail**: nasiree1988@gmail.com

| ABSTRACT

Health is a crucial element in human life and directly affects labour productivity. The health of its citizens significantly impacts the socio-economic development of every country or region. The connection between socioeconomic development and health is intricately linked and profoundly impacts one another. An adequate healthcare infrastructure is strongly associated with enhancing the overall health status of a population. This study's main objective is to identify the discrepancies in health infrastructure across different provinces of Afghanistan in 2020 by constructing a health infrastructure index. We utilised Principal Component Analysis (PCA) to create a composite index for health infrastructure, incorporating seven physical and human resource health infrastructure indicators. Based on the investigation, the province of Nooristan has been ranked first in the health infrastructure index (HII), which falls under the highly developed category. On the other hand, Faryab province has been ranked last and falls under the highly backward category along with four other provinces, including Badghis, Kandahar, Herat, and Paktika. Additionally, three other provinces, namely Logar, Panjsher, and Bamyan, have been categorised as developed provinces and come after Nooristan. The remaining twenty-five provinces have been classified under the "Backward" category. As per the study, there are significant differences in the health infrastructure of Afghanistan's provinces. The health infrastructure index (HII) value ranges from 0.151394 to 0.80448. Furthermore, 88 per cent of the country's provinces are classified as backward and highly backward, indicating that the health infrastructure in this country is generally in very poor condition.

| KEYWORDS

Afghanistan, Health Infrastructure Index, Principal Component Analysis, Inter-provinces Disparities

| ARTICLE INFORMATION

ACCEPTED: 01 April 2026 **PUBLISHED:** 03 May 2026 **DOI:** 10.32996/ijaas.2026.5.1.3

1. Introduction

Health comes first for the best quality of life (Dreze, 2016)**.** The link between health and development has long been acknowledged. Health is not just an outcome of development but also a crucial component of a country's development process (Lyngdoh, 2015). Since 1990, health has been included as a key factor alongside income and education in determining development within the context of the human development index.

The country's economic development encompasses various dimensions, including quality of life, healthcare standards, and educational facilities (De, 2017; Guo & Liu, 2022; Jędrzejczak-Gas et al., 2021). Maintaining good health requires more than just avoiding illness. It encompasses complete physical, mental, and social well-being (Blanchet et al., 2021; Rao, 2003). Improving the health of deprived individuals is one of the key primary objective of economic development (David E. Bloom & Canning, 2008; Vulovic & Chaloupka, 2022; Weil, 2014), this is due to, healthy lifestyles have a significant impact on labor productivity, overall well-being, and economic growth (G. Kumar & Singh, 2020). Ensuring access to adequate physical and mental healthcare is a fundamental human right and is crucial for a country's economic development (Armenta et al., 2018; Rao, 2003). Recognizing health as a fundamental human right creates an ethical obligation for any government to give its citizens access to high-quality healthcare that is also conveniently available and affordable (Armenta et al., 2018)**.** Improving people's health is crucial for achieving social and economic development, and this is heavily reliant on the establishment and delivery of proper infrastructure

for healthcare services within a country or community (Kaur et al., 2023a; G. Kumar & Singh, 2020). The accessibility and quality of physical healthcare infrastructure directly impact an individual's well-being (Armenta et al., 2018; Lakshmi & Sahoo, 2013; Shaw & Sahoo, 2020).
there are efforts and signs that infrastructure facilities are improving living conditions, levels of health and education, and regional development (Agénor & Moreno-Dodson, 2012; Aschauer, 2000; Baldwin & Dixon, 2011; Nijkamp, 1986). Infrastructure is described as the physical network of facilities through which the general public is served with goods and services (Khader, 1998)**.** The term "health infrastructure" refers to the actual physical components of the healthcare system, such as hospitals, comprehensive health centers, basic health centers, sub-health centers, government laboratories, beds, human resources that is, doctors, midwives, nurses, etc. The improvement of social infrastructure in general and health infrastructure, in particular, reflects the standard of living of the people in a given country (G. Kumar & Singh, 2020). We may argue that while healthcare services are quite accessible in certain countries, they are not as accessible in others. In underdeveloped countries, deteriorating health infrastructure is one of the most significant challenges to accessing and using primary healthcare services (Banu & Biswas, 2022)**.** The affordability of health infrastructure and the quality of institutions, on the other hand, has promoted human growth in many developed countries (Ullah & Majeed, 2023)**.** Disparities in physical infrastructure are caused by a variety of factors, including low budgets, inadequate medical research, ineffective policy formulation and implementation, a lack of resources, and others (Lahmar et al., 2021)**.** Health disparities hurt people's quality of life, increase the risk of premature death, and place an economic burden on both the individuals and communities they touch (Mendoza-Walters et al., 2016)**.** There must be compelling reasons for expanding diversity and cultural competence in the health care system as well as adequate health infrastructures to reduce health disparities (Jackson & Nadine Gracia, 2014)**.** It is crucial to be successful to report the progress or lack of progress made in eradicating health disparities and to compare them over time and across communities (Asada et al., 2013; Truman et al., 2011).

