International Advance Journal of Engineering, Science and Management (IAJESM)
Multidisciplinary, Indexed, Double Blind, Open Access, Peer-Reviewed, Refereed-International Journal.
SJIF Impact Factor =7.938, January-June 2024, Submitted in May 2024, ISSN -2393-8048

Geographical Assessment of Rural Health Conditions in Bardhaman District, West Bengal

Md Ashif Ikbal, Department of Geography, Sardar Patel University, Balaghat
Dr. Arvind Kumar Singh, Sardar Patel University, Balaghat

Abstract

The situation description of Rural Health in India is unequal and, in most cases, underprivileged especially in states such as West Bengal characterized by the intersection of the socio-economic and infrastructural distortions with environmental weaknesses. As a geographical evaluation of rural health condition around Bardhaman district, the paper is qualitative, document-based, and observational in four community development blocks, viz. Kalna I, Katwa II, Galsi II and Raina I. Some of the main determinants that the study looks at are being physically close to healthcare facilities, functionality of sub-centres, availability of safe drinking water and prevalence of common diseases. With 110 observational data points (government records, health maps, and field observation of the environmental health risks) analysis manifests that there is emergency disparities related to the healthcare accessibility. The results show that rural households and more than 60% of the households are not within 3km of a Primary Health Centre, a substantial proportion of the people continue to rely on unsafe/arsenic-prone water sources and almost one in every three health sub-centres are non-functional.

Keywords: Rural Health, Bardhaman District, Spatial Analysis, Primary Health Centres (PHCs), Health Infrastructure.

1. INTRODUCTION

Health has been touted as a human right and everybody is entitled to enjoy it, but in practice this is usually not the case since different geographical areas are affected differently as a result of socio-economic, infrastructural and environmental disparities. Rural health in India is an issue of great concern as it is associated with asymmetrical distribution of medical facilities, health infrastructure and health output differences across regions. Such disparities are particularly noticeable in such states as West Bengal where the long-term underdevelopment in combination with the population density and vulnerability of the state environment has led to the permanent health inequities.

Bardhaman district which is in the central place in West Bengal can provide a convincing reason to look at these dissimilarities. It also features a rich geographical setting that contains fertile agricultural plains, high density rural villages and a growing peri-urban environments. This geographical disparity is also coupled with the imbalance in the infrastructural development especially in the direction of the public health. There are blocks that are more connected and better covered in health services than others are left neglected or portrayed with outdated facilities or environmental obstacles including contamination of the groundwater.

The current condition of rural health using both spatial and qualitative measures of Bardhaman. It researches the role of distance between the population living in rural areas and health facilities, the operative abilities of the local health system, availability of safety drinking water, and environmental risk factors in the health of residents in rural areas. The given methodology covers systematic evaluation of health-related disparities without limitations of self-reported data, which is common in this evaluation area.

2. LITERATURE REVIEW

Banerjee et al. (2022) carried out a metric examination of urban development in Bardhaman Municipality and it gave significant understanding about land use change, infrastructural growth, and population transition in the urban centre of Purba Bardhaman district. Even though their study was carried out in the city this work created an important comparison to the health infrastructure conditions of the rural blocks. Their discoveries revealed that majority of infrastructural investments were present in the urban centres and the rural peripheries were at the lower end in all health indicators of service, connectivity, and sustainable development. Such an urban-rural inequality creates an important context against which rural health inequality within the same district is to be analysed.

Banu and Biswas (2022) And they investigated the impact that international boundaries that existed in West Bengal had on access to healthcare, through a geographical approach, in order to expose the entrenched spatial inequality. Although the focus of their work was in border districts their conclusions were relevant of any region which was either administratively marginal or situated in poor infrastructure. The researchers found that physical distance, political geography, and uneven distribution of services were prohibitive factors of healthcare access by vulnerable populations. This further testifies to the importance of studying the intra-district spatial inequalities, which exist between the more developed areas in central Bardhaman and its rural health-deprived spaces.

