



Socio-economic disparity in development of Maldah district, West Bengal: A block level appraisal

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Abstract

Maldah district of West Bengal is recognized as one of those backward districts with a low HDI of 0.44 (West Bengal Human Development Report, 2004). This district is marked by low literacy rate, inferior quality of life and seasonal migration in search of livelihoods, along with the devastation of annual floods and riverbank erosion, which may have an impact on the socio-economic development of this district. The aim of the present study is to illustrate the level of development and to highlight the inter-block disparity in Maldah using 39 socio-economic variables. The simple Composite Development Index (CDI) was obtained from 39 indicators to quantify the cross-block level development. In addition, Principal Component Analysis (PCA) was carried out in order to identify the prime variables that affect regional disparities in development. The CDI reveals that the eastern and northern parts of the district are more developed compared to the southern and western parts of the district. The study indicates that there are wide disparities in socio-economic development among different blocks within the district.

Key words: Regional disparity, Socio-economic development, Composite Development Index, Principal Component Analysis

Introduction

Development is a multi-dimensional aspect that involves the process of changing the nature of human well-being. The process of socio-economic development involves a significant change in the different socio-economic characteristics of each geographical area. Socio-economic development planning includes policies, strategies and programs for the location of different amenities or conveniences and services (Ahmed et al, 2000; Baig, 2014; Gilani et al., 2020). However, the facilities are often distributed inconsistently encouraging to different levels of development across our society. Consequently, this unchecked and uncontrolled development procedure leads to regional disparities in socio-economic development (Mathur, 1983; Rao, 1984). Consequently, any region or state that is rich in terms of common

natural resources such as land, water and minerals, rather than social, political, demographic and economic characteristics, is equally likely to cause regional disparities in development there.

In both developed and developing economies, it is evident that different kinds of regional disparities in socio-economic development prevail in their societies (Ewetan & Urhie, 2014; Waheed et al., 2020). However, it varies in different countries and societies as for individuals with different economic classes within a society. In India, inequalities in socio-economic and cultural development are found both at inter and intra regions level (Ohlan, 2013). Although the Government has seek to minimize regional disparities, yet the recent trend in socio-economic development has not produced positive results towards this path, it has instead created a wide gap at all levels of administrative regions (Agarwala & Hazarika, 2002).

Correspondingly, Maldah has been identified as one of the most backward districts of West Bengal in recent years due to the low status of socio-economic development (Ahmed & Hussain, 2013; Siddiqui & Hussain, 2010). The district ranked 17th in West Bengal, with a very low HDI of 0.44 (West Bengal Human Development Report, 2004). The district is less addressed and underdeveloped in both the agriculture and industrial sectors and therefore lacks basic social and economic needs (Md Shamim & Ahmed, 2011). Low agricultural productivity, small landholdings, high agricultural dependence and ecological vulnerabilities such as riverbank erosion and floods are additional factors behind the underdevelopment of this district (Ahmed & Hussain, 2013; Ismail & Mustaqim, 2013). Since the district economy is mainly rural, the Maldah (Old) and English Bazar municipalities are the only major urban centers of consequence, the livelihood opportunities for the district population are limited, mainly from agriculture or other agricultural activities, including agricultural trade (District Human Development Report, 2007). Moreover, given that the vast majority of rural residents in the district are marginal to landless and have to rely on wage employment, a large proportion of marginal workers tend to migrate seasonally from the district to the metropolitan cities engaged there as migrant workers mainly during the agricultural slack season (Taufique & Hoque, 2017). Thus, despite its former glory as of the former capital of Bengal, Maldah district has consistently witnessed a series of political and geographical vagaries that have brought it to its present position as the most backward district in West Bengal (Ismali, 2012). The present study, therefore, aims to examine the level of socio-economic development at C.D. block level in order to highlight the existing disparities in development within the district based on existing socio-economic amenities and conveniences. An additional attempt has also been made to examine the root causes of these inequalities in the Maldah district.

Study Area

Regarding the present analysis, Maldah district of West Bengal was taken, extending over 24°40'20" N to 25°32'08" N latitudes and 87°45'50" E to 88°28'10" E longitudes (Figure 1). The district borders Bangladesh in the East and South Dinajpur district of West Bengal in the North East, Bihar and Jharkhand in the West, North Dinajpur district of West Bengal in the North and Murshidabad district of West Bengal in the South. The geographical area of the district is 3733 sq.km. and is highly dense with a total population of approximately 39,88,845 people with a high density of 1,071 persons per square kilometer (District Census Handbook, 2011). For administrative purposes, the district has divided into 15 C.D. blocks which are further divided into three physiographic units viz. Tal, Diara and Barind (District Statistical Handbook, 2011).

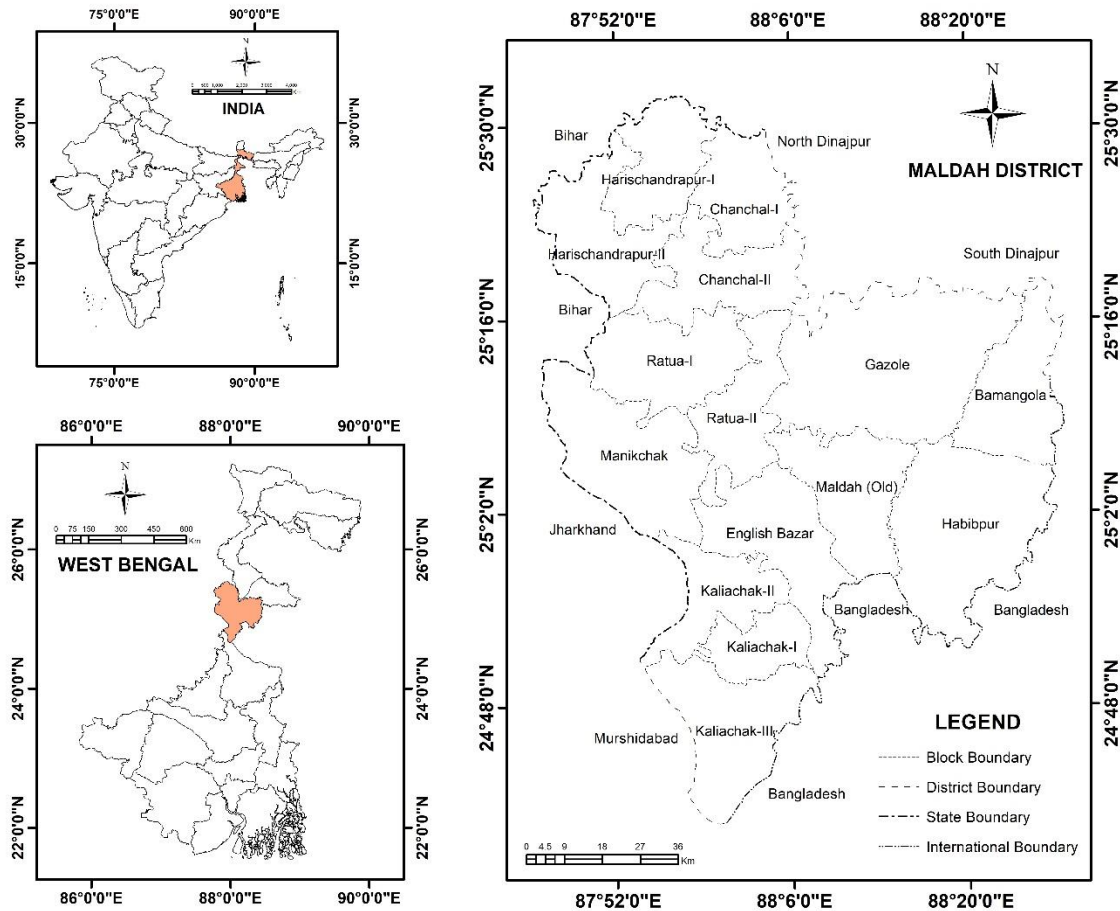


Figure 1. Location of study area

Research objective

The basic objectives of this paper are- to evaluate the inter-block disparity in socio-economic development and to define the backward blocks of the Malda district. An additional attempt has also been made to examine the root causes of these inequalities in the Malda district.

Methodology

Data Source

The present study is based on secondary data obtained from District Census Handbook (2011 census year) and District Statistical Handbook (2011 census year) of Maldah. In order to examine the disparities in development, C.D. blocks have been considered as a basic unit of investigation. The district of Maldah is composed of 15 C.D. blocks, i.e. Harischandrapur-I & II, Chanchal-I & II, Ratua-I & II, English Bazaar, Manikchak, Kaliachak-I, II & III, Maldah (Old), Gazole, Bamangola and Habibpur respectively.

Choice of Indicators

Variables from various groups of socio-economic characteristics were considered to examine the extent of the block level disparities in terms of social and economic development. In this analysis, measures common to all of the blocks were used for assessing the extent of developmental variance. The present study accounted for a total of 39 variables, of which 28 are social and 11 are economic (Table 1).

Table 1. Selected variables that were used in this study

Group	Variables	Symbol
SOCIAL	Number of primary schools	X ₁
	Number of Middle schools	X ₂
	Proportion of literates	X ₃
	Number of hospitals	X ₄
	Number of primary health centers	X ₅
	Number of primary health sub-centers	X ₆
	Number of hospital beds	X ₇
	Number of doctors	X ₈
	Number of dispensaries	X ₉
	Number of family welfare centers	X ₁₀
	Proportion of villages having tap water	X ₁₁
	Proportion of villages having well water	X ₁₂
	Proportion of villages having tube wells	X ₁₃
	Proportion of villages access drinking water from tank, pond or lake	X ₁₄
	Proportion of villages access drinking water from river or canal	X ₁₅
	Proportion of villages having toilet facilities	X ₁₆
	Number of post office	X ₁₇
	Number of post and telegraph office	X ₁₈
	Proportion of villages having telephone (landlines) connection	X ₁₉
	Proportion of villages having public and private bus service	X ₂₀
	Proportion of villages having railway stations	X ₂₁
	Proportion of villages having pucca roads	X ₂₂
	Proportion of villages having electrified	X ₂₃
	Proportion of urban population	X ₂₄
	Proportion of villages having cinema or video hall	X ₂₅
	Proportion of villages having sports club or recreation centers	X ₂₆
	Proportion of villages having public library	X ₂₇
	Proportion of villages having newspaper supply facility	X ₂₈
ECONOMIC	Proportion of villages having commercial and co-operative banks	X ₂₉
	Proportion of villages having agricultural credit societies	X ₃₀
	Proportion of villages having canals for irrigation	X ₃₁
	Proportion of villages having wells or tube wells for irrigation	X ₃₂
	Proportion of villages access tanks or lakes for irrigation	X ₃₃
	Proportion of male main workers	X ₃₄
	Proportion of female main workers	X ₃₅
	Proportion of male marginal workers	X ₃₆
	Proportion of female marginal workers	X ₃₇
	Proportion of male non workers	X ₃₈
	Proportion of female non-workers	X ₃₉

Techniques and analysis

To determine the disparity of socio-economic development at block level 39 said indicators were included in the statistical analysis and each of the indicator was divided by 10,000 population to get a ratio. These indicators may not form an all-inclusive list, but these are the main interacting components of each block's socio-economic development and are selected solely by constraints on data availability (Milenkovic et al, 2014). Since each variable is measured on a different scale and has different magnitudes and ranges, each variable must first be standardized as an index. Here the equation used for this conversion was adapted from that used in the Human Development Index (HDI) to calculate life expectancy index by UNDP (2007) resulting in an indicative score of 0 to 1. This computation is shown in Eq. (1):

$$S_{ij} = \frac{X_{ij} - A_{min}}{A_{max} - A_{min}} \quad (1)$$

Where, S_{ij} denotes standardized value of i^{th} variable at j^{th} unit of study; X_{ij} is the actual value of i^{th} variable at j^{th} unit of study; A_{max} is the maximum value of i^{th} variable at j^{th} unit of study and A_{min} is the minimum value of i^{th} variable at j^{th} unit of study.

Subsequently, a Composite Development Index (CDI) was derived from the standardized values of all indicators and the block securing maximum average score fell under the high developed category blocks and the lowest average score fell under the low developed category blocks. Furthermore, the spatial distribution of inter-block disparity in development has been mapped out in ArcGIS 10.3 platform and assessed. This computation is shown in Eq. (2):

$$CDI_j = \frac{\sum_{i=1}^n S_{ij}}{n} \quad (2)$$

Where, CDI_j denotes Composite Development Index at j^{th} unit of study; n is the number of variables.

Since all variables may not be equally influenced by the assessment of regional disparities in development. In order to minimize this conflict, Factor Analysis was conducted through Principal Component Analysis (PCA) to reduce a large number of variables and to extract the relevant prime variables which influence the actual scenario of cross-block level disparity in development within the district (Weaver & Maxwell, 2014; Yong & Pearce, 2013). The basic principle of Principal Component Analysis (PCA) is to minimize the dimensionality of a data set consisting of a large number of interrelated variables while preserving as much variance as possible in the data set. This is done by converting to a new set of variables, the main components (PCs), which are not associated and which are ordered such that the first few maintain much of the variance present in all the original variables (Abdi & Williams, 2010; Fávero & Belfiore, 2019; Jolliffe, 2002). Accordingly, the first three Principal Components (PCs) were used for analysis as almost all variables were included in the first three Principal Components (Table 6; Fig. 3). PCA was rendered with the help of SPSS version 23 platform.

Results and Discussion

Deprivation addresses various aspects that cause a lack of access to basic necessities and related resources that in turn affect the way of life (Bell et al, 2007; Nolan & Marx, 2012). In this present study, socio-economic disparities in development have been assessed at two levels. First of all, the overall disparity in development was analyzed on the basis of the overall CDI values, including all 39 indicators. Since generalization is not the way to understand the overall development, as all variables are not of the same nature and may not give an equal impression on the progress of an area. Factor analysis was therefore

carried out with the help of Principal Component Analysis (PCA) and extracted the prime variables which, on the other hand, ultimately reflect the ultimate nature of the district’s development (Table 6).

Pattern of disparity in development in Maldah district

The ultimate aim of this study to portray the overall human well-being of existing societies as planned socio-economic development is the key to maintaining social progress through continuous improvement in people's quality of life (Jamal, 2016; Pawlas, 2017). As the development of a particular region depends not only on a single criterion, but rather on the interplay between a number of socio-economic facets, the Composite Development Index, based on selected indicators of the social, economic dimension, presents an overall scenario of inter-block disparity in the level of development (Prem et al, 2011; Sultana & Aktar, 2016). Therefore C.D. blocks of Maldah were categorized into three levels of development zone based on CDI values. (Figure 2).

Table 2a. Block wise Composite Development Index (CDI) in Maldah district

C.D. blocks	SOCIAL																				
	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁	X ₁	X ₁	X ₁	X ₁	X ₁	X ₁	X ₁	X ₁	X ₁	X ₂	X ₂
Harischandrapur - I	0.3	0.4	0.3	0.0	0.2	0.5	0.0	0.0	0.0	0.1	0.4	0.0	0.3	0.4	0.5	0.5	0.0	0.3	0.2	0.4	0.5
Harischandrapur - II	0.1	0.3	0.2	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.4
Chanchal - I	0.2	0.4	0.5	0.0	0.6	0.5	0.0	0.0	0.0	0.1	0.5	0.1	0.5	0.4	0.8	0.4	0.1	0.6	0.3	0.3	0.1
Chanchal - II	0.0	0.0	0.4	0.0	0.3	0.7	0.0	0.0	0.0	0.3	0.0	0.2	0.7	0.4	0.3	0.0	0.3	0.0	0.3	0.0	0.0
Ratua - I	0.1	0.2	0.2	0.0	0.2	0.4	0.0	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.3	0.1	0.8	0.0	0.2	0.1	0.1
Ratua - II	0.1	0.1	0.3	0.0	0.4	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.1	1.0	0.5	0.7	0.0	0.2	0.2	0.6
Gazole	0.5	0.6	0.1	0.1	0.5	1.0	0.0	0.0	1.0	1.0	0.2	0.7	0.3	0.2	0.3	0.0	0.1	0.2	0.8	0.5	0.6
Bamangola	0.7	0.6	1.0	0.2	0.2	0.5	0.0	0.0	0.0	0.5	0.4	1.0	0.0	0.0	0.0	1.0	0.0	0.4	1.0	1.0	0.1
Habibpur	0.7	0.5	0.4	0.0	0.5	0.3	0.0	0.0	0.0	0.2	0.7	0.8	0.8	1.0	0.7	0.4	0.3	1.0	0.4	0.7	0.3
Maldah (Old)	1.0	1.0	0.7	0.0	0.6	0.6	0.0	0.1	0.3	0.0	0.0	0.5	1.0	0.7	0.8	0.8	0.1	0.0	0.2	0.1	1.0
English Bazar	0.9	0.3	0.2	0.2	1.0	0.2	1.0	1.0	0.0	0.0	0.7	0.1	0.2	0.1	0.6	0.1	0.1	0.5	0.4	0.2	0.0
Manikchak	0.3	0.0	0.2	0.0	0.4	0.3	0.0	0.0	0.0	0.0	1.0	0.1	0.1	0.1	0.4	0.2	0.2	0.2	0.2	0.0	0.1
Kaliachak - I	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.2
Kaliachak - II	0.4	0.3	0.4	0.1	0.3	0.1	0.0	0.0	0.0	0.3	0.9	0.0	0.0	0.1	0.4	0.4	1.0	0.0	0.2	0.1	0.1
Kaliachak - III	0.0	0.3	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.7	0.0	0.1	0.4	0.0	0.0	0.4	0.5	0.0	0.0	0.1

Source: Computed by the authors

Contd.....

Table 2b. Block wise Composite Development Index (CDI) in Maldah district

C.D. blocks	SOCIAL																	ECONOMIC									Composite Development Index (CDI)	Rank
	X ₂	X ₂	X ₂	X ₂	X ₂	X ₂	X ₂	X ₂	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃	X ₃								
Harischan drapur - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.34	7						
Harischan drapur - II	30	38	00	47	38	42	14	25	54	28	90	03	56	36	45	18	62	76	0.	0.	0.15	14						
Chanchal - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.42	5						
Chanchal - II	32	13	00	07	04	05	09	00	00	21	00	00	19	00	54	07	43	55	0.	0.	0.30	9						
Ratua - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.20	12						
Ratua - II	54	34	16	21	41	95	30	64	53	28	38	14	62	33	39	32	49	69	0.	0.	0.30	8						
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.30	8						
	66	29	00	28	35	39	35	33	61	31	39	22	47	23	54	23	61	73	0.	0.	0.30	8						
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.20	12						
	37	20	00	10	04	00	17	36	46	02	00	02	15	05	41	13	33	43	0.	0.	0.30	8						
	42	09	00	70	26	55	13	34	00	31	45	08	43	13	57	00	71	83	0.	0.	0.30	8						

Gazole	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.	0.45	4	
Bamangola	66	70	12	28	89	51	70	61	58	00	20	00	19	36	00	28	00	14	0.56	3
Habibpur	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	1.	0.	1.	1.	1.	1.	0.58	1
Maldah (Old)	00	85	00	28	69	38	00	69	00	00	38	38	00	95	00	00	00	0.57	2	
English Bazar	0.	1.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.41	6	
Manikchak	83	00	68	40	39	71	25	00	68	87	28	91	44	91	85	81	46	0.23	11	
Kaliachak - I	0.	0.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.12	15	
Kaliachak - II	44	61	00	79	00	00	49	36	46	29	23	40	91	93	73	64	90	0.30	10	
Kaliachak - III	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.16	13	
	33	26	50	00	36	83	27	88	59	06	42	06	25	40	26	09	27			
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.			
	24	12	00	14	09	07	04	59	67	16	35	13	11	14	60	36	35			
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.			
	26	00	96	00	00	00	00	41	14	04	00	00	00	80	09	21	00			
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.			
	00	04	10	10	00	10	14	52	43	21	13	01	35	00	65	78	65			
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.			
	22	03	28	20	05	02	04	18	20	04	43	01	00	77	21	37	09			

Source: Computed by the authors

High level of development

It can be seen from Figure 2 & Table 2a, 2b that the Habibpur, Maldah (Old) and Bamangola blocks are identified as highly developed blocks compared to other blocks of Maldah with rich CDI values of 0.58, 0.57 and 0.56 respectively. It is interesting to note that only three blocks of the district enjoy a high level of development scenario and all are located in the eastern part of the district. Since these blocks lie in the Barind zone, characterized by older alluvium humps like uplands with scarring groundwater and lateritic soil, resulting in less agricultural activity and less densely populated (Biswas & Anwaruzzaman, 2019; Ghosh & Kar, 2018; Rudra, 2018). However, these blocks have provided amenities such as good number of schools, post offices, banks, drinking water, electricity, roadway lengths, health facilities, community centers, adequate irrigation facilities and the working population etc. All these conditions have allowed these blocks to conquer the highly established position within the district.

Moderate level of development

Moderately developed blocks consist of seven C.D. blocks named Gazole (0.45), English Bazar (0.41), Chanchal-I (0.42), Harischandrapur-I (0.34), Kaliachak-II (0.30), Chanchal-II (0.30) and Ratua-II (0.30) respectively (Table 2a, 2b). It can be noted that almost half of the Maldah district blocks recognized as moderately developed blocks indicating a modest degree of socio-economic growth (Figure 2). The moderate presence of various socio-economic indicators promoting development like number of colleges, health centers, irrigation, electricity, transportation, communication and banking facilities effectively influences development level here. Surprisingly English Bazar block, which is the headquarter of Maldah district having also an urban center within the block, belongs to moderately developed blocks within the district, indicates that the development of English Bazar block is mainly urban in nature.

Low level of development

Less developed blocks of the district are identified in Manikchak, Ratua-I, Kaliachak-III, Harischandrapur-II and Kaliachak-I with low CDI values of 0.23, 0.20, 0.16 and 0.15, 0.12 respectively (Table 2a, 2b; Figure 2). Lack of adequate schools, hospitals, irrigation, electricity, banking, transport, communication facilities along with low literacy rates, low working population and seasonal migration due to inadequate livelihood opportunities have led to these blocks being recognized as the most backward C.D. blocks in the Maldah district. Considering the geographical location of these blocks, excluding Kaliachak-I, all the poorly developed blocks are situated on Tal and Diara physiographic units, adjacent to the rivers (Mainly Ganga and Fulhar- the two most flood-producing rivers of Maldah) and thus heavily affected by

catastrophes like annual floods and riverbank erosion, that can be attributed as one of the reasons for the poor development (Iqbal, 2010).

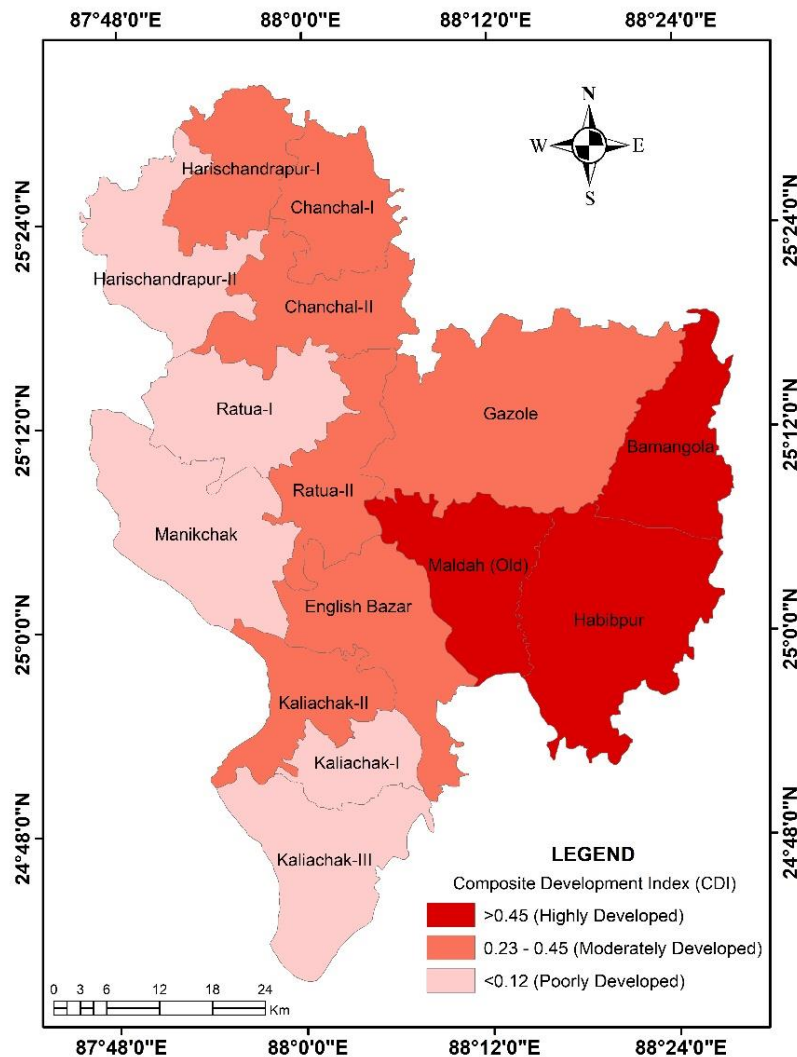


Figure 2. Inter-block disparity in development in Maldah district

Regionalization of disparity in development based on Principal Components (PCs)

In order to extract noteworthy variables that mainly impact inter-block discrepancy in socio-economic development of the district, Principal Component Analysis (PCA) was carried out where the first three Principal Components (PCs) were used for evaluation (Table 6; Figure 3).

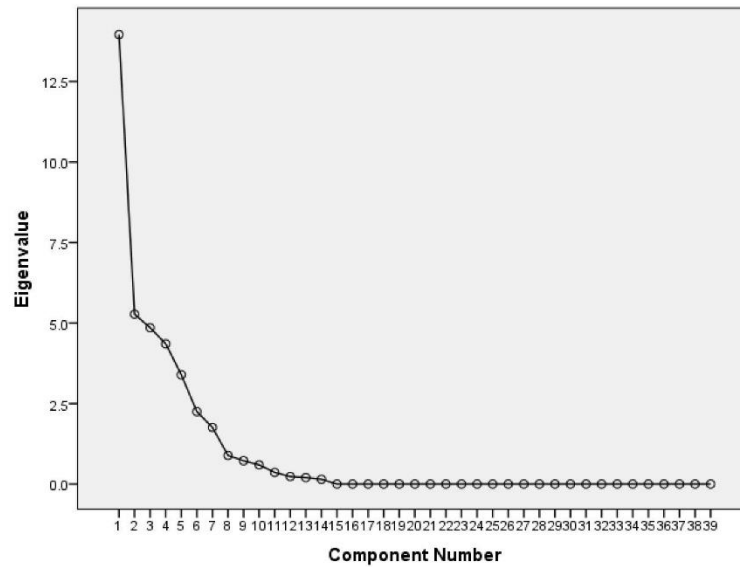


Figure 3. Scree plot for the component matrix showing the eigenvalues

Principal Component 1

The first Principal Component consists of a total of twenty-one variables which can be recognized as prime variables for evaluating the essence of inter-block disparity in development of the district i.e. Number of primary schools (X_1), Number of Middle schools (X_2), Proportion of literates (X_3), Proportion of villages having well water (X_{12}), Proportion of villages having tube wells (X_{13}), Proportion of villages access drinking water from tank, pond or lake (X_{14}), Proportion of villages having toilet facilities (X_{16}), Proportion of villages having telephone (landlines) connection (X_{19}), Proportion of villages having public and private bus service (X_{20}), Proportion of villages having pucca roads (X_{22}), Proportion of villages having electrified (X_{23}), Proportion of villages having sports club or recreation centers (X_{26}), Proportion of villages having public library (X_{27}), Proportion of villages having newspaper supply facility (X_{28}), Proportion of villages having commercial and co-operative banks (X_{29}), Proportion of villages having agricultural credit societies (X_{30}), Proportion of villages access tanks or lakes for irrigation (X_{33}), Proportion of male main workers (X_{34}), Proportion of female marginal workers (X_{37}), Proportion of male non workers (X_{38}), Proportion of female non workers (X_{39}). Consequently based on these 21 variables (Based on CDI values of 21 variables) C.D. blocks of Maldah have been regionalized into three levels of development- high, moderate and low (Figure 4a).

Table 3. Block wise Composite Development Index (CDI) in Maldah district based on Principal Component 1

C.D. blocks	SOCIAL										ECONOMIC										Composite Development Index (CDI)	Rank	
	X ₁	X ₂	X ₃	X ₁₂	X ₁₃	X ₁₄	X ₁₆	X ₁₉	X ₂₀	X ₂₂	X ₂₃	X ₂₆	X ₂₇	X ₂₈	X ₂₉	X ₃₀	X ₃₃	X ₃₄	X ₃₇	X ₃₈			X ₃₉
Harischandrapur - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.36	6
	3	4	3	0	3	4	5	2	4	3	3	3	4	14	2	5	0	5	1	6	7		
Harischandrapur - II	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.14	13
	1	3	2	0	0	0	2	0	0	3	1	0	0	09	0	0	0	1	0	4	5		
Chanchal - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.45	5
	3	4	0	0	0	2	6	0	0	2	3	4	5	0	0	0	9	7	3	5			
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
	2	4	5	1	5	4	4	3	3	5	3	4	9	30	6	5	1	6	3	4	6		
	8	9	2	7	4	0	9	5	5	4	4	1	5		4	3	4	2	2	9	9		

Chanchal - II	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.34	8	
	0	0	4	0	2	2	4	3	0	6	2	3	3	35	3	6	2	4	2	6	7		
	9	4	0	8	0	9	0	6	6	9	5	9		3	1	2	7	3	1	3			
Ratua - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.19	12	
	1	2	2	0	0	0	1	2	1	3	2	0	0	17	3	4	0	1	1	3	4		
	3	3	1	4	6	3	8	4	6	7	0	4	0		6	6	2	5	3	3			
Ratua - II	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.28	10	
	1	1	3	0	2	1	5	2	2	4	0	2	5	13	3	0	0	4	0	7	8		
	1	1	9	5	1	4	0	5	4	2	9	6	5		4	0	8	3	0	1	3		
Gazole	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.49	4	
	5	6	1	7	3	2	0	8	5	6	7	8	5	70	6	5	0	1	2	0	1		
	1	9	0	0	0	8	0	4	4	6	0	9	1		1	8	0	9	8	0	4		
Bamangola	0.	0.	1.	1.	0.	0.	1.	1.	1.	1.	0.	0.	0.	1.	0.	1.	0.	1.	1.	1.	1.	0.78	1
	7	6	0	0	0	0	0	0	0	8	6	3	00	6	0	3	0	0	0	0			
	4	6	0	0	2	0	0	0	0	5	9	8		9	0	8	0	0	0	0			
Habibpur	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.66	3	
	7	5	4	8	8	0	4	4	7	8	0	3	7	25	0	6	9	4	8	4	4		
	9	3	0	3	3	0	5	5	3	0	9	1		0	8	1	4	1	6	4			
Maldah (Old)	1.	1.	0.	0.	1.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.69	2	
	0	0	7	5	0	7	8	2	1	4	6	0	0	49	3	4	4	9	6	9	9		
	0	0	1	6	0	4	6	3	8	4	1	0	0		6	6	0	1	4	0	4		
English Bazar	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.35	7	
	9	3	2	1	2	1	1	4	2	3	2	3	8	27	8	5	0	2	0	2	4		
	8	3	4	0	4	3	8	1	1	3	6	6	3		8	9	6	5	9	7	0		
Manikchak	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.22	11	
	3	0	2	1	1	1	2	2	0	2	1	0	0	04	5	6	1	1	3	3	3		
	9	0	0	0	2	0	0	7	8	4	2	9	7		9	7	3	1	6	5	8		
Kaliachak - I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.08	15	
	0	3	0	0	0	0	0	0	0	2	0	0	0	00	4	1	0	0	2	0	0		
	6	3	5	6	8	6	0	9	2	6	0	0	0		1	4	0	0	1	0	0		
Kaliachak - II	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.28	9	
	4	3	4	0	0	1	4	2	1	0	0	0	1	14	5	4	0	3	7	6	4		
	8	5	9	7	4	4	6	4	5	0	4	0	0		2	3	1	5	8	5	4		
Kaliachak - III	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.09	14	
	0	3	0	0	1	0	0	0	0	2	0	0	0	04	1	2	0	0	3	0	0		
	0	2	0	5	6	5	0	0	2	2	3	5	2		8	0	1	0	7	9	3		

Source: Computed by the authors

According to Principal Component 1, the highly developed blocks comprised just three blocks of the district viz. Bamangola, Maldah (Old) and Habibpur having high CDI values of 0.78, 0.69 and 0.66 respectively. These blocks have high availability of the above 21 variables suggested by PC 1 and conquer the highest development position within the district. Moderately developed blocks consist of seven blocks of the district named Gazole (0.49), Chanchal-I (0.44), English Bazar (0.41), Harischandrapur-I (0.36), Chanchal-II (0.34), and Ratua-II (0.28), Kaliachak-II (0.28) respectively (Table 3; Figure 4a). Moderately availability of these socio-economic components recognized these blocks as moderately developed blocks of the Maldah district. Subsequently, the remainder of the five C.D. blocks in Maldah viz. Manikchak (0.22), Ratua-I (0.19), Harischandrapur-II (0.14), Kaliachak-III (0.09) and Kaliachak-I (0.08) classified as less developed district blocks respectively suggested by PC 1 (Table 3; Figure 4a). Since the low accessibility of 21 indicators are prevalent in these blocks, securing low CDI values naturally hindered socio-economic growth and increased inequality.

Principal Component 2

According to Principal Component 2, eight variables were extracted from the original variable dataset viz. Proportion of literates (X_3), Number of dispensaries (X_9), Number of family welfare centers (X_{10}), Proportion of villages having toilet facilities (X_{16}), Proportion of male main workers (X_{34}), Proportion of male marginal workers (X_{36}), Proportion of male non-workers (X_{38}) and Proportion of female non-workers (X_{39}). C.D. blocks were further classified into three stages of development on the basis of the CDI values derived from these 8 variables (Table 4; Figure 4b).

Table 4. Block wise Composite Development Index (CDI) in Maldah district based on Principal Component 2

C.D. blocks	SOCIAL			ECONOMIC				Composite Development Index (CDI)	Rank	
	X ₃	X ₉	X ₁₀	X ₁₆	X ₃₄	X ₃₆	X ₃₈			X ₃₉
Harischandrapur - I	0.35	0.02	0.13	0.52	0.56	0.45	0.62	0.76	0.43	6
Harischandrapur - II	0.20	0.00	0.00	0.26	0.19	0.54	0.43	0.55	0.27	10
Chanchal - I	0.52	0.06	0.19	0.49	0.62	0.39	0.49	0.69	0.43	4
Chanchal - II	0.40	0.06	0.03	0.49	0.47	0.54	0.61	0.73	0.42	8
Ratua - I	0.21	0.00	0.24	0.18	0.15	0.41	0.33	0.43	0.24	12
Ratua - II	0.39	0.11	0.03	0.50	0.43	0.57	0.71	0.83	0.45	3
Gazole	0.10	1.00	1.00	0.00	0.19	0.00	0.00	0.14	0.31	9
Bamangola	1.00	0.09	0.51	1.00	1.00	1.00	1.00	1.00	0.82	1
Habibpur	0.40	0.07	0.22	0.45	0.44	0.85	0.46	0.44	0.42	7
Maldah (Old)	0.71	0.33	0.00	0.86	0.91	0.73	0.90	0.94	0.67	2
English Bazar	0.24	0.09	0.07	0.18	0.25	0.26	0.27	0.40	0.22	13
Manikchak	0.20	0.07	0.07	0.20	0.11	0.60	0.35	0.38	0.25	11
Kaliachak - I	0.05	0.10	0.02	0.00	0.00	0.09	0.00	0.00	0.03	15
Kaliachak - II	0.49	0.04	0.35	0.46	0.35	0.65	0.65	0.44	0.43	5
Kaliachak - III	0.00	0.18	0.07	0.00	0.00	0.21	0.09	0.03	0.07	14

Source: Computed by the authors

Suggesting Principal Component 2, it can be observed that there are only two blocks of the district viz. Bamangola (0.82) and Maldah (Old) (0.67) showed healthy CDI values, secured highly developed blocks within the district (Table 4; Figure 4b). Comparatively moderately developed C.D. blocks were found in Ratua-II (0.45), Harischandrapur-I (0.43), Chanchal-I (0.43), Kaliachak-II (0.43), Chanchal-II (0.42), Habibpur (0.42), and Gazole (0.31) respectively. The rest of the six blocks viz. Harischandrapur-II (0.27), Manikchak (0.25), Ratua-I (0.24), English Bazar (0.22), Kaliachak-III (0.07), Kaliachak-I (0.03) falling in a poorly developed region with low CDI values as suggested by PC 2. (Table 4; Figure 4b).

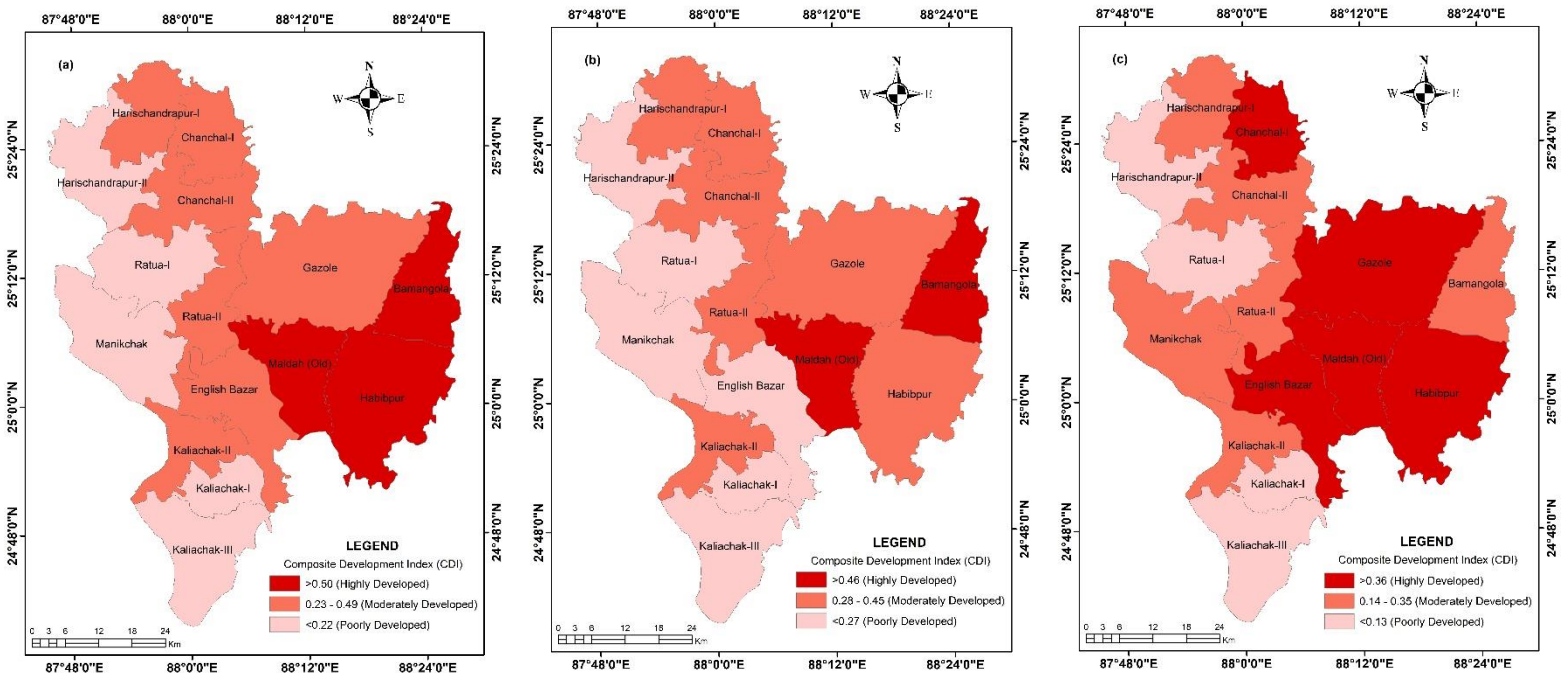


Figure 4. Inter-block disparity in development in Maldah district based on (a) Principal Component 1, (b) Principal Component 2 and (c) Principal Component 3.

Principal Component 3

Out of the 39 original variables, only six variables were suggested by the Principal Component 3 e.g. Number of primary health centers (X_5), Number of hospital beds (X_7), Number of doctors (X_8), Number of family welfare centers (X_{10}), Proportion of villages access drinking water from river or canal (X_{15}), Proportion of villages having public library (X_{27}). All of the variables suggested by PC 3 are of a social nature. Based on CDI values obtained from these six variables, blocks have been categorized again (Fig. 4c).

Table 5. Block wise Composite Development Index (CDI) in Maldah district based on Principal Component 3

C.D. blocks	SOCIAL						Composite Development Index (CDI)	Rank
	X_5	X_7	X_8	X_{10}	X_{15}	X_{27}		
Harischandrapur - I	0.24	0.04	0.06	0.13	0.57	0.42	0.24	8
Harischandrapur - II	0.16	0.00	0.03	0.00	0.12	0.05	0.06	13
Chanchal - I	0.69	0.05	0.06	0.19	0.80	0.95	0.46	2
Chanchal - II	0.34	0.01	0.03	0.03	0.77	0.39	0.26	7
Ratua - I	0.22	0.02	0.00	0.24	0.32	0.00	0.13	12
Ratua - II	0.47	0.01	0.02	0.03	1.00	0.55	0.35	6
Gazole	0.50	0.01	0.07	1.00	0.35	0.51	0.41	4
Bamangola	0.21	0.03	0.07	0.51	0.00	0.38	0.20	10
Habibpur	0.55	0.02	0.07	0.22	0.77	0.71	0.39	5
Maldah (Old)	0.64	0.02	0.12	0.00	0.84	1.00	0.44	3
English Bazar	1.00	1.00	1.00	0.07	0.69	0.83	0.76	1
Manikchak	0.49	0.01	0.06	0.07	0.41	0.07	0.19	11
Kaliachak - I	0.00	0.00	0.00	0.02	0.13	0.00	0.03	15
Kaliachak - II	0.33	0.02	0.08	0.35	0.41	0.10	0.21	9
Kaliachak - III	0.14	0.00	0.00	0.07	0.08	0.02	0.05	14

Source: Computed by the authors

According to Principal Component 3, English Bazar (0.76), Chanchal-I (0.46), Maldah (Old) (0.44), Gazole (0.41), Habibpur (0.39) enjoys a highly developed category block, respectively. On the other hand, Ratua-II (0.35), Chanchal-II (0.26), Harischandrapur-I (0.24), Kaliachak-II (0.21), Manikchak (0.19) and Bamangola (0.20) were classified as moderately developed blocks. Whereas Ratua-I (0.13), Harischandrapur-II (0.06), Kaliachak-III (0.05) and Kaliachak-I (0.03) were classified as poorly developed C.D. blocks of the district, respectively (Table 5; Figure 4c).

Table 6. Component matrix of the factor analysis showing the computed value loadings

Input Variables	Component						
	1	2	3	4	5	6	7
X_1	.779	.157	.366	.194	.092	-.252	.083
X_2	.728	.061	-.082	-.239	.218	-.485	-.037
X_3	.734	-.566	-.047	.307	-.025	-.078	.144
X_4	.457	.342	.301	.433	-.490	-.315	.060
X_5	.474	.233	.755	-.046	-.161	.177	.179
X_6	.575	-.052	-.243	-.501	-.517	.195	.130
X_7	.070	.334	.764	.298	-.340	-.211	-.022
X_8	.151	.338	.757	.281	-.320	-.245	.002
X_9	.352	.603	-.287	-.515	-.181	-.186	.236
X_{10}	.441	.548	-.530	.002	-.263	.047	.241
X_{11}	-.281	.374	.136	.663	.296	.307	.093
X_{12}	.878	.201	-.341	.095	.126	-.065	-.073
X_{13}	.625	-.035	.371	-.440	.482	.086	-.076
X_{14}	.613	-.007	.242	-.358	.548	.268	-.137
X_{15}	.326	-.223	.623	-.376	.066	.447	.265
X_{16}	.685	-.701	-.012	.171	.015	-.048	.068
X_{17}	-.350	-.076	.001	.152	.267	.359	.710
X_{18}	.420	.321	.213	.290	.219	.326	-.547
X_{19}	.764	.304	-.300	.260	-.355	.063	.122

X ₂₀	.817	.103	-.286	.262	-.061	.154	-.162
X ₂₁	.401	-.194	-.012	-.728	.109	-.281	.114
X ₂₂	.760	.039	-.289	.039	-.154	.232	-.240
X ₂₃	.586	.489	.287	.421	.136	.266	.074
X ₂₄	.680	.159	-.083	.507	-.101	.197	-.020
X ₂₅	.917	.151	-.185	-.017	.089	.115	-.202
X ₂₆	.474	.429	-.169	-.525	.113	.384	-.012
X ₂₇	-.063	-.399	.104	-.187	-.418	.016	-.657
X ₂₈	.723	.474	-.277	-.269	.133	.200	-.025
X ₂₉	.203	.219	.346	-.178	.649	-.477	-.042
X ₃₀	.453	-.093	.733	-.174	-.177	.093	.013
X ₃₁	.874	.064	-.018	-.338	-.161	-.205	.084
X ₃₂	.746	-.025	.566	-.269	-.029	.067	.018
X ₃₃	.822	.061	-.331	.127	-.339	-.185	.102
X ₃₄	.803	-.556	.013	.073	-.052	-.079	.040
X ₃₅	.423	.074	-.102	.315	.633	-.424	.061
X ₃₆	.497	-.633	-.088	.376	.200	.172	-.025
X ₃₇	.623	-.073	-.310	.464	.466	-.098	.050
X ₃₈	.532	-.801	.011	.183	-.045	.007	.153
X ₃₉	.554	-.779	.096	.013	-.245	.082	.064

Extraction Method: Principal Component Analysis

Source: Computed by the authors

The entire study shows that different Principal Components (PCs) have different sets of variables that influence the socio-economic development of the district. Eventually, this heterogeneity of the selected indicators is expressed in the regionalization trend of the C.D. blocks within the district (Table 6). It has been found that Bamongola and Maldah (Old) have always occupied the highly developed blocks suggested by all three PCs, while Habibpur, English Bazar, