



Research Article

Micro Level Demographic Zoning and Regional Disparities in Rural Bankura District, West Bengal, 2011

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DOI: <https://doi.org/10.5281/zenodo.19398824>

Abstract

This study examines the spatial pattern of demographic development across rural Community Development Blocks of Bankura district in West Bengal by applying a composite index-based approach. The analysis is based on selected demographic indicators such as literacy rate, gender disparity in literacy and work participation, child population in the age group zero to six years, proportion of non-agricultural workers, marginal workers, social composition in terms of Scheduled Caste and Scheduled Tribe population, and sex ratio. These indicators collectively reflect the level of human development, economic diversification, and social inequality in the rural landscape.

The methodology involves normalization of each indicator using minimum and maximum values, followed by transformation into a standardized ten-point scale. The composite score derived from the aggregation of all indicators enables a systematic classification of rural blocks into different levels of demographic development. The results clearly indicate the existence of strong spatial disparities and a distinct core and peripheral structure within the district.

The eastern and central parts of the district, particularly Kotulpur, Bankura, and Joypur, represent relatively advanced zones characterised by higher literacy, lower gender disparity, and greater participation in non-agricultural activities. In contrast, the western and south western plateau regions, such as Saltora, Khatra, and Indpur, exhibit lower levels of development with high dependence on marginal employment and significant social disadvantage. The study highlights the importance of demographic indicators in regional planning and emphasises the need for targeted policy intervention for balanced development.

Manuscript Information

- ISSN No: 2583-7397
- Received: 10-02-2026
- Accepted: 26-03-2026
- Published: 31-03-2026
- IJCRM:5(2); 2026: 378-384
- ©2026, All Rights Reserved
- Plagiarism Checked: Yes
- Peer Review Process: Yes

How to Cite this Article

Mondal, R. Micro Level Demographic Zoning and Regional Disparities in Rural Bankura District, West Bengal, 2011. Int J Contemp Res Multidiscip. 2026;5(2):378-384.

Access this Article Online



www.multiarticlesjournal.com

KEYWORDS: Demographic zoning, composite index, rural development, regional disparity, workforce structure, gender disparity, social composition

1. INTRODUCTION

Regional disparities in demographic and socio-economic development remain a persistent feature of rural India, particularly at the micro level where variations across Community Development Blocks reflect differences in human capital, occupational structure, and social composition [6]. Understanding these disparities is essential for effective planning and resource allocation.

Demographic indicators such as literacy, workforce participation, and sex ratio play a crucial role in determining development levels and shaping policy decisions [4][7]. Among these, literacy is widely recognised as a fundamental determinant of development, as it enhances productivity, employment opportunities, and social mobility [3][10]. Gender disparity in literacy and workforce participation reflects structural inequalities that limit inclusive growth.

The proportion of the child population provides insight into demographic transition and dependency burden, while the share of non-agricultural workers indicates economic diversification and structural transformation [3][4]. Similarly, a high proportion of marginal workers reflects employment insecurity and economic vulnerability [6]. Social composition, particularly the presence of the Scheduled Caste and the Scheduled Tribe population, further influences regional inequality due to historical marginalisation [5].

Most existing studies focus on macro-level analysis, often overlooking micro-level variations within districts. This creates a gap in understanding localised patterns of development. In this context, the present study aims to delineate micro-level demographic zones in the rural Bankura district using a composite index and to analyse spatial disparities.

The present study has significant relevance in the context of sustainable development, as it highlights the spatial inequalities in key demographic and socio-economic indicators that directly influence long-term developmental outcomes. Sustainable development emphasises balanced growth that integrates social equity, economic viability, and human well-being, and these dimensions are closely reflected through indicators such as literacy, gender equality, workforce participation, and social inclusion [2][10]. The identification of micro-level disparities across the rural Bankura district reveals areas where developmental deficits persist, particularly in terms of education, employment security, and inclusion of disadvantaged communities. Such disparities hinder the achievement of inclusive and sustainable growth by perpetuating poverty, limiting human capability, and restricting access to resources. Therefore, the composite index-based zoning not only serves as a tool for regional analysis but also provides a framework for targeted policy intervention aimed at reducing inequality, enhancing livelihood opportunities, and promoting socially inclusive development. In this context, the findings of the study align closely with broader sustainable development goals related to quality education, gender equality, decent work, and reduced inequalities, thereby reinforcing its practical significance in planning and policy formulation.

2. LITERATURE REVIEW

The study of demographic development and regional disparities has been widely explored in population geography and regional planning. Bhende and Kanitkar emphasised the importance of demographic indicators such as literacy, fertility, and workforce structure in understanding population dynamics and development [3]. Chandna further highlighted the role of spatial variation in demographic characteristics and the need for regional-level analysis [4].

The relationship between literacy and development has been strongly established in academic literature. Sen argued that literacy enhances human capability and plays a critical role in socio-economic transformation [10]. Similarly, the Human Development Report emphasised education and gender equality as key components of development [2].

Regional disparities in India have been examined by Rao, who identified uneven distribution of resources and occupational structure as major determinants of inequality [6]. Bose also emphasised demographic diversity and its implications for regional planning [5].

The role of occupational structure in development has been widely recognised. A higher proportion of non-agricultural workers indicates economic diversification and stability, while dependence on agriculture and marginal employment reflects vulnerability [6][8]. Social composition further influences development, as disadvantaged communities often face barriers in accessing resources and opportunities [5].

Studies on eastern India have shown significant intra-regional variation in demographic characteristics. Mukherjee and Chattopadhyay observed that rural areas exhibit uneven patterns of literacy, employment, and social development, which require micro-level analysis [9].

Despite these contributions, limited attention has been given to micro-level zoning within districts. The present study addresses this gap by applying a composite index approach to analyse demographic disparities in Bankura district.

3: Study Area

Bankura district is situated in the western part of West Bengal and forms a transitional zone between the fertile alluvial plains of eastern India and the rugged terrain of the Chotanagpur Plateau. The district extends approximately between 22°38' North to 23°38' North latitude and 86°36' East to 87°46' East longitude. It is bounded by Purulia district to the west, Paschim Medinipur to the south, Hooghly to the east, and Bardhaman to the north.

The district is predominantly rural in character, with nearly ninety per cent of its population residing in rural areas. Agriculture remains the principal occupation, although its nature and productivity vary significantly across different parts of the district.

Physiographically, Bankura can be divided into two major regions. The eastern part is characterised by low-lying plains with fertile alluvial soil, a gentle slope, and better irrigation facilities. This region supports intensive agriculture and relatively higher population density. The presence of transport

networks and proximity to urban centres further enhances socio-economic development in this zone.

In contrast, the western and south-western parts of the district fall within the plateau fringe of the Chotanagpur Plateau. This region is marked by undulating topography, lateritic soil, low water retention capacity, and poor agricultural productivity. Forest cover is relatively higher in this region, particularly in areas such as Ranibundh, Raipur, and Khatra. The harsh physical environment restricts agricultural expansion and limits economic opportunities, resulting in lower population density and higher levels of poverty.

Climatically, the district experiences a tropical monsoon climate with hot summers, moderate rainfall, and a distinct dry season. Rainfall variability often affects agricultural output, especially in the plateau region, where irrigation facilities are limited.

The uneven distribution of physical resources, combined with historical and socio-economic factors, has led to significant regional disparities within the district. These variations make Bankura an ideal case for micro-level demographic analysis.