De et al. (2018) And they investigated the impact that international boundaries that existed in West Bengal had on access to healthcare, through a geographical approach, in order to expose the entrenched spatial inequality. Although the focus of their work was in border districts their conclusions were relevant of any region which was either administratively marginal or situated in poor infrastructure. The researchers found that physical distance, political geography, and uneven distribution of services were prohibitive factors of healthcare access by vulnerable populations. This further testifies to the importance of studying the intra-district spatial inequalities, which exist between the more developed areas in central Bardhaman and its rural health-deprived spaces.

Dey and Chattopadhyay (2018) appraised the quality of primary healthcare facilities in West Bengal and found that there are problems in the centres repeatedly raised, and they are: inadequate staffing of centres, irregular working hours, and inadequate health infrastructure maintenance. The paper developed by them gave a state-wide picture which revealed a long-term disregard to the rural healthcare infrastructure. These findings are especially relevant to the rural setting of Bardhaman where most of the sub-centres are still dysfunctional or semi-functional. The focus on facility-based evaluation in their experiment also fits the current study, which is also institutional and observational when coming to the issues of healthcare quality.

3. METHODOLOGY

This paper follows the quantitative and document oriented and geographical methodology of observational methodology to determine the spatial aspect of rural health within Bardhaman district, West Bengal. It focuses on institutional information, observational records, and spatial tools but not on surveys thus it studies in the actual situation of the real world on the ground without respondent-basis.

3.1 Research Design

The study is based on the study design of descriptive, qualitative, and cross-sectional design that considers spatial inequalities and environmental determinants of health. The design will be specific to know the geographical distribution of health infrastructure, the pattern of morbidity and water source at specific rural areas that will be selected. It adopts an interpretative lens of observation, in which administrative records, maps of health, and visual-field based pieces of data points become the building block of analysis.

3.2 Sample Size

The research has been conducted in four Community Development Blocks in Bardhaman via purposive sampling that included Kalna I, Katwa II, Galsi II, and Raina I blocks. These 10 blocks were selected so as to represent an array of agro climatic zones, population densities, and level of infrastructural development, which provides a geographical cross-section of the rural health situation in the district. Through the blocks, a total of 110 observational data points were obtained. Observations were at the level of: clusters (10 to 15 households), health facility (sub-centre or Primary Health Centre (PHC) or geographically relevant hotspot based on the presence of an environmental health hazard e.g. arsenic contamination, or the potential to breed vectors.

3.3 Analytical Techniques

The following were used to support the use of spatial tools such as block-level health maps and manual geo-referencing to:

- Find out the radii of service of PHCs and CHCs
- Identifies under-served areas more than 5 km away from care facilities
- Correlation of the environmental hazards with the trends of morbidity being observed

It is with these spatial overlays that the creation of a more delicate interpretation of health inequality in the rural setting within a geographical arena was realized.

4. RESULT AND DISCUSSION

This section gives an analytical profile of rural health situation in Bardhaman district, as per the 110 observations made in 4 community development blocks as per the systematic documentation. These findings are categorized into four central themes, namely spatial accessibility to health infrastructure, availability of drinking water that is safe, functionality of rural health sub-centres as well as common patterns of morbidity.

4.1 Proximity of Households to Nearest Primary Health Centre (PHC)

Table 1 is a categorical distribution of the rural households in Bardhaman district according to the distance to the 1 st nearest Primary Health Centre (PHC). This information indicates the effect of spatial proximity on access to rudimentary healthcare services. It obtained the information out of 110 field observations in several chosen rural blocks. The objective of the table will be to bring out the frequency and percentage of households within given ranges of distance to PHCs.

Table 1: Proximity of Households to Nearest Primary Health Centre (PHC)

Distance to PHC	Frequency	Percentage (%)
Less than 1 km	18	16.4%
1–3 km	33	30.0%
3–5 km	26	23.6%
More than 5 km	33	30.0%
Total	**110**	**100%**

As per the table, 60% of rural households are outside the radius of 3 km of a PHC so that 30% of the households are beyond 5km of a PHC. This is a very long distance posing logistical and financial problems in accessing medical services in time and more so in emergencies. The number of households that can easily access it within 1 km is only 16.4 which means there is spatial inequality in the distribution of healthcare infrastructure.

Figure 1 is a figure view of the Table 1 percentage representational values. The graph will help in grasping the percentage breakdown of households at various distances to the PHCs in a more natural way of grasping and in comparative form as well.

