International Journal of Science and Research Archive

eISSN: 2582-8185

Cross Ref DOI: 10.30574/ijsra

Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

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Health care facility system: A block level analysis of Uttar Dinajpur District, West Bengal, India

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International Journal of Science and Research Archive, 2024, 13(02), 3986-3995

Publication history: Received on 20 November 2024; revised on 29 December 2024; accepted on 31 December 2024

Article DOI: https://doi.org/10.30574/ijsra.2024.13.2.2631

Abstract

Human health has long been seen as one of the most important measures of human progress. The general health of a population is a good indicator of the quality of health-care services offered in that location. In recent years, there has been renewed emphasis on efficiency in resource utilization in the healthcare sector. Most studies in the Indian context have focused on block level analysis. This paper explores block level health system efficiency in the district of Uttar Dinajpur, West Bengal. The analysis estimates the efficiency of the healthcare system at the block level using district-level data for 2017-2018. The goal of this study is to examine several aspects of health-care facilities in order to determine the state of the health-care system in the Uttar Dinajpur district of West Bengal, India. To do so, the Health Care Facility Index (HCFI) is calculated to assess the district's total health care situation. The Raiganj block in Uttar Dinajpur district has a higher average HCFI rating (0.9452) than the Itahar CD block (0.0625). There is a substantial difference in performance between the most efficient block of Raiganj and the least efficient block of Itahar, resulting from inadequate utilization of available health care resources. The study also identifies complementarities of private health care resources and the role of other factors, such as Health Care Institution Population Ratio (HCIPR), Bed Population Ratio (BPR), Doctor Population Ratio (DPR), Doctor Health Care Institution Ratio (DHCIR) and Bed Health Care Institution Ratio (BHCIR). The results suggest a need for better utilization of budgetary resources, both under the state department of health and the National Rural Health Mission, to increase health manpower and improve quality through training and better management resources in order to improve district health systems in Uttar Dinajpur.

Keywords: Health; Dimension Index; Health Care Facility; Correlation Matrix; Human Development

1. Introduction

"Health is a condition of complete physical, mental, and social well-being, not only the absence of sickness or disability," (World Health Organization, 1948). This definition explains the significance of health, which is seen as a fundamental human right and a key indication of human growth. People's health must be promoted and protected in order to achieve long-term economic and social growth and a higher quality of life. The International Conference on Primary Health Care held in Alma Ata, Russia in 1978 and co-sponsored by WHO and UNICEF, emphasised the need of all people across the globe achieving a level of health that allows them to live a socially and economically productive life (WHO, 1978). Out of the 8 goals, 18 objectives, and 48 indicators, the United Nations (UN) Millennium Development Objectives highlight the importance of health, with 6 goals, 8 targets, and 18 indicators directly related to it. A well-functioning health-care system, according to the World Health Organization (WHO, 1948), requires a financing mechanism, a well-trained and adequately compensated workforce, reliable data on which to base decisions and policies, and well-maintained health-care facilities to deliver quality medicines and technologies.

In recent years, there has been renewed emphasis on efficiency in resource utilization in the healthcare sector. A number of studies have focused on the overall performance of the healthcare system and its impact on health outcomes