It is very popular among researchers and policymakers to analyse infrastructure, generally, health infrastructure, health care services, and health outcomes, specifically, by creating composite indices. There is a significant research gap in Afghanistan regarding the understanding of healthcare accessibility and quality variations across the country's different provinces. This research aims to address this gap by comprehensively analysing the disparities in health infrastructure among provinces, considering the physical and human resources health infrastructure indicators. Our hypothesis in this investigation is the existence of health infrastructure disparities among the different provinces of Afghanistan. The study's findings will provide valuable insights to guide targeted policy interventions, resource allocation, and healthcare strategies, promoting a more equal and efficient health infrastructure across all provinces of Afghanistan.

2. Literature review

Despite the lack of literature on the topic under investigation in Afghanistan, researchers reviewed literature that was available worldwide, particularly in India. (Kaur et al., 2023b; Koka & Mir, 2018; G. Kumar & Singh, 2020; K. Kumar & Singh, 2010; Lakshmi & Sahoo, 2013; Lyngdoh, 2015; M. M. Goel & Ishu Garg, 2018) used the principal component analysis to figure out the disparities in health infrastructure throughout India's many states, and they all found the existence of health infrastructure inequalities. (Pradhan et al., 2011) examines the relationship between health infrastructure inputs, outputs, and their effects on economic growth by utilizing the simple regression and Granger causality test, in India between 1980 and 2005. The results demonstrated that health infrastructure inputs had a significant influence on health infrastructure outputs, including crude birth rate (CBR), crude death rate (CDR), the infant mortality rate (IMR), life expectancy at birth (LER), and couple protection rate (CPR).

(Rout, 2007) analysed the disparities in healthcare infrastructure at the district level across the districts of Orissa and developed a composite healthcare infrastructure indicator. He discovered that the state's health infrastructure is deficient in one-fourth of the state and is developed in about half. (Poddar., 2014) claims that in West Bengal's Hugli district, there is a large disparity in women's health status at the level of sub-district blocks, mostly due to inequities in the availability of health infrastructure. Using PCA, (Kumari & Raman, 2022) developed 12 representative indices to evaluate health disparities in Uttar Pradesh in the areas of access to care, amenities for care, and affordability. According to their research, western districts had better development in each of the three areas as well as a higher overall health index.

(Gupta, 2012) When the discrepancies in Uttar Pradesh's health infrastructure are examined, it is found that, despite the latter's superior socioeconomic development, the eastern area of the state has worse health indices than the western region. (Saikia & Bhattacharjee, 2011) the identified inter-district disparity in the accessibility of healthcare facilities using the Mazziotta-Pareto Index. To promote equitable distribution and allocation of health services across all areas, the report emphasized the crucial role that government must play. (Mr. Q. Andaish & Assadi, 2024; Q. Andaish et al., 2022)Found a positive correlation between foreign aid and HDI, notably the Health Index of Afghanistan and Asian countries. Afghanistan has been plagued by internal conflicts, leaving its citizens to cope with the aftermath of war and its socioeconomic impact. In particular, the health sector has been severely impacted by a lack of access to basic infrastructure. In current study our hypothesis is that there is a significant disparity in health

infrastructure across different provinces in Afghanistan. This disparity is influenced by various factors such as socio-economic conditions, population density, inadequate resource allocation, and the impact of conflicts.

3. Methodology and database

This study utilizes secondary data from two primary sources, namely the Afghanistan Statistical Yearbook 2020 and the Income and Expenditure & Labour Force Survey Report 2020, both of which are published by the National Statistics and Information Authority (NSIA) of the Afghanistan government. Our main objective is to analyse health infrastructure inequalities at the provincial level by constructing a comprehensive health infrastructure index for each province. Through extensive research and analysis of available literature, including sources such as (Kaur et al., 2023a; G. Kumar & Singh, 2020; Kumari & Raman, 2022), the researchers have developed the HII for 34 provinces in Afghanistan. The HII was constructed using a variety of indicators, including:

1. Number of government hospitals per 10000 populations; designated as X1.
2. Number of government laboratories per 10000 populations; designated as X2.
3. Number of specialists per 10000 populations; designated as X3.
4. Number of comprehensive health centers per 10000 populations; designated as X4.
5. Number of basic health centers per 10000 populations; designated as X5.
6. Number of sub-health centers per 10000 populations; designated as X6.
7. Number of beds per 10000 populations; designated as X7.

In order to effectively analyse the health infrastructure of various provinces in Afghanistan, we have assigned specific indicators denoted as X1, X2, X3, X4, X5, X6, and X7. These indicators encompass both physical and human resources within the health sector. My selection of these indicators was informed by an extensive review of relevant literature, which provided valuable insights into the various facets of health infrastructure. In order to investigate inter-province health infrastructure disparities in Afghanistan, comprehensive health infrastructure indicators were used to create a composite health infrastructure index (HII) at the provincial level. The Afghanistan government's National Statistics and Information Authority (NSIA) was the primary source of secondary data for the study.