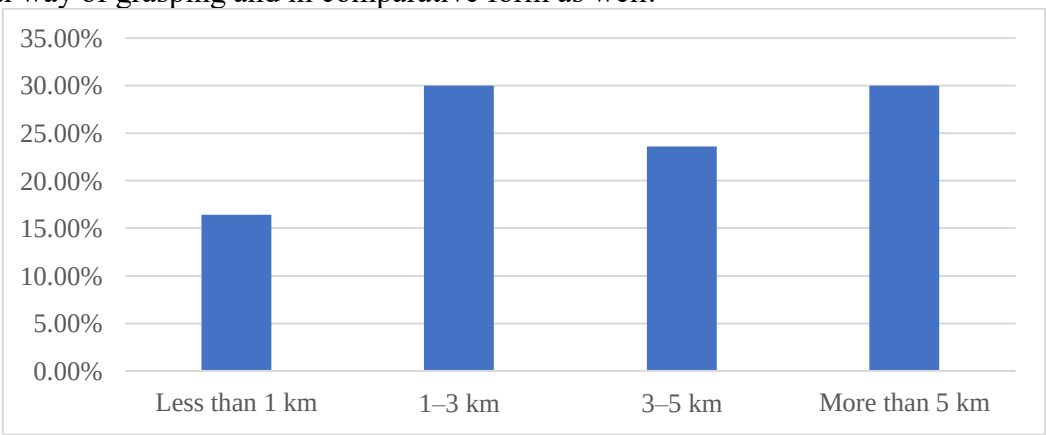

Figure 1: Graphical Representation of the Percentage of Proximity of Households to Nearest Primary Health Centre (PHC)

The graphically verifies the concentration of the households in the 1-3 km and over 5km by the ratios of 30 and 30 respectively. It shows that there exists a spike in both the mid-distance and long-distance groups which point towards the disproportionate availability of PHCs in rural Bardhaman. The figure confirms the necessity of strategic spatial planning to eliminate these gaps in access to health in the countryside.

4.2 Availability of Safe Drinking Water Sources at Household Level

One of the most vital environmental determinants of the health of the population is the access to reliable and safe drinking water. The nature of the water source in the rural region also determines the adequate possession of infrastructure in addition to affecting the occurrence of water borne diseases. The Table 2 gives the distribution of drinking water sources available at household level among the chosen blocks of Bardhaman district. The sources have been divided into 4 categories: piped water, handpumps in safe areas, handpumps in arsenic prone areas and more traditional sources such as open wells or ponds.

Table 2: Availability of Safe Drinking Water at Household Level

Type of Drinking Water Source	Frequency	Percentage (%)
Piped water	29	26.4%
Handpump (safe zone)	45	40.9%
Handpump (arsenic-prone)	24	21.8%
Open well or pond	12	10.9%
Total	**110**	**100%**

This information shows hand pumps placed in the safe areas are the most prevalent source of drinking water with 40.9% of studied households using it. Nevertheless, a considerable share (21.8%) continues to use handpumps prone to arsenic contamination and thus this group is also exposed to risks through long-term health issues (development of skin lesions, gastrointestinal irritation and carcinogenicity). Although piped water supply is available (and on the whole safer) to 26.4% of the households, its presence is still confined. Astoundingly, 10.9% of the homes are still being supplied with water through open wells or ponds which is prone to pollution and parasitic season.

Table 2 has provided a percentage distribution of the sources of drinking water, which is given graphically by Figure 2. The bar graph can provide the comparative chart on the level of dependency on the type of source of water and create the stress gaps in safe water access in the district.