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(Murray and Frenk 1999; World Health Organization [WHO] 2000). Some notable studies, for instance, have concentrated on hospitals, nursing homes, Health Maintenance Organizations (HMOs) and district health authorities (Wang et al. 1999; Evans et al. 2001; Jamison et al. 2001; Salomon et al. 2001; Hollingsworth and Wildman 2002; Worthington 2004; Sankar and Kathuria 2004). India had made remarkable progress in the field of health. The first important initiative was made in 1943, by Health Survey and Development Committee Report and known as Bhore Committee (KPMG and ASSOCHAM 2011). The initiatives' list included the adoption of a National Health Policy in 1983, the 73rd and 74th Constitutional Amendments devolving power to local institutions in 1992, the National Nutrition Policy in 1993, the National Policy on Indian System of Medicine and Homeopathy and Drug Policy in 2002, introduction of a first health insurance schemes for poor people in 2003 and the inclusion of health in the Common Minimum Program of Government in 2004 (Fugazzola, 2015). In order to improve the National Health System of India it is therefore necessary to evaluate and assess the health services in terms of quantity, quality, cost and sustainability (Capolongo et al. 2016b, 2015a). Specific terms of valuation are defined and supervised by the Ministry of Health and Family Welfare (MoH, FW). The aim of the World Health Organization, in collaboration with the Indian Government, is to identify approaches that support the continuous improvements in the field of health. Summarizing the fields of interest of the Indian Health are International Regulations for healthcare, pharmaceutical, health administration, financial protection, quality, health for mothers and children, morbidity, health services, etc. WHO has to improve the way in which health service delivery institutions in the public and private sectors are managed, introducing professional decision-making in the use of resources (Capasso et al. 2017), serving the client and maximizing quality and productivity (Strategic Priority, 2017). Moreover, most important aspects are the adjusting service delivery structures to meet the health needs of the population in terms of quantities and modalities of networked, affordable and sustainable evidence-based services (Buffoli et al. 2015) and modernizing outdated structures (Strategic Priority, 2015). Currently India has 0.6 beds every 1,000 inhabitants. This scenario is worsened by the scarcity of architectures for health and support staff that leads to have 50% of beds in the public health sector and 30% in the private one not utilized totally. Nevertheless, the situation has, however, slightly improved by NRHM, founded by 85% the Union and the remaining 15% by the states, which aims to bring its action in rural areas strategic, engaging more than 800,000 workers paid according to the performances (Fugazzola, 2015).

The public health is mainly guaranteed by primary levels, with differences between rural and urban areas; in urban areas there is a double level system: a Basic Health Post for few thousand inhabitants and a Health Centre Urban, or Urban Family Welfare Centre, for 100,000 people attached with a general hospital. Instead, in rural areas there is a triple level system: a Sub-Centre for 5,000 inhabitants manages by two professionals (a man and a woman); a Primary Health Care Centre for 30,000 people with medical and paramedical staffs; a Primary Hospital with 30 beds per 100,000 inhabitants and some basic specializations (WHO, India 2012). The last cases include primary care services, which mean that they are specialized, mainly, in vaccinations, prevention of malnutrition, pregnancies, postnatal care and treatment of common diseases (Brahmochary, 2015). These activities are essential although not specialized because they guarantee basic health services in place that would otherwise be totally devoid (Fugazzola, 2015).

The current study aims to examine the health-care facility system in the Uttar Dinajpur district of West Bengal on a block wise. Health infrastructure in Uttar Dinajpur District is found to be insufficient due to high population pressure, with only one Community Health Centre for nearly three lakh people, when the national standard is one lakh; Primary Health Centers and Sub Centers are also found in a similar condition, with double or triple the number of patients. This diminishes their efficiency, resulting in poor health care. Although the district of Uttar Dinajpur contains 160 basic health care service facilities and sub-centres, their distribution is not uniform. Because the district is rural in character and the bulk of the inhabitants reside in rural regions, the population relies on these service centres for routine outpatient treatments, preventive, promotional, and emergency care. Simultaneously, these facilities act as focal points for the implementation of national health programmes, mostly through nurse personnel and outpatient department services.

1.1. Study Area

After the split of the previous West Dinajpur District, Uttar Dinajpur was formed on April 1, 1992. The district spans an area of 3,140 square kilometers and is situated between 87° 49' East longitudes and 90°00' East longitude, between latitudes 25° 11' North and 26° 49' North. The district is bordered on the east by the Bangladesh districts of Panchagarh, Thakurgaon, and Dinajpur, on the west by the Bihar districts of Kishanganj, Purnia, and Katihar, on the north by Darjeeling district and Jalpaiguri district, and on the south by Malda district and Dakshin Dinajpur district. The region is divided into 2 sub-micro regions i.e. (a) Islampur-Goalpokhar Plain (b) Sudhani Mahananda-Gamari Plain. Uttar Dinajpur comprises of 2 sub-divisions namely Raiganj and Islampur with 9 C.D blocks namely Chopra, Islampur, Goalpokhar I, Goalpokhar II, Karandighi, Raiganj, Hemtabad, Kaliyaganj and Itahar. Uttar Dinajpur district has 4 municipalities and 98 Gram Panchayats covering 1,494 villages during 2011 Census. The total population of Uttar

Dinajpur district as per Census 2011 is 30, 07134 out of which 26, 44,906 reside in rural areas and 3,62,228 are from urban areas. In the 2011 Census, the district's sex ratio was 939, with rural at 941 and urban at 921, which is lower than the total and rural. The effective literacy rate is 60.13 %, which is much lower than the national and state averages (Government of India, 2011).

1.2. Objectives

The main objective of this study is:

- To determine the block wise disparities in health care facilities in Uttar Dinajpur District by using Health Care Facility Index (HCFI).

2. Database and Methodology

The research was carried out using secondary data from the Census of India, 2011, and the Uttar Dinajpur district Statistical Handbook, 2017-2018. The total population of the municipalities of Raiganj, Kaliaganj, Dalkhola, and Islampur has been added to the populations of the corresponding C.D blocks in Uttar Dinajpur. All the hospitals including rural hospitals, Block Primary Health Centers (BPHC), Primary Health Centers (PHC), Sub-Centres (SC) other clinical departments of Govt. of West Bengal including State Govt. Undertakings, local bodies, and Govt. of India including Central Govt. undertaking, N.G.O. / Private Bodies (Nursing Homes) have been considered as Health Care Institutions (HCI). Total number of beds and total number of doctors of each C.D blocks have been collected from District Statistical Handbook of Uttar Dinajpur, 2017-2018.

In the present study, five dimensions have been selected to measure the extent of Health Care Facility System. At first, Health Care Facility System of Uttar Dinajpur district has been analyzed on the basis of secondary data collected from District Statistical Handbook, Uttar Dinajpur, 2017-2018. Five basic dimensions of Health Care Facility System have been identified and calculated using the following formula:

$$\text{HCIPR} = \frac{\text{Health Care Institution (HCI)} \times 1{,}00{,}000}{\text{Total Population}} \ldots\ldots\ldots\ldots\ldots (1)$$

$$\text{BPR} = \frac{\text{Number of Bed in HCI} \times 10{,}000}{\text{Total Population}} \ldots\ldots\ldots\ldots\ldots (2)$$

$$\text{DPR} = \frac{\text{Number of Doctor in HCI} \times 1{,}00{,}000}{\text{Total Population}} \ldots\ldots\ldots\ldots\ldots (3)$$

$$\text{DHCIR} = \frac{\text{Number of Doctor in HCI}}{\text{Health Care Institution (HCI)}} \ldots\ldots\ldots\ldots (4)$$

$$\text{BHCIR} = \frac{\text{Number of Bed in HCI}}{\text{Health Care Institution (HCI)}} \ldots\ldots\ldots\ldots\ldots (5)$$

2.1. Deprivation Method

The deprivation indicator I^{ij} for the j^{th} district (j = 1, 2, 3 …6) with respect to the $\boldsymbol{i}^{th}$ indicator (i =1, 2, 3 ….18) is given by-

$$Iij\ (Dimension\ Index) = \frac{Actual\ Value - Minimum\ Value}{Maximum\ Value - Minimum\ Value}$$

2.2. Health Care Facility Index (HCFI)

Considering all the five dimensions, i^{th} C. D. Block can be represented by a point (d_1, d_2, d_3) in three-dimensional Cartesian space like $0 \leq d_1, d_2, d_3 \leq 1$. In the three-dimensional Cartesian space, the point '0' would indicate the worst condition whereas '1' would indicate the ideal or perfect condition. HCFI is measured by the Normalized Inverse Euclidean Distance of the point (d_1, d_2, d_3) from the best or perfect point (1, 1, and 1).