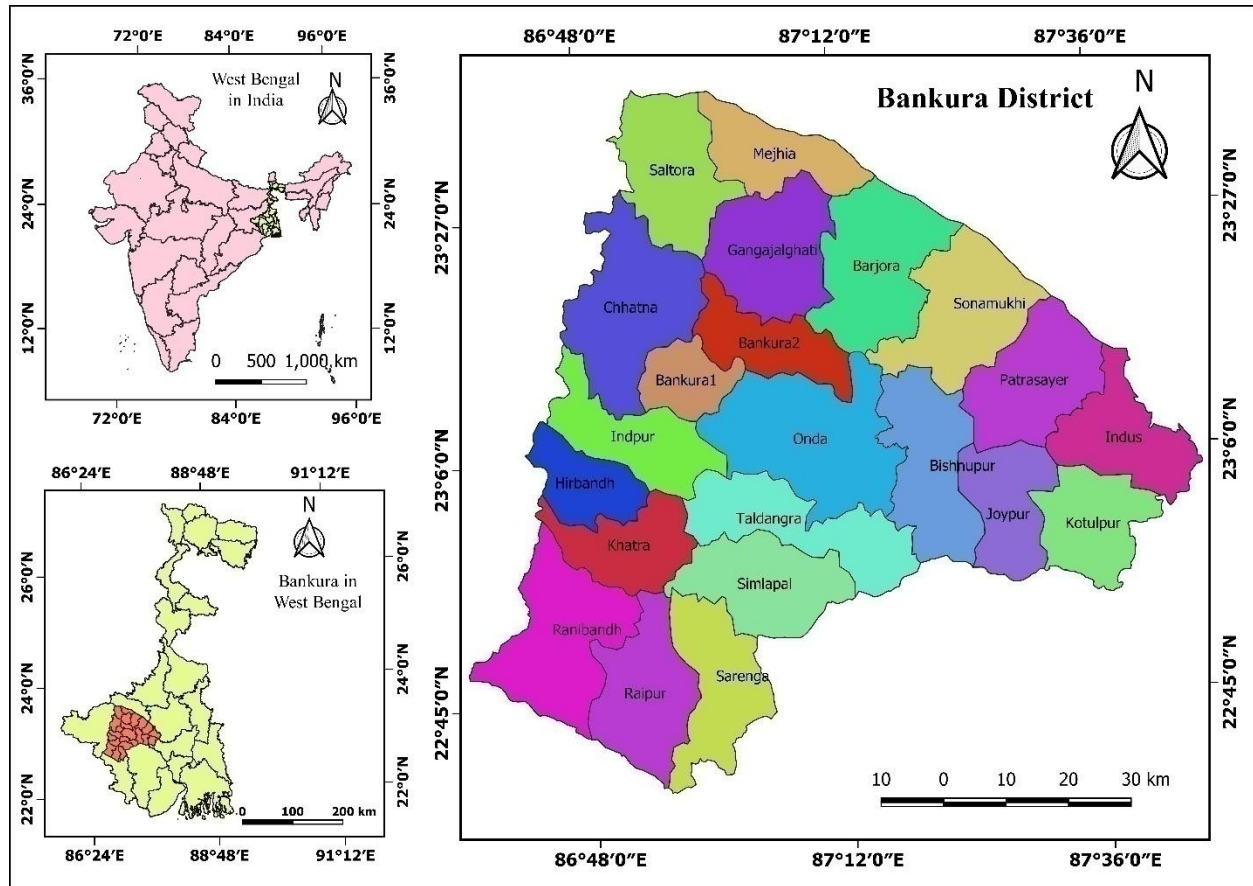


Fig 1: Location Map of Bankura District

4. OBJECTIVES OF THE STUDY

1. To analyse the spatial variation of demographic characteristics across rural Community Development Blocks of Bankura district.
2. To construct a composite index using selected demographic indicators such as literacy, workforce structure, and social composition.
3. To delineate micro-level demographic zones into high, moderate, low, and very low development categories.
4. To examine regional disparities in terms of human development, gender inequality, and employment structure.

5. To identify core and peripheral regions based on demographic development patterns.
6. To assess the role of socio-economic and physical factors in shaping demographic variations.

5: Data Sources

The present study is based entirely on secondary data collected from reliable and authoritative sources. The primary source of data is the **Census of India 2011**, particularly the District Census Handbook of Bankura, which provides detailed information on demographic and socio-economic characteristics at the Community Development Block level.

6. METHODOLOGY

A composite index method has been used to measure development levels across blocks. Indicators are normalised using standard techniques and converted into a ten-point scale. The final composite score is obtained by aggregating all indicators with equal weight.

The selected indicators represent different dimensions of development, including human capital, economic structure, and social inequality.

6.1 Rationale for Selection of Indicators

The selection of demographic indicators is based on their relevance in reflecting different dimensions of development. Each indicator represents a specific aspect of demographic and socioeconomic structure.

Literacy rate reflects the level of human capital and educational attainment. Gender disparity in literacy highlights inequality in access to education. The proportion of the child population indicates the stage of demographic transition and dependency burden. The share of non-agricultural workers represents economic diversification and structural transformation.

Similarly, gender disparity in workforce participation indicates the level of economic inclusion of women. The percentage of marginal workers reflects employment insecurity and seasonal dependency. The proportion of the Scheduled Caste and Scheduled Tribe population highlights social disadvantage and marginalisation. The sex ratio provides insight into gender balance and social well-being.

Together, these indicators capture the multidimensional nature of development and allow for a comprehensive assessment of regional disparities.

6.2 Method of Analysis

The study adopts a composite index method to quantify the level of demographic development across different blocks. The procedure involves several systematic steps.

• Steps for Scoring

I. Normalise Each Indicator:

$$\text{Normalized Value}(X) = \frac{\text{Actual Value} - \text{Min Value}}{\text{Max Value} - \text{Min Value}}$$

$$\text{Normalized Value}(\bar{X}) = \frac{\text{Actual Value} - \text{Max Value}}{\text{Min Value} - \text{Max Value}}$$

*This ensures comparability across different indicators.

II. Assign Weights (if applicable):

If certain indicators are more important, assign weights to reflect their relative importance. Otherwise, treat all indicators equally.

III. Scale Scores to a 10-Point Scale:

Multiply the normalised values by 10 to assign scores out of 10 for each indicator.

IV. Composite Score:

Calculate the composite score by summing up the weighted scores for all indicators.

Classification of Blocks

Based on the composite scores, the blocks are classified into four categories:

- High development
- Moderate development
- Low development
- Very low development

This classification enables the identification of spatial patterns and regional disparities.

7: RESULTS

Composite Index and Spatial Pattern of Development

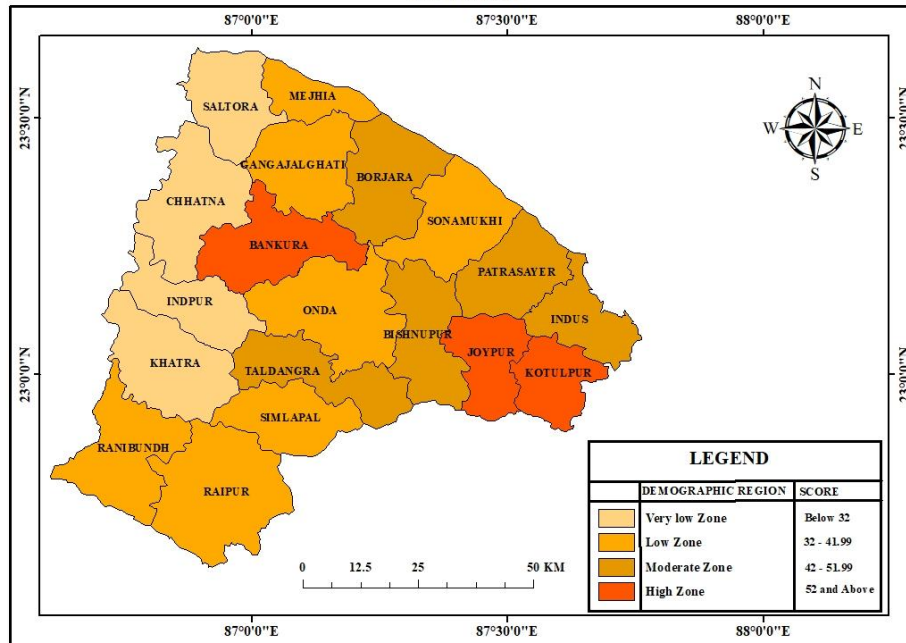
The application of the composite index method reveals considerable variation in the level of demographic development across the rural blocks of Bankura district. The calculated scores range from very low values in the plateau region to relatively high values in the alluvial plains. A clear spatial pattern emerges from the analysis. The eastern and central parts of the district exhibit higher composite scores, indicating better performance in terms of literacy, workforce participation, and gender equality. In contrast, the western and south-western parts show lower scores, reflecting structural disadvantages and limited economic opportunities.

Table 1: Different demographic parameters in the rural Bankura district in 2011

Sl. No	CD Block	Literacy rate	x	Gender diff. literacy (%)	\bar{x}	%(0-6 population)	\bar{x}	% non-agri worker	x	Gender diff. worker (%)	\bar{x}	Marginal Worker %	\bar{x}	Backward class %	\bar{x}	Sex Ratio	x	Composite Score	Score x10
1	Saltora	53.58	0.00	23.11	0.00	12.82	0.15	40.46	0.61	44.14	0.45	40.91	0.45	53.10	0.25	950	0.39	2.30	23.01
2	Meibia	58.30	0.30	20.58	0.22	12.77	0.17	54.71	1.00	63.69	0.00	34.34	0.70	37.21	0.99	934	0.00	3.39	33.87
3	Gangajalghati	60.05	0.42	20.45	0.23	11.83	0.59	39.16	0.58	49.48	0.33	46.45	0.24	39.23	0.90	941	0.17	3.45	34.48
4	Chhatna	57.24	0.24	20.77	0.20	12.48	0.30	37.72	0.54	40.72	0.53	48.56	0.16	51.03	0.35	960	0.63	2.95	29.48
5	Bankura	63.30	0.62	16.69	0.56	11.46	0.76	52.22	0.93	54.35	0.21	29.70	0.88	37.02	1.00	951	0.41	5.38	53.75
6	Borjora	62.13	0.55	17.16	0.52	11.50	0.74	38.87	0.57	51.40	0.28	34.57	0.69	37.22	0.99	945	0.27	4.61	46.06
7	Onda	57.16	0.23	16.92	0.54	13.15	0.00	28.76	0.29	46.96	0.38	30.45	0.85	38.10	0.95	957	0.56	3.80	38.03
8	Sonamukhi	58.29	0.30	16.99	0.53	11.90	0.56	21.90	0.11	35.68	0.64	26.41	1.00	47.39	0.52	945	0.27	3.93	39.30
9	Patrasayer	57.39	0.24	15.03	0.70	11.53	0.72	23.27	0.14	42.71	0.48	26.66	0.99	49.46	0.42	966	0.78	4.49	44.88
10	Indus	63.89	0.66	12.42	0.93	10.97	0.97	24.16	0.17	53.23	0.24	34.89	0.68	45.06	0.63	958	0.59	4.87	48.66
11	Kotulpur	69.15	1.00	11.64	1.00	10.91	1.00	28.63	0.29	49.77	0.32	26.13	1.01	39.24	0.90	957	0.56	6.08	60.77
12	Joypur	66.24	0.81	13.68	0.82	11.16	0.89	29.63	0.32	48.91	0.34	30.91	0.83	40.93	0.82	958	0.59	5.41	54.11

13	Bishnupur	58.22	0.30	16.31	0.59	12.18	0.43	34.15	0.44	37.92	0.59	34.84	0.68	43.20	0.71	962	0.68	4.43	44.31
14	Indpur	59.05	0.35	21.83	0.11	12.41	0.33	26.23	0.23	39.28	0.56	50.60	0.08	50.18	0.39	943	0.22	2.27	22.68
15	Taldangra	62.32	0.56	15.02	0.71	12.07	0.48	21.56	0.10	35.99	0.63	45.38	0.28	40.23	0.85	972	0.93	4.54	45.41
16	Simlapal	60.22	0.43	17.10	0.52	11.93	0.55	23.58	0.15	37.81	0.59	47.33	0.21	42.27	0.76	960	0.63	3.84	38.41
17	Khatra	59.59	0.39	21.77	0.12	11.83	0.59	22.57	0.13	34.48	0.67	52.84	0.00	52.78	0.27	950	0.39	2.54	25.42
18	Ranibundh	60.52	0.45	19.53	0.31	11.69	0.65	18.74	0.02	20.28	0.99	52.29	0.02	58.52	0.00	975	1.00	3.44	34.44
19	Raipur	63.83	0.66	16.93	0.54	11.58	0.70	17.95	0.00	29.00	0.79	52.13	0.03	49.23	0.43	966	0.78	3.93	39.31

**BANKURA DISTRICT
CATEGORIZATION OF BLOCKS BASED ON SELECTED DEMOGRAPHIC PARAMETERS.
YEAR: 2011**



Source: District census handbook 2011

Fig 2: Categorisation of blocks based on selected demographic parameters in 2011

The map clearly illustrates the uneven distribution of development and highlights the existence of distinct zones.

7.1 High Development Zone

The high development zone includes Kotulpur, Bankura, and Joypur blocks, which record the highest composite scores in the district. Kotulpur emerges as the most developed block with a score of approximately 60.77, followed by Joypur and Bankura. These blocks are characterised by relatively high literacy rates, which exceed sixty five percent in most cases. Gender disparity in literacy is comparatively low, indicating better access to education for women. The proportion of non-agricultural workers is also higher, reflecting a diversified economic base that includes trade, services, and small-scale industries. The percentage of marginal workers in these blocks is relatively low, suggesting more stable employment conditions. Gender disparity in workforce participation is also less pronounced, indicating greater involvement of women in economic activities.

The favourable performance of these blocks can be attributed to their advantageous geographical location in the eastern plains, better infrastructure, and closer integration with urban centres.

These factors have facilitated economic diversification and improved access to education and healthcare.

7.2 Moderate Development Zone

The moderate development zone comprises blocks such as Indus, Borjora, Taldangra, Patrasayer, Bishnupur, and Raipur. These blocks exhibit intermediate levels of development, with composite scores ranging between approximately 39 and 49. Literacy levels in these blocks are moderate, generally ranging between fifty-five and sixty five percent. The occupational structure shows a mix of agricultural and non-agricultural activities, although agriculture continues to dominate. Gender disparity in literacy and workforce participation remains noticeable but not extreme. The proportion of marginal workers is moderate, indicating partial employment stability. These blocks represent transitional areas where some degree of economic development has taken place, but structural constraints still limit overall progress. The variation within this category suggests that certain blocks have the potential to move towards higher development with appropriate policy interventions.

7.3 Low Development Zone

The low development zone includes Simlapal, Sonamukhi, Onda, Gangajalghati, and Ranibundh. These blocks show relatively lower composite scores and exhibit several developmental challenges.

Literacy rates in these blocks are generally around fifty-eight to sixty per cent, but gender disparity remains significant. The occupational structure is heavily dependent on agriculture, with a limited presence of non-agricultural employment.

The proportion of marginal workers is relatively high, indicating seasonal employment and income insecurity. Gender disparity in workforce participation is also pronounced, reflecting limited opportunities for women.

Social composition in these blocks often includes a higher proportion of disadvantaged communities, which further contributes to their lower development status. Despite these challenges, some positive trends, such as moderate literacy levels, suggest the possibility of gradual improvement.

7.4 Very Low Development Zone

The very low development zone consists of Saltora, Khatra, and Indpur, which record the lowest composite scores in the district. These blocks are primarily located in the plateau and forested regions.

Literacy rates in these areas are significantly lower compared to other parts of the district. Gender disparity in both literacy and workforce participation is high, indicating deep-rooted socioeconomic inequalities.

The proportion of the child population is relatively high, suggesting a higher dependency burden. The percentage of marginal workers is also very high, reflecting unstable and seasonal employment patterns.

These blocks have a high concentration of Scheduled Caste and Scheduled Tribe population, which historically face limited access to resources and opportunities. The lack of economic diversification and infrastructural development further exacerbates their backwardness.

7.5 Core and Peripheral Structure

The overall pattern of demographic development in Bankura district clearly reflects a core and peripheral structure. The eastern and central blocks, characterised by fertile land, better connectivity, and diversified economic activities, form the core region.

In contrast, the western and south-western blocks, marked by poor physical conditions and limited economic opportunities, constitute the peripheral region. This spatial inequality is reinforced by differences in social composition, literacy levels, and employment structure.

The persistence of this pattern highlights the need for region-specific planning strategies that address the unique challenges of each zone.

8: DISCUSSION

The spatial pattern of demographic development in Bankura district reflects a complex interaction between physical

environment, historical processes, and socio-economic structures. The clear differentiation between the eastern alluvial plains and the western plateau region forms the fundamental basis of regional inequality.

The eastern part of the district, characterised by fertile alluvial soil, low relief, and better irrigation facilities, supports intensive agricultural practices. This favourable physical environment has historically encouraged settlement concentration, infrastructure development, and improved access to education and healthcare services. As a result, blocks located in this region, such as Kotulpur and Joypur, exhibit higher literacy rates, lower gender disparity, and a more diversified occupational structure. These characteristics collectively contribute to their higher composite scores and advanced development status.

In contrast, the western and south-western parts of the district, forming part of the plateau fringe, present a markedly different scenario. The undulating terrain, poor soil fertility, and limited irrigation facilities restrict agricultural productivity and reduce income opportunities. These physical constraints are further compounded by inadequate infrastructure and limited access to educational institutions. Consequently, blocks such as Saltora, Khatra, and Indpur show lower literacy levels, higher gender disparity, and a greater dependence on marginal employment.

The occupational structure plays a crucial role in shaping these disparities. In the more developed blocks, a higher proportion of the workforce is engaged in non-agricultural activities, indicating structural transformation and economic diversification. This not only enhances income stability but also reduces vulnerability to climatic fluctuations. On the other hand, the dominance of agricultural employment in less developed blocks increases economic insecurity, particularly in the context of seasonal variability and limited technological advancement.

Gender disparity emerges as another critical dimension of regional inequality. In relatively developed blocks, improved access to education and employment opportunities has led to greater participation of women in the workforce. However, in backward regions, socio-cultural constraints and limited institutional support continue to restrict female participation, thereby reinforcing economic dependence and limiting overall development potential.

Social composition further intensifies these disparities. The higher concentration of the Scheduled Caste and Scheduled Tribe populations in the plateau region reflects historical patterns of marginalisation and exclusion. These communities often face barriers in accessing education, healthcare, and employment opportunities, which perpetuates a cycle of poverty and underdevelopment. The composite index effectively captures these multidimensional disadvantages and highlights the need for targeted interventions.

Migration patterns also provide insight into the regional dynamics of development. In the less developed blocks, seasonal out-migration is a common phenomenon, driven by the lack of local employment opportunities. This not only affects the demographic structure but also has implications for

social stability and economic sustainability. Overall, the findings demonstrate that demographic development in Bankura district is not uniform but highly uneven, shaped by a combination of environmental constraints, economic structure, and social factors. The persistence of these disparities underscores the importance of micro-level analysis in understanding regional development and formulating effective policy measures.

9: CONCLUSION

The present study provides a comprehensive assessment of micro-level demographic disparities in the rural Bankura district through the application of a composite index-based approach. By integrating multiple demographic indicators, the study successfully delineates distinct development zones and reveals the underlying spatial pattern of inequality.

The analysis clearly establishes the existence of a core and peripheral structure within the district. The eastern and central blocks, characterised by favourable physical conditions, higher literacy, and greater economic diversification, represent the core region. In contrast, the western and south western plateau blocks, marked by poor physical conditions, high marginal employment, and significant social disadvantage, constitute the peripheral region.

The study highlights that literacy, occupational structure, and gender equality are key determinants of demographic development. Blocks with higher literacy rates and greater participation in non-agricultural activities tend to exhibit higher levels of development. Conversely, regions with high dependence on marginal labour and significant gender disparity remain trapped in a cycle of underdevelopment.

The role of social composition is equally significant. The concentration of disadvantaged communities in the less developed regions points to the persistence of structural inequalities that require focused policy attention. Addressing these disparities is essential for achieving inclusive and balanced regional development.

From a policy perspective, the findings suggest the need for region-specific planning strategies. In the backward plateau regions, priority should be given to improving educational infrastructure, promoting skill development, and creating non-farm employment opportunities. The development of agro-based and forest-based industries can provide alternative livelihood options and reduce dependence on seasonal agriculture.

Enhancing female education and encouraging women's participation in the workforce should be a central component of development policy. Additionally, targeted welfare programmes aimed at the Scheduled Caste and the Scheduled Tribe populations can help in reducing social and economic inequalities.

In conclusion, the study demonstrates that micro-level demographic analysis is crucial for identifying regional disparities and guiding effective planning interventions. The composite index approach adopted in this study provides a

robust framework for assessing development and can be applied to other regions for similar analysis.

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