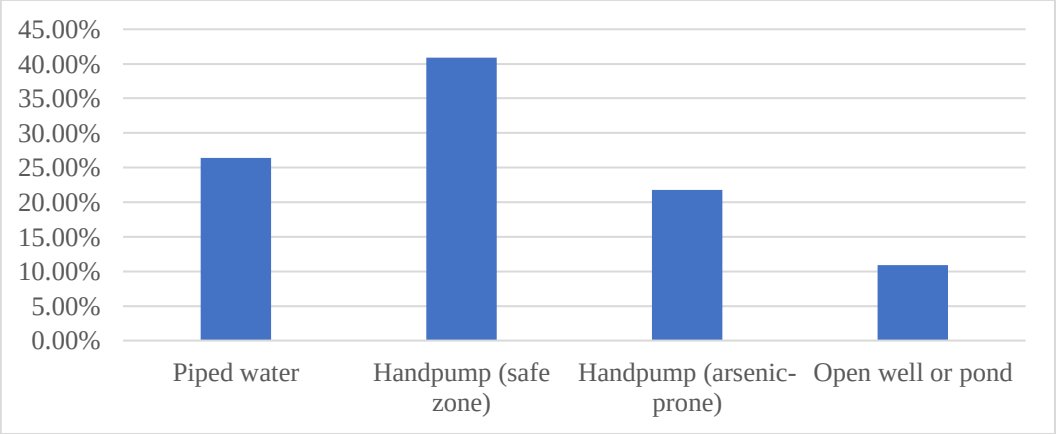

Figure 2: Graphical Representation of the Percentage of Availability of Safe Drinking Water at Household Level

The strength of dominance of the handpumps in the safe zones are well visualized in the bar graph, however, the bar graph also puts in perspective the worrying percentage of the household using arsenic contaminated sources or the traditional sources that are not safe. The joint 32.7% of the households that use either open wells or arsenic prone handpumps demonstrates a weakness in terms of the public health that cannot be ignored. It is also contrasted visually to show that there is a lack of access to piped water infrastructure implying that vast swathes of the rural population relies on semi-safe or unsafe water systems.

4.3 Functionality of Health Sub-Centres in Rural Areas

The performance of primary healthcare delivery in rural settings has been reflected by the performance of the rural health sub-centres. Sub-centres are the entry point to the basic health services, immunization, maternal-child health, and treatment of minor ailments. The problem

is, though, that they are frequently defeated by the misaligned functionality. The distribution of health sub-centre revealed in the study area is outlined in table 3 along with three groups, viz., a fully functional, partially functional and non-functionable/closed, respectively.

Table 3: Functionality Status of Sub-Centres Observed

Status	Frequency	Percentage (%)
Fully functional	31	28.2%
Partially functional	44	40.0%
Non-functional/closed	35	31.8%
Total	**110**	**100%**

This information reveals that not even a third of the rural households can access properly functioning health sub-units as the percentage of such fully functioning sub-centres is 28.2. An important number of 40% fall into the group of partially functional, meaning that there are flaws in the presence of the staff, the availability of medicine, infrastructure, or hours of service. What is more alarming is the sub-centres that are non-functional or closed (31.8%) where the large populations lack direct access to healthcare.

Figure 3 is some graphical presentation of the percentage distribution of the condition of rural health sub-e centres as shown in Figure 3 as indicated in Table 3. This graphical representation aides in finding all too soon, the degree of functionality and non-functionality within the rural health system of the district.

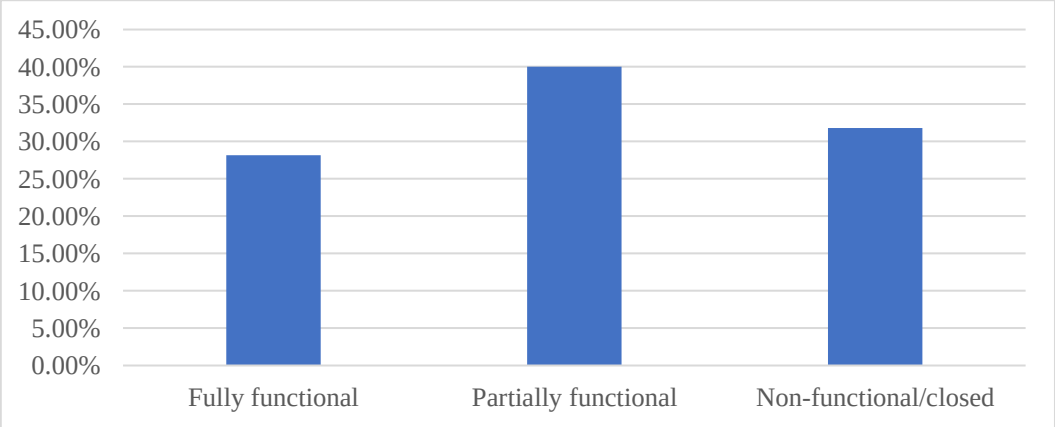

Figure 3: Graphical Representation of the Percentage of Functionality Status of Sub-Centres Observed