In order to generate an accurate health infrastructure index (HII), several steps must be taken. Initially, the data must be normalised to ensure precise outcomes when statistical tools are applied. To guarantee result accuracy, the following process has been utilised (Kaur et al., 2023b; M. M. Goel & Ishu Garg, 2018; OECD Annual Report, 2008).

$$\mathrm{NVid} = 1 - \frac{MaxAi - OAid}{MaxAi - MinAid}$$

In order to calculate the NVid formula, we first normalized the data. NVid calculates the normalized value of each indicator, where MaxAi is the maximum value of the indicator, MinAid represents the minimum value of the indicator, and OAid determines the observed value of the indicator at the provincial level (Hair et al., 2006).

In statistical analysis, Principal Component Analysis (PCA) is a widely-used method for transforming a set of potentially correlated variables into a set of linearly uncorrelated variables. This transformation is achieved through an orthogonal transformation, resulting in a set of Principal Components or factors (Pi, i=1 to n). These factors are combinations of variables (Pi, i=1 to m) that are orthogonal to each other, and are determined by analysing the Rotated Components and Eigenvalues of the normalized data.

$P_1 = a_{11} X_1 + a_{12} X_2 + a_{13} X_3 + \ldots\ldots\ldots\ldots\ldots + a_{1m}A_m$

$P_2 = a_{21} X_1 + a_{22} X_2 + a_{23} X_3 + \ldots\ldots\ldots\ldots\ldots + a_{2m}A_m$

$P_3 = a_{31} X_1 + a_{32} X_2 + a_{33} X_3 + \ldots\ldots\ldots\ldots\ldots + a_{3m}A_m$

$P_n = a_{n1} X_1 + a_{n2} X_2 + a_{n3} X_3 + \ldots\ldots\ldots\ldots\ldots + a_{nm}A_m$

Or

$$\mathrm{Pi} = \sum_{j=1}^{m} aijAj$$

Here, aij stands in for the factor loading and illustrates the relationship between the factor and the initial variable. (Malhotra & Dash, 2018) In Principal Component Analysis (PCA), each component is ranked according to the level of data variation it represents. The component with the highest level of variation is ranked first, followed by the second, and so on. Factor loading is used to

establish the link between variables and fundamental factors. The larger the factor loading, the stronger the relationship between the variable and the fundamental component. In the calculation, only the most significant factor loadings with values greater than or equal to 1.0 are considered. The eigenvalue of a factor indicates the amount of variance it explains. Factors with eigenvalues greater than 1 are taken into account during the analysis.

Each indicator's weight needs to be determined by applying the following formula after the total initial eigenvalues and the rotated component have been calculated.

$$\mathbf{Wi} = \sum_{\square}^{\square} (|\mathbf{Pin}| \times \mathbf{GVn})$$

In the formula above, Wi represents the weight of the ith indicator, Pin denotes the nth component of the ith indicator, and GVn is the component's total initial eigenvalue, which is constant.

In the end, used the following formula to determine the HII for each province of Afghanistan while taking into account normalized data and weights.

$$HIId = \frac{\sum \square [\mathrm{NVid} * Wi]}{\sum_{i=1}^{7} Wi}$$

The health infrastructure index (HII) is calculated for each province using the aforementioned formula. NVi represents normalized data, and Wi represents indicator weights. The position of each province regarding the Health Infrastructure Index has been determined by allocating ranks to the provinces. The province with the highest index received the top position, and the province with the lowest index received the lowest position.

4. Result and discussion

This section presents the results of the empirical examination of inter-province disparities in Afghanistan's health infrastructure. Since many variables relate to health infrastructure, an attempt has been made to create a composite HII to assess Afghanistan's level of health infrastructure development.

Table 1, Population and Health Infrastructure Indicators in different provinces of Afghanistan