Therefore, taking into account the equal weight for each dimension we can explain the formula for calculation of HCFI as follows-

$$\text{HCFI} = 1 - \sqrt{\frac{(1-d_1)^2 + (1-d_2)^2 + (1-d_3)^2 + (1-d_4)^2 + (1-d_5)^2}{5}}$$

The value of HCFI ranges from '0' to '1'. The value '0' indicates the worst health care facilities system and '1' indicates the perfect health care facilities. On the basis of the HCFI values, the C. D. Blocks are classified into three categories-

0.5<HCFI≤1.0 indicates 'High' or 'Very Good' health care facility system;

0.1<HCFI≤0.5 indicates 'Moderate' health care facility system and

0<HCFI≤0.1'Low' or 'Poor' health quality facility system.

3. Result and discussion

The table 1 provides various health-related ratios for different Community Development (C.D.) Blocks, which help in assessing the distribution and efficiency of healthcare resources in these areas. Below is an explanation of each metric and the interpretation of the data:

3.1. Health Care Institution Population Ratio (HCIPR)

Represents the number of healthcare institutions available per unit of the population. A higher HCIPR indicates better accessibility to healthcare facilities for the population. *Example:* Raiganj has the highest HCIPR (3.02), showing relatively good availability of healthcare institutions, whereas Goalpokhar-I has the lowest (0.61), indicating poor healthcare accessibility (Smith et al., 2014) (Fig. 1).

3.2. Bed Population Ratio (BPR)

Indicates the number of hospital beds available per unit of the population. A higher BPR suggests better hospitalization facilities and readiness to handle inpatient care. *Example:* Raiganj stands out with the highest BPR (13.71), highlighting better hospital infrastructure. Goalpokhar-I (1.23) and Chopra (1.76) have low BPRs, showing limited inpatient facilities (Jones & Taylor, 2016) (Fig. 1).

3.3. Doctor Population Ratio (DPR)

Indicates the availability of doctors per unit of the population. A higher DPR suggests better access to medical expertise for the population. *Example:* Islampur has a remarkably high DPR (12.32), implying a greater concentration of doctors. Itahar (0.99) has the lowest DPR, showing a potential shortage of medical professionals (Government of Uttar Dinajpur, 2017) (Fig. 1).

3.4. Doctor Health Care Institution Ratio (DHCIR)

Measures the average number of doctors per healthcare institution. A higher DHCIR suggests a better staffing level of doctors at

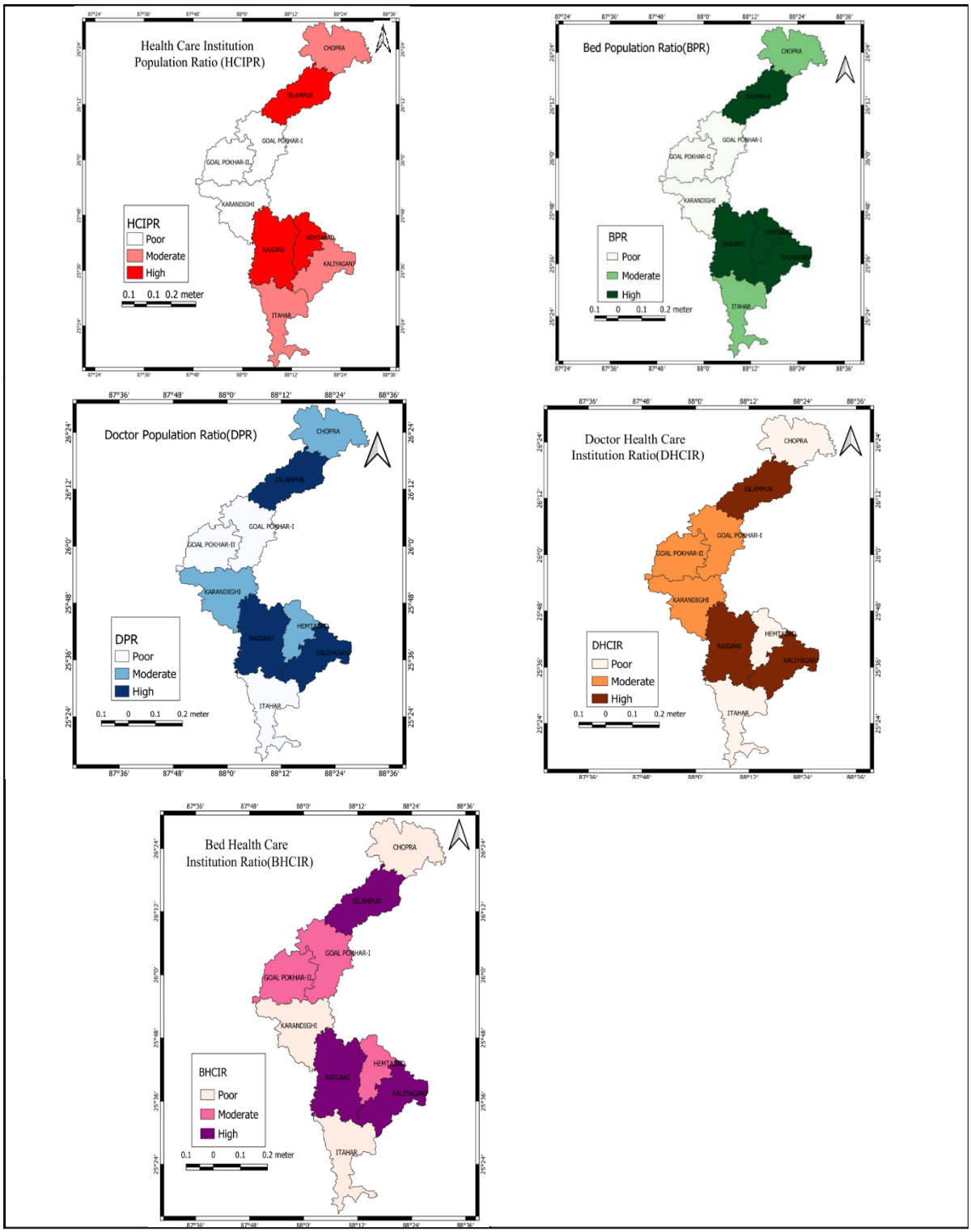

Figure 1 Block Wise Disparities in Health Care Facilities in Uttar Dinajpur District

healthcare institutions. *Example:* Islampur (4.22) and Kaliaganj (3.67) have higher DHCIR values, indicating well-staffed institutions. Itahar (0.75) and Chopra (1.00) reflect fewer doctors per institution, potentially straining healthcare delivery (World Health Organization, 2015) (Fig. 1).

3.5. Bed Health Care Institution Ratio (BHCIR)

Indicates the average number of beds available per healthcare institution. A higher BHCIR signifies larger or better-equipped healthcare institutions. *Example:* Raiganj (45.40) has the highest BHCIR, showing that its institutions are well-equipped. In contrast, Chopra (12.50) and Karandighi (13.00) have relatively low BHCIRs, suggesting smaller or less-equipped facilities (National Health Policy, 2017) (Fig. 1).

3.6. Block-wise Insights

- Chopra: Low HCIPR (1.41) and DPR (1.41), indicating limited healthcare access and doctor availability. BHCIR (12.50) is low, suggesting small healthcare institutions.
- Islampur: High DPR (12.32) and moderate HCIPR (2.92), showing good doctor availability but less accessibility to healthcare institutions. BHCIR (29.67) indicates relatively well-equipped facilities.
- Goalpokhar-I: Lowest HCIPR (0.61) and low BPR (1.23), highlighting poor healthcare accessibility and infrastructure. BHCIR (20.00) indicates moderate healthcare institution size.
- Goalpokhar-II: Moderate HCIPR (1.03) and BPR (1.58), reflecting a slight improvement over Goalpokhar-I but still below par. BHCIR (15.33) suggests smaller healthcare institutions.
- Karandighi: Moderate HCIPR (1.09) but low BPR (1.41) and DPR (2.44), indicating limited infrastructure and doctor availability. BHCIR (13.00) suggests small healthcare institutions.
- Raiganj: Best-performing block in HCIPR (3.02), BPR (13.71), and BHCIR (45.40), indicating excellent healthcare access and infrastructure. High DPR (11.62) and DHCIR (3.85), showing good doctor availability and staffing levels.
- Hemtabad: Moderate HCIPR (2.11) and BPR (3.24), indicating relatively good healthcare access and infrastructure. BHCIR (15.33) and DHCIR (1.00) suggest smaller institutions with limited staff.
- Kaliaganj: HCIPR (1.34) is slightly above average, and BPR (3.84) is relatively good. High DHCIR (3.67) and BHCIR (28.70) reflect well-staffed and equipped institutions.
- Itahar: Moderate HCIPR (1.32) but low DPR (0.99), highlighting poor doctor availability. BHCIR (13.00) indicates smaller healthcare institutions.

Table 1 Block Level Health Care Facility Dimensions of Uttar Dinajpur District

SR. No.	C.D Blocks	Health Care Institution Population Ratio (HCIPR)	Bed Population Ratio (BPR)	Doctor Population Ratio (DPR)	Doctor Health Care Institution Ratio (DHCIR)	Bed Health Care Institution Ratio (BHCIR)
1	Chopra	1.41	1.76	1.41	1.00	12.50
2	Islampur	2.92	8.65	12.32	4.22	29.67
3	Goalpokhar-I	0.61	1.23	1.23	2.00	20.00
4	Goalpokhar-II	1.03	1.58	1.37	1.33	15.33
5	Karandighi	1.09	1.41	2.44	2.25	13.00
6	Raiganj	3.02	13.71	11.62	3.85	45.40
7	Hemtabad	2.11	3.24	2.11	1.00	15.33
8	Kaliaganj	1.34	3.84	4.91	3.67	28.70
9	Itahar	1.32	1.71	0.99	0.75	13.00

(Computed by the authors, 2024)

Raiganj is the most well-equipped block in terms of healthcare institutions, hospital beds, and doctors. Islampur excels in doctor availability but needs more institutions to balance accessibility. Goalpokhar-I and II require significant improvements in healthcare infrastructure and staffing. Chopra and Karandighi have limited facilities and small institutions, indicating the need for upgrades. Kaliaganj and Hemtabad have moderate setups but could benefit from more doctors and better infrastructure (Fig. 1). Itahar faces challenges in doctor availability and institutional capacity. There are some recommendations like-

- Increase Healthcare Institutions in Underserved Blocks: Priority: Goalpokhar-I, Goalpokhar-II, Chopra, and Karandighi.
- Enhance Doctor Availability: Focus: Itahar, Chopra, and Goalpokhar-II to meet minimum standards.
- Upgrade Hospital Infrastructure: Invest in facilities in Goalpokhar-II, Chopra, and Karandighi to increase BHCIR and BPR.
- Balance Resource Distribution: Blocks like Raiganj and Islampur should act as benchmarks for resource planning.

These interventions would help bridge the disparities and ensure equitable healthcare delivery across all blocks.

The data (Table 1) highlights significant disparities in healthcare resources across Community Development (C.D.) Blocks. Raiganj emerges as the best-equipped block with the highest Health Care Institution Population Ratio (HCIPR), Bed Population Ratio (BPR), and Bed Health Care Institution Ratio (BHCIR), indicating excellent accessibility and infrastructure. Islampur stands out with the highest Doctor Population Ratio (DPR) and Doctor Health Care Institution Ratio (DHCIR), reflecting well-staffed institutions. In stark contrast, Goalpokhar-I and Itahar face severe shortages, with Goalpokhar-I recording the lowest HCIPR (0.61) and BPR (1.23), and Itahar struggling with the lowest DPR (0.99) and DHCIR (0.75). Chopra also lags with the lowest BHCIR (12.50), indicating smaller, under-equipped facilities. These variations call for urgent interventions in underperforming blocks to improve healthcare access, infrastructure, and staffing, while leveraging successful models from Raiganj and Islampur for equitable development.

Table 2 Health Care Facility Index (HCFI) of Uttar Dinajpur District

Sr. No.	Block Name	HCFI	Rank	Remarks
1	Raiganj	0.9452	1	High
2	Islampur	0.7189	2	High
3	Kaliaganj	0.3958	3	Medium
4	Hemtabad	0.1809	4	Medium
5	Karandighi	0.1438	5	Medium
6	Goalpokhar-I	0.1095	6	Medium
7	Goalpokhar-II	0.0956	7	Low
8	Chopra	0.0884	8	Low
9	Itahar	0.0625	9	Low

(Computed by the authors, 2024)

After the block wise calculation of Health Care Facility Index (HCFI) of Uttar Dinajpur district (Fig. 2), we have placed each block according to their rank. Table number 2 portrays the rank wise distribution of each block of Uttar Dinajpur district. In Uttar Dinajpur district, Raiganj block and Islampur block get the first and second position with HCFI value of 0.9452 and 0.7189 respectively. Thus, it can be stated that Raiganj and Islampur block have the perfect condition of health care facilities. Raiganj block gets the first position due to the good health care facilities of Raiganj Municipality which has been added with this Block. Kaliaganj, Hemtabad, Karandighi and Goalpokhar-I follow respectively with the 3rd, 4th, 5th and 6th position. These four blocks are considered under the medium or moderate condition of health care facilities. Whereas, rest of the three blocks of this district fall under very poor condition of health care facilities. The last three blocks are in this list are Goalpokhar-II, Chopra and Itahar. In Uttar Dinajpur district, Raiganj block has the maximum density of Health Care Institution Population Ratio (HCIPR) with 3.02, on the other hand Goalpokhar –I have the lowest density of HCIPR with 0.61. Thus, highest density of health care institution indicates the good condition of health care where lowest density indicate the worst condition of health. In case of bed population ratio, the highest density is found in Raiganj block where Goalpokhar-I has the lowest position. Another important dimension is doctor population ratio, where Islampur block have the first position and Itahar has worst condition. Thus, it can be started that, population pressure is higher in Itahar than Islampur block. Doctor health care institution ratio is higher in Islampur block, where Itahar block have the 9^{th} position. Bed health care institution ratio is the last indicator, where again Raiganj block have the 1^{st} position and Chopra block has the 9^{th} position. Here both the government as well as the private health services exists simultaneously and both of them are widely utilized by different sections of the population depending upon their health needs and health resources. Though these health care facilities provide both preventive as

well as the curative health needs, the urban community in India perceives the curative health care needs better than the preventive health care needs (Yesudian, 1988).

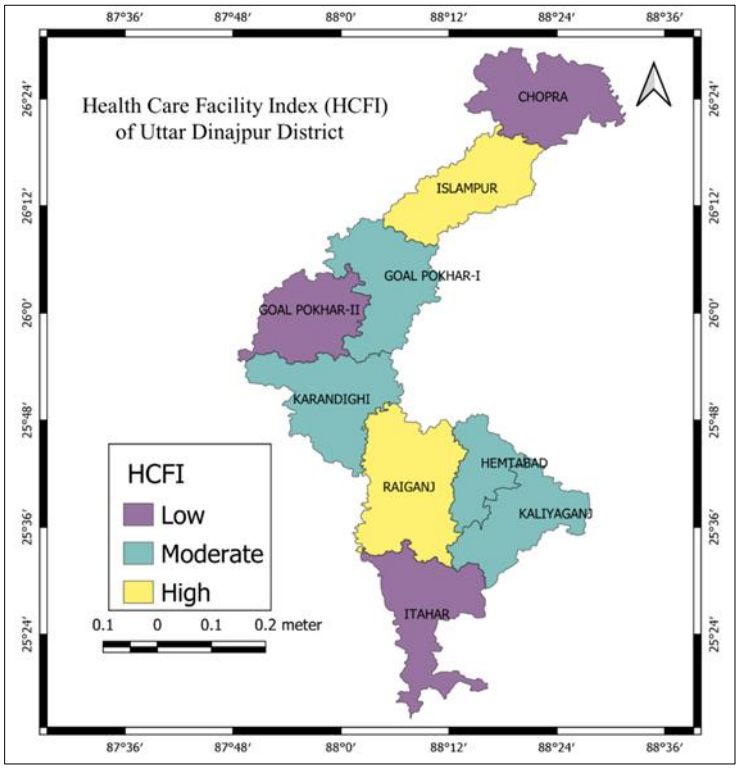

Figure 2 Health Care Facility Index (HCFI) of Uttar Dinajpur district

The correlation matrix (Table 3) provides insights into the relationships between healthcare resource variables in the blocks of Uttar Dinajpur district. The Health Care Institution Population Ratio (HCIPR) shows a strong positive correlation with both Bed Population Ratio (BPR) ($r = 0.896$, $p < 0.01$) and Doctor Population Ratio (DPR) ($r = 0.875$, $p < 0.01$), indicating that as healthcare institutions increase, the availability of beds and doctors also improves. Similarly, BPR and DPR are highly correlated ($r = 0.931$, $p < 0.01$), reflecting the intertwined nature of infrastructure and staffing. Bed Health Care Institution Ratio (BHCIR) correlates significantly with most variables, particularly with BPR ($r = 0.928$, $p < 0.01$) and DPR ($r = 0.870$, $p < 0.01$), suggesting that better-equipped healthcare facilities tend to have more beds and doctors. However, the Doctor Health Care Institution Ratio (DHCIR) has weaker correlations, particularly with HCIPR ($r = 0.577$), indicating variability in the staffing levels of doctors across institutions. These findings underscore the interconnectedness of healthcare metrics and the need for a balanced approach in resource distribution.

Table 3 Block Level Correlation Coefficient Matrix of Uttar Dinajpur district

Correlation Matrix							
Variables	**HCIPR**	**BPR**	**DPR**	**DHCIR**	**BHCIR**	**Mean**	**Std. Deviation**
HCIPR	1					1.65	0.84732
BPR	.896**	1				4.1256	4.28467
DPR	.875**	.931**	1			4.2667	4.52546
DHCIR	.577	.744*	.878**	1		2.23	1.35728
BHCIR	.704*	.928**	.870**	.845**	1	21.4367	11.14479

*. Correlation is significant at the 0.05 level (2-tailed). (Computed by the authors, 2024); **. Correlation is significant at the 0.01 level (2-tailed).

4. Conclusion

Health care facility is one of the basic indicators to measure the wellbeing of a society. In this study different dimensions of health care facilities have been measured to analyze the health care system of Uttar Dinajpur District. Health Care Facility Index (HCFI) value of each CD block shows the health care facilities condition and position of those blocks within the district. The Mean HCFI value of Uttar Dinajpur district is 0.304511 which indicates very worst situation of health care facilities of this District. The Government may look for a way to enhance the quality of health care facilities from the grassroots level since wellbeing of a society is closely associated with the improvement of the health care facilities of that region. The analysis of healthcare resource distribution across the blocks of Uttar Dinajpur district highlights significant disparities in infrastructure, staffing, and accessibility. Blocks like Raiganj and Islampur emerge as better equipped, with high availability of healthcare institutions, beds, and doctors, serving as benchmarks for resource allocation. Conversely, blocks such as Goalpokhar-I, Itahar, and Chopra show critical deficits in healthcare infrastructure and staffing, necessitating urgent interventions. The correlation analysis underscores the interdependence of healthcare variables, indicating that improvements in infrastructure, such as beds or institutions, often correlate with better staffing levels and accessibility. However, the inconsistent Doctor Health Care Institution Ratio (DHCIR) across blocks suggests unequal distribution of doctors within institutions, pointing to the need for equitable staffing strategies.

To address these disparities, an integrated approach focusing on increasing healthcare institutions, improving hospital infrastructure, and ensuring equitable distribution of doctors is essential. Blocks with critical gaps require targeted investments, while successful strategies in Raiganj and Islampur can be adapted for underperforming regions. Overall, this data-driven assessment provides a roadmap for optimizing healthcare resources and ensuring equitable access and quality of care across Uttar Dinajpur district.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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