4.4 Prevalence of Common Morbidity Cases in Rural Areas

Morbidity patterns can help us find valuable information about issues pertaining to the health of the people of the countryside. This data in the Table 4 has been collected through local health registers in the various blocks chosen in the district of Bardhaman. It groups common health related conditions into five: gastrointestinal related, respiratory infections, skin diseases, vector borne diseases and other ailments. Secondary records kept at the sub-centres and Primary.

Table 4: Observed Common Morbidity Cases from Local Health Registers

Health Condition	Frequency	Percentage (%)
Gastrointestinal issues	34	30.9%
Respiratory infections	28	25.5%
Skin diseases	19	17.3%
Vector-borne diseases	21	19.1%
Others	8	7.2%
Total	**110**	**100%**

The data reveals that the most significant number of morbidity cases comprises of gastrointestinal disorders that come to 30.9% and can probably be connected with unsafe drinking water, lack of sanitation facilities, and inappropriate waste utilization. Next is respiratory infections in a figure of 25.5% and it may be linked to indoor air pollution, seasonal aspects, and congested living situations. There is also skin disease (17.3%) and vector-born

disease (19.1%) which signifies poor hygiene, stagnant water and inadequate pest control. The other 7.2% constitutes the rest of the conditions that encompass musculoskeletal difficulties, fevers of unknown sources, and long-term issues.

Figure 4 provides a visual presentation of percentage distribution of most common morbidity cases as noted down by the local health registers. The figure gives an overview graphically, which defines the comparative burden of each health condition type in the rural areas.

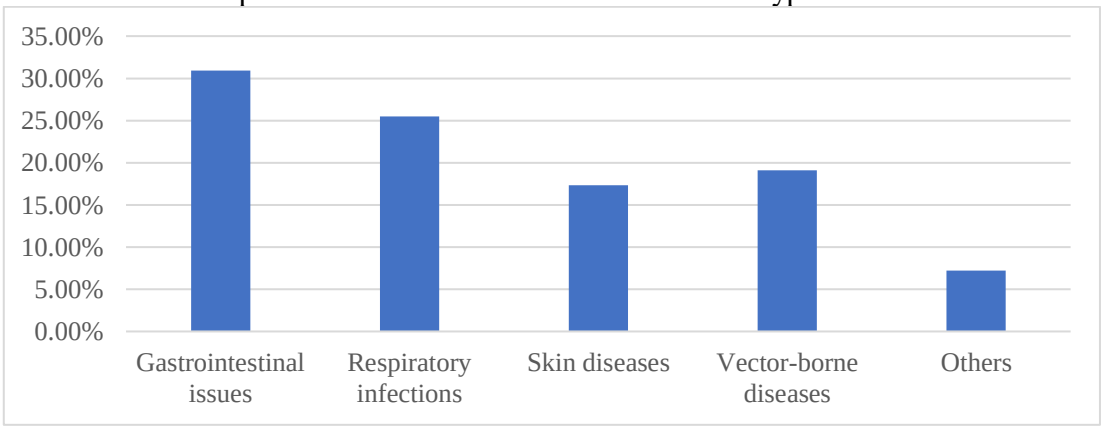

Figure 4: Graphical Representation of the Percentage of Observed Common Morbidity Cases from Local Health Registers

The image makes the prevalence of gastrointestinal and respiratory diseases visually confirmed, which indicates a high reliance on the unsafe conditions of the surroundings. The high percentage of vector borne and skin diseases also supports the existence of the environmental health risk factors like mosquito breeding centres, inadequate drainage and contact with pollutants. The comparatively low share on other reveals a focus on health burdens on a small number of preventable categories of illnesses.

5. CONCLUSION

The paper highlights the importance of having geographically based interventions that will help in closing the rural health disparities that exist in the district of Bardhaman. According to spatial analysis, it can be seen that the majority of rural households are experiencing issues related with access to healthcare because of physical distance, of which 60% of the household is located beyond 3 km within a radius of Primary Health Centre. The evaluation of sub-centre functionality reveals that their performances are not sufficient and only 28.2% of sub-centres are operational, and serve only a little part of the population. Safe drinking water also becomes an urgent issue in which 21.8% of the households rely on the sources susceptible to arsenic and 10.9% on the open water bodies which are prone to contamination. These infrastructural and environmental risks cause a direct impact on the morbidity patterns of that region with a predominance of gastrointestinal tract infections, respiratory tract infections and other respiratory illnesses. The combination of all these interrelated challenges needs a multi-pronged response which should include an increase in sub-centre functionality, growth of piped water supplies, selective reduction of arsenic and better connection of the rural regions.

REFERENCES

1. *Banerjee, S., Bhandari, G., & Ray, R. (2022). Study on Urban Growth in Bardhaman Municipality, Purba Bardhaman District, West Bengal: A Metric-Based Analysis. In Social Morphology, Human Welfare, and Sustainability (pp. 243-261). Cham: Springer International Publishing.*
2. *Banu, N., & Biswas, B. (2022). Role of international border on healthcare access in West Bengal, India: A geographical analysis. GeoJournal, 87(4), 2949-2974.*
3. *De, S., Roy, R., Mitra, K., Das, D., & Dan, A. (2018). Physical activities and quality of life among elderly population in urban slum of Bardhaman Municipality, West Bengal. Journal of Dental and Medical Sciences (IOSR-JDMS), 17(12), 67-73.*
4. *Dey, S., & Chattopadhyay, S. (2018). Assessment of quality of primary healthcare facilities in West Bengal. International Journal of Research in Geography, 4(2), 22-33.*

5. *Ghosh, A., & Mistri, B. (2020). Spatial disparities in the provision of rural health facilities: application of GIS based modelling in rural Birbhum, India. Spatial Information Research, 28(6), 655-668.*
6. *Ghosh, P. (2018). Spatial analysis and assessment of child health risk and vulnerability in West Bengal: A geo-medical study. Inclusion and Empowerment, 75.*
7. *Islam, K., & Roy, M. (2020). Functional influence of urban centres, their growth and potentialities: an approach of rural development in Purba Bardhaman District. IASSI-Quarterly, 39(3), 405-419.*
8. *Karmakar, R., & Behera, B. (2022). Geographical inequalities in access to public healthcare facilities in rural West Bengal: Exploring major health system challenges. Journal of Rural Development, 50-63.*
9. *Mondal, B. K., Mondal, A., & Das, R. (2023). Assessing the Effectiveness of the Major Welfare Schemes of West Bengal: A Geographical Appraisal.*
10. *Nandi, S., & Mistri, T. (2018). Nature and Characteristics of Rural Settlement in Salanpur, Paschim Bardhaman, West Bengal, India. International Journal of Innovative Knowledge Concepts, 6(5), 202-210.*
11. *Pal, I. (2021). Rural settlement types in Purba Bardhaman District of West Bengal: A study at CD Block Level.*
12. *Roy, P. K., Mondal, P., Sutradhar, S., & Ghosh, R. (2018). Assessment of the Quality of the Health in Rural Areas of Purba Bardhaman District, West Bengal, India: A Quantitative Approach. Research Journal of Humanities and Social Sciences, 9(4), 875-880.*
13. *Sarkar, S., Paul, S., & Bandyopadhyay, B. (2023). Health-Related Quality of Life of Backward Caste Workers in Selected Small Hospitals in Purba Bardhaman district of West Bengal. J West Bengal Univ Health Sci, 3(4), 4-15.*
14. *Satpati, S., & Sharma, K. K. (2023). Geographical variations in outreach of information and communication technology and rural development in West Bengal, India. The Electronic Journal of Information Systems in Developing Countries, 89(4), e12261.*
15. *Satpati, S., Sharma, K. K., & Ghosh, P. (2023). Geographical variations of livelihood capital and associated effects in Rarh region of West Bengal, India. The Oriental Anthropologist, 23(1), 168-201.*