No	Province	Population in 2020-2021	X1	X2	X3	X4	X5	X6	X7
1	Kabul	5204667	0.067247	0.315102	3.047265	0.103753	0.136416	0.023056	4.104009
2	Kapisa	488298	0.040959	0.983006	0.737255	0.163834	0.389107	0.348148	3.071895
3	Parwan	737700	0.027111	0.488003	0.691338	0.162668	0.420225	0.501559	3.14491
4	Wardak	660258	0.060582	0.620969	0.287766	0.13631	0.408931	0.545241	3.407759
5	Logar	434374	0.115108	0.690649	0.414389	0.253238	0.529498	0.322303	6.146777
6	Nangarhar	1701698	0.047012	0.658166	0.305577	0.123406	0.481872	0.193924	1.087149
7	Laghman	493488	0.060792	0.46607	0.303959	0.182375	0.385014	0.668709	4.660701
8	Panjsher	169926	0.117698	0.70619	0.294246	0.117698	0.529642	1.059285	2.353966
9	Baghlan	1014634	0.029567	0.551923	0.197115	0.167548	0.236538	0.394231	2.414664
10	Bamyan	495557	0.080717	0.524662	0.504483	0.201793	0.464124	0.827352	5.065008
11	Ghazni	1362504	0.044037	0.286238	0.234862	0.198165	0.293577	0.366971	3.58898
12	Paktika	775498	0.038685	0.515798	0.116054	0.116054	0.206319	0.361058	1.676342
13	Paktya	611952	0.065365	0.42487	0.294141	0.114388	0.2778	0.343164	3.921876
14	Khost	636522	0.031421	0.596994	0.487022	0.204235	0.141393	0.392759	3.094944
15	Kunarha	499393	0.060073	0.560681	0.260316	0.180219	0.360438	0.740899	4.004862
16	Nooristan	163814	0.183135	1.037762	0.183135	0.244179	0.549404	1.404031	3.052242
17	Badakshan	1054087	0.037948	0.5787	0.227685	0.142303	0.294093	0.626134	4.07936
18	Takhar	1093092	0.045742	0.548902	0.256154	0.10978	0.329341	0.301896	2.305387
19	Kundoz	1136677	0.026393	0.659818	0.175951	0.114368	0.281522	0.281522	3.149531
20	Samangan	430489	0.092918	0.209065	0.301982	0.092918	0.348441	0.487817	3.716704
21	Balkh	1509183	0.059635	0.357809	1.265585	0.099392	0.364436	0.337931	6.056257
22	Sar-e-pul	621002	0.064412	0.386472	0.193236	0.144927	0.338163	0.515296	2.737511
23	Ghor	764472	0.039243	0.28778	0.183133	0.104647	0.366266	0.523237	3.335636
24	Daykundi	516504	0.077444	0.658272	0.154887	0.154887	0.367858	0.638911	3.52369
25	Urozgan	436079	0.045863	0.733812	0.114658	0.206385	0.298111	0.940197	2.981111
26	Zabul	384349	0.052036	0.572396	0.208144	0.208144	0.39027	0.780541	3.642523
27	Kandahar	1399594	0.021435	0.364391	0.893116	0.192913	0.207203	0.342957	0.53587
28	Jawzjan	602082	0.066436	0.398617	1.212459	0.116263	0.265745	0.415226	5.979252
29	Faryab	1109223	0.027046	0.28849	0.15326	0.15326	0.207352	0.252429	1.739957
30	Helmand	1446230	0.048402	0.380299	0.477103	0.103718	0.324983	0.304239	4.010427

31	Badghis	549583	0.036391	0.254739	0.090978	0.072782	0.363912	0.400304	2.456408
32	Herat	2140662	0.023357	0.32233	0.789475	0.130801	0.186858	0.233573	2.971044
33	Farah	563026	0.035522	0.674924	0.124328	0.213134	0.177612	0.728208	2.966115
34	Nimroz	183554	0.05448	0.490319	0.381359	0.21792	0.435839	0.326879	5.447988

Source: Author's calculation based on NSIA.

Table one provides information about the population and health infrastructure indicators of 34 provinces in Afghanistan. The data shows that Kabul, Nangarhar, Balkh, and Kandahar are the most populous provinces, while Nooristan has the lowest population, followed by Panjsher, Nimroz, and Zabul. Among the seven indicators measured, Nooristan appears to outnumber four of them; these are the number of government hospitals, laboratories, basic health centres, and sub-health centres per 10,000 population. Conversely, Kabul boasts a substantial number of specialists per 10,000 individuals. Meanwhile, Logar outshines the other 34 provinces regarding the number of comprehensive health centres and beds per 10,000 people.

Table 2, Result of Factor Analysis for the Year 2020 and Weight Calculation

Indicators	**Rotated Component Matrix**		**weights**
	Component 1	**Component 2**	
X1	**.747**	**.447**	2.874839
X2	**.745**	-.192	2.501192
X3	-.438	**.669**	2.274709
X4	**.611**	-.082	1.942671
X5	**.755**	.221	2.571961
X6	**.841**	-.119	2.68137
X7	.163	**.832**	1.689635
Total weights			16.53638
Total initial eigenvalues	2.985	1.444	
per cent of Variance	42.673	20.632	
Extraction Method: Principal Component Analysis. **Rotation Method: Varimax with Kaiser Normalization**			

The bold value depicts the highest factor loading of each variable on the component.

Source: Author's calculation using SPSS.

The results of the factor analysis for the seven indicators in 2020 are presented in table two. The principal component analysis (PCA) identified two component factors from the seven health infrastructure indicators in 34 provinces in Afghanistan. The first component, with an eigenvalue of 2.985, accounts for 42.673 per cent of the health infrastructure disparities among the provinces. Based on the data analysis, it appears that the most significant factor loaded on the first factor is the number of sub-health centres per 10,000 people, with a factor loading of 0.841. The second most significant factor is the number of basic health centres per 10,000 people, with a factor loading of 0.755. Following that, we have the number of government hospitals per 10,000 population, which has a factor loading of 0.747, the number of government laboratories per 10,000 population with a factor loading of 0.745, and the number of comprehensive health centres per 10,000 populations with a factor loading of 0.611. The second component, which has an eigenvalue of 1.444, represents 20.632 per cent of the inequalities in Afghanistan's health infrastructure across its 34

provinces. The number of beds per 10,000 population has the highest factor loading value of 0.832, indicating that it is the most important factor, followed by the number of specialists per 10,000 population (0.669), and the number of public hospitals per 10,000 population (0.447).

Table 3, Health Infrastructure Index

No	Province	HII	Rank
1	Kabul	0.291306	21
2	Kapisa	0.431116	7
3	Parwan	0.354046	15
4	Wardak	0.384026	12
5	Logar	0.606488	2
6	Panjsher	0.535801	3
7	Nangarhar	0.312613	18
8	Laghman	0.415028	10
9	Kunarha	0.415366	9
10	Nooristan	0.80448	1
11	Bamyan	0.5249	4
12	Dykundi	0.412515	11
13	Ghazni	0.281873	22
14	Paktika	0.19065	31
15	Paktya	0.275651	24
16	Khost	0.277432	23

17	Badakshan	0.331561	17
18	Takhar	0.257553	26
19	Kundoz	0.251221	29
20	Baghlan	0.253457	28
21	Balkh	0.363571	13
22	Sar-e-pul	0.304181	19
23	Samangan	0.292125	20
24	Jawzjan	0.357349	14
25	Faryab	0.151394	34
26	Zabul	0.433907	5
27	Kandahar	0.208101	30
28	Helmand	0.265657	25
29	Nimroz	0.43275	6
30	Urozgan	0.423231	8
31	Badghis	0.189362	32
32	Herat	0.181072	33
33	Farah	0.335664	16
34	Ghor	0.254823	27

Source: Author's calculation using SPSS.

Table three presents the health infrastructure index (HII) scores and rankings of all 34 provinces in Afghanistan. According to the findings, Nooristan has secured the top position with an HII score of 0.80448. This signifies that Nooristan is the most developed province out of all the 34 provinces in Afghanistan in terms of health infrastructure. However, this province is one of the most

deprived provinces in Afghanistan, but the lower proportion of the population might be the main reason for its top ranking. Based on the result, Nooristan province is ranked as the top province in Afghanistan, followed by Logar, Panjsher, Bamiyan, Zabul, and Nimroz. The study suggests that a province's population size is a determining factor in its ranking. On the other hand, Faryab has been ranked last out of all 34 provinces, with an index value of 0.151394. The study also shows that the provinces of Faryab, Herat, Badghis, Paktika, Kandahar, and Kunduz are at the bottom six positions. The research emphasizes the significant disparities in the Health Index Indicator (HII) across all Afghan provinces, with the range varying between 0.151394 and 0.80448.

It should be pointed out that the six most highly-ranked provinces in terms of development, namely Nooristan, Logar, Panjsher, Bamiyan, Zabul, and Nimroz, have populations of 163814, 434374, 169926, 495557, 384349, and 183554, respectively. Conversely, the populations of the six provinces with the lowest rankings are 1109223, 2140662, 549583, 775498, 1399594, and 1136677. Although all six highly-ranked provinces have populations of less than 500,000, most of the provinces with the lowest rankings have populations exceeding 1000000, except for Badghis and Paktika, whose populations are also greater than 500,000. Notably, Herat Province has a larger population than all of the provinces that received the highest rankings

Table 4, Categorization of the Province of Afghanistan According to Performance of Health Infrastructure Index

Province category	Rank	Number of provinces	Percentages	Name of Province
Highly developed	0.750 - 1.00	1	3pere cent	Nooristan
Developed	0.500 – 0.749	3	9 per cent	Logar, Panjsher and Bamyan
Backward	0.250 – 0.499	25	73 per cent	Kabul, Wardak, Parwan, Nangarhar, Kapisa, Laghman, Ghazni, Khost, Baghlan, Kunarha, Badakshan, Paktiya, Kundoz, Balkh, Takhar, Ghor, Sar-e-pul, Samangan, Urozgan, Dykundi, Helmand, Zabul, Nimroz, Jawzjan, and Farah.
Highly Backward	0.000 – 0.249	5	15 per cent	Faryab, Bdghis, Kandahar, Herat and Paktika.

Source: Author's calculation.

The provinces of Afghanistan have been classified into four groups based on their HII performance in 2020. The categories, namely highly developed, developed, backward, and significantly backward, are determined by each province's HII score. Table four provides a clear and concise overview of how the provinces are grouped according to their HII performance. A province is considered "highly developed" if its index value is between 0.750 and 1.00, "developed" if it is between 0.500 and 0.749, "backward" if it is between 0.250 and 0.499, and "highly backward" if it is between 0.000 and 0.249.

The provinces of Afghanistan have been classified into different categories based on their HII score. Out of the total of 34 provinces, only Nooristan has been classified as a highly developed province with a score of 0.80448. There are three other provinces, namely Logar, Panjsher, and Bamyan, which fall under the developed category. 25 other provinces, including Kabul, Wardak, Laghman, Kapisa, Nangarhar, Parwan, Paktiya, Ghazni, Badakshan, Khost, Takhar, Kunarha, Kunduz, Balkh, Sar-e-pul, Samangan, Ghor, Dykundi, Urozgan, Zabul, Jawzjan, Helmand, Nimroz and Farah, are classified as backward provinces. The remaining five provinces, namely Kandahar, Faryab, Badghis, Herat, and Paktika, are all highly backward provinces. Based on research findings, Afghanistan's healthcare infrastructure is significantly lacking. Only three per cent of provinces boast a highly developed system, while nine per cent have a developed infrastructure. An alarming 73 per cent of provinces have a backward infrastructure, and 15 per cent are severely backward. This highlights the inadequacy and inequities of the nation's healthcare system. It is crucial that the government takes swift action to improve the situation.

All 34 provinces of Afghanistan are divided into eight regions such as central (Kabul, Wardak, Panjsher, Kapisa, Parwan, and Logar), central highlands (Dykundi and Bamyan), East (Nangarhar, Nooristan, Kunarha, and Laghman), Southeast (Khost, Paktya, Ghazni, and Paktika), North (Balkh, Sar-e-pul, Samangan, Jawzjan, and Faryab), North-east (Baghaln, Kundoz, Badakshan, and Takhar), South (Nimroz, Zabul, Urozgan, Kandahar and Helmand), and West (Ghor, Herat, Badghis and Farah). Faryab Province, which had the lowest ranking in terms of health infrastructure, belongs to the North region. In contrast, the province of Nooristan, which received the highest ranking, is related to the East region. The East region was at the top when compared to the regional health infrastructure development. Followed by the Central and Central Highlands. Whereas the rest of the regions are all in the backward and highly backward categories, these three regions at least have a representative in the highly developed and developed categories.

The investigation's results seem to contradict common beliefs. For example, provinces like Nooristan, Panjsher, Loger, and Bamyan, which are categorised as developed or highly developed, are not considered developed when assessing overall socio-economic development. On the other hand, provinces like Kabul, Balkh, Herat, and Nangarhar, which have high socio-economic performance, are classified as Backward or Highly Backward. To support these findings, I would like to present the following arguments. Firstly, the population of highly developed and developed provinces is significantly lower than that of provinces like Kabul, Balkh, Herat, Nangarhar, and Kandahar. Secondly, this investigation did not consider the private healthcare infrastructure, which is more widely available in Kabul, Balkh, Herat, and Nangarhar. Finally, this study solely focused on the health infrastructure and did not consider overall health outcomes or health conditions.

1. Conclusion and suggestion

Our objective for this study is to analyse the discrepancies in health infrastructure among the provinces of Afghanistan in 2020, utilizing the composite health infrastructure index (HII). The findings indicate that Noorsitan province holds the highest rank with an index value of 0.80448, whereas Faryab province received the lowest rank with an index value of 0.151394. From among the 34 provinces in Afghanistan, only four - Nooristan, Logar, Panjsher, and Bamyan - are considered highly developed or developed. The remaining 30 provinces are categorized as backward or highly backward in terms of HII, revealing that 89 per cent of the country's provinces lack sufficient health infrastructure. Among the provinces in Afghanistan, Faryab, Badghis, Kandahar, Herat, and Pktika exhibit the most inadequate health infrastructure conditions. Moreover, the health infrastructure index (HII) varies between 0.151394 to 0.80448. It is clear from the preceding analysis that there exist notable inconsistencies among the provinces regarding health infrastructure development. To tackle this challenge, appropriate policies must be devised and executed.

Although it was anticipated that provinces such as Kabul, Balkh, Herat, and Nangarhar would receive higher rankings in terms of health infrastructure, the current study reveals that Nooristan, Lagman, Panjsher, and Bamyan actually have a superior ranking. This is unexpected as these provinces are generally considered to have poor socioeconomic development, particularly in terms of health. Nonetheless, there may be a few explanations for this. Firstly, the four provinces with the highest ranking have significantly smaller populations than the others; the indicators are based on the proportion of the population. For example, the total population of Nooristan only accounts for 6.53 per cent of Kabul's population. Secondly, the study did not account for the private health infrastructure, which is more available in larger cities. Lastly, the primary focus of this study is solely on the health infrastructure index and not the overall health situation. It is plausible that Kabul's overall health condition could be better than that of Nooristan and Bamyan. As the study's primary focus is on the government health infrastructure index, the ranking difference is elucidated.

Based on the aforementioned discussions, it is my belief that the government has a responsibility to address the disparities in health infrastructure. To uplift and support the Backward and highly backward provinces, the government needs to allocate more funds. In addition, the government must consider population density when constructing health infrastructure. Nevertheless, possessing adequate health infrastructure alone is not sufficient to yield improved health outcomes. Maintenance and operational efficiency are equally imperative. Hence, in conjunction with government action, it is crucial for every citizen to possess a sense of patriotism and uphold the principles of safeguarding public assets.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Declaration of conflicting interests

The Author declares that there is no conflict of interest.

References

[1]. Agénor, P.-R., & Moreno-Dodson, B. (2012). Public Infrastructure and Growth: New Channels and Policy Implications. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2005043

[2]. Andaish, Mr. Q., & Assadi, Mr. S. (2024). A study on the effectiveness of foreign aid on human development of Afghanistan. *Sustainable Technology and Entrepreneurship*, *3*(1), 100056. https://doi.org/10.1016/j.stae.2023.100056

[3]. Andaish, Q., Vansiya, Y., & Assadi, S. (2022). A Study on the Impact of Foreign Aid on Human Development of Asian Countries: With Quantile Regression Approach. *Towards Excellence: An Indexed, Refereed & Peer Reviewed Journal of Higher Education*, *14*(4), 862–873. https://hrdc.gujaratuniversity.ac.in/Ejournal

[4]. Armenta, B., Rathi, N., Assasnik, N., & Kamimura, A. (2018). Structural quality of healthcare facilities in India. *International Journal of Health Care Quality Assurance*, *31*(6), 483–488.

[5]. Asada, Y., Yoshida, Y., & Whipp, A. M. (2013). Summarizing social disparities in health. *Milbank Quarterly*, *91*(1), 5–36. https://doi.org/10.1111/milq.12001

[6]. Aschauer, D. A. (2000). Public capital and economic growth: Issues of quantity, finance, and efficiency. *Economic Development and Cultural Change*, *48*(2), 390–406. https://doi.org/10.1086/452464

[7]. Baldwin, J. R., & Dixon, J. (2011). Infrastructure Capital: What is it? Where is it? How Much of it is There? In *SSRN Electronic Journal* (Issue 15). https://doi.org/10.2139/ssrn.1507883

[8]. Banu, N., & Biswas, B. (2022). Role of international border on healthcare access in West Bengal, India: A geographical analysis. *GeoJournal*, *87*(4), 2949–2974. https://doi.org/10.1007/s10708-021-10411-8

[9]. Blanchet, R., Batal, M., Johnson-Down, L., Johnson, S., Louie, C., Terbasket, E., Terbasket, P., Wright, H., & Willows, N. (2021). An Indigenous food sovereignty initiative is positively associated with well-being and cultural connectedness in a survey of Syilx Okanagan adults in British Columbia, Canada. *BMC Public Health*, *21*(1), 1–12. https://doi.org/10.1186/s12889-021-11229-2

[10]. David E. Bloom, & Canning, D. (2008). Population Health and Economic Growth. *Journal of Internal Medicine*, *8*(4), 233–233.

[11]. De, K. (2017). Social Infrastructure: Urban & Rural Health and Education. *Journal of Infectious Diseases & Epidemiology*, *1*(1), 8–11. https://doi.org/10.00000/jide.2017.102

[12]. Dreze, J. (2016). *Social policy*.

[13]. Guo, Y., & Liu, Y. (2022). Sustainable poverty alleviation and green development in China's underdeveloped areas. *Journal of Geographical Sciences*, *32*(1), 23–43. https://doi.org/10.1007/s11442-021-1932-y

[14]. Gupta, A. (2012). *Magnitude of Urban Health Disparity in Uttar Pradesh*. *December*, 108–124.

[15]. Hair, E., Halle, T., Terry-Humen, E., Lavelle, B., & Calkins, J. (2006). Children's school readiness in the ECLS-K: Predictions to academic, health, and social outcomes in first grade,. *Early Childhood Research Quarterly*, *21*(4), 431–454. https://doi.org/10.1016/j.ecresq.2006.09.005.%0A(https://www.sciencedirect.com/science/article/pii/S0885200606000640%0A

[16]. Jackson, C. S., & Nadine Gracia, J. (2014). Addressing health and health-care disparities: The role of a diverse workforce and the social determinants of health. *Public Health Reports*, *129*(SUPPL. 2), 57–61. https://doi.org/10.1177/00333549141291s211

[17]. Jędrzejczak-Gas, J., Barska, A., & Wyrwa, J. (2021). Economic development of the european union in the relation of sustainable development—Taxonomic analysis. *Energies*, *14*(22). https://doi.org/10.3390/en14227488

[18]. Kaur, N., Ahmad, S., & Shakeel, A. (2023a). An inter-district analysis of health infrastructure disparities in the Union Territory of Jammu and Kashmir. *GeoJournal*, *0123456789*. https://doi.org/10.1007/s10708-023-10869-8

[19]. Kaur, N., Ahmad, S., & Shakeel, A. (2023b). An inter-district analysis of health infrastructure disparities in the Union Territory of Jammu and Kashmir. *GeoJournal*, *0123456789*. https://doi.org/10.1007/s10708-023-10869-8
[20]. Khader, S. A. (1998). Productivity in Infrastructure. *Yojana*, *42*(1), 13–18.
[21]. Koka, A. A., & Mir, M. A. (2018). Inter District Disparities in Health Infrastructure Development in Kashmir: A Principal Component Analysis. *IJARIIE*, *4*(1), 1562–1567.
[22]. Kumar, G., & Singh, J. (2020). Health Infrastructure Disparities in Punjab: An Inter-district Analysis. *Journal of Infrastructure Development*, *12*(1), 25–38. https://doi.org/10.1177/0974930620902311
[23]. Kumar, K., & Singh, S. (2010). Health infrastructure and uti lization pattern in rural Punjab: Emerging public policy issues. *Journal of Economic and Social Development*, *6*(2), 79–96.
[24]. Kumari, R., & Raman, R. (2022). Regional disparities in healthcare services in Uttar Pradesh, India: A principal component analysis. *GeoJournal*, *85*, 5027–5050. https://doi.org/10.1007/s10708-021-10542-y
[25]. Lahmar, B., Dridi, H., & Akakba, A. (2021). Territorial health approach outputs of geo-governance of health facilities: Case study of Batna, Algeria. *GeoJournal*, *86*(5), 2305–2319. https://doi.org/10.1007/s10708-020-10189-1
[26]. Lakshmi, T. S., & Sahoo, D. (2013). Health Infrastructure and Health Indicators: The Case of Andhra Pradesh, India. *IOSR Journal of Humanities and Social Science*, *6*(6), 22–29. https://doi.org/10.9790/0837-0662229
[27]. Lyngdoh, L. M. (2015). Inter-State Variations in Rural Healthcare Infrastructure in North-East India. *The NEHU Journal*, *XIII*(2), 31–48.
[28]. M. M. Goel & Ishu Garg. (2018). Construction of Health Infrastructure Index in Haryana: An Econometric Approach. *Journal of Technology Management for Growing Economies*, *9*(1), 103–123. https://doi.org/10.15415/jtmge.2018.91005
[29]. Malhotra, N., & Dash, S. (2018). *Marketing research: An applied orientation*.
[30]. Mendoza-Walters, A., Mishra, M., Carlin, M., Nweke, O. C., Sellers, K., & Jarris, P. (2016). State and territorial infrastructure for health equity andminority health. *Journal of Public Health Management and Practice*, *22*, S77–S86. https://doi.org/10.1097/PHH.0000000000000336
[31]. Nijkamp, P. (1986). Infrastructure and regional development: A multidimensional policy analysis. *Empirical Economics*, *11*(1), 1–21. https://doi.org/10.1007/BF01978142
[32]. OECD Annual Report. (2008). *OECD Annual Report 2008*. OECD iLibrary.
[33]. Poddar., S. (2014). A Study of Spatial Variation of Women Health Status in Hugli District of West Bengal, India. *International Research Journal of Social Sciences*, *3*(11), 20–26. http://www.isca.in/IJSS/Archive/v3/i11/4.ISCA-IRJSS-2014-189.php
[34]. Pradhan, R. P., Kumar, M., & Sanyal, G. S. (2011). Health infrastructure in India: The input and output association with economic growth. *Journal of Health Management*, *13*(1), 59–75. https://doi.org/10.1177/097206341001300104
[35]. Rao, K. N. (2003). Trends In The Health Status In Andhra Pradesh: An Empirical Analysis. *The Indian Economic Journal*, *51*(1), 80–88. https://doi.org/10.1177/0019466220030108
[36]. Rout, H. S. (2007). Health Infrastructure in Orissa: An Inter-district analysis. *The Icfai Journal of Infrastructure, 5*(4), 58–71.
[37]. Saikia, H., & Bhattacharjee, D. (2011). Quantifying basic health care facilities in Assam: Where do the districts stand. *Elixir Soc. Sci*, *36*(304), 3476–3482.
[38]. Shaw, S., & Sahoo, H. (2020). Accessibility to Primary Health Centre in a Tribal District of Gujarat, India: Application of two step floating catchment area model. *GeoJournal*, *85*, 505–514. https://doi.org/10.1007/s10708-019-09977-1
[39]. Truman, B. I., C. Kay, S., Roy, K., Chen, Z., Moonesinghe, R., Zhu, J., Crawford, C. G., & Zaza, S. (2011). Rationale for regular reporting on health disparities and inequalities—United States. *MMWR Supplements*, *60*(1), 3–10. pmid: 21430613.
[40]. Ullah, K., & Majeed, M. (2023). District-level multidimensional poverty and human development in the case of Pakistan: Does institutional quality matter?. *GeoJournal*, *88*(1), 561–581. https://doi.org/10.1007/s10708-022-10600-z
[41]. Vulovic, V., & Chaloupka, F. J. (2022). *Taxation of Tobacco , Alcohol and Sugar-Sweetened Beverages for Achieving the Sustainable Development Goals*. *4*(Sdg 1).
[42]. Weil, D. N. (2014). Health and economic growth. In *Handbook of economic growth* (pp. 623–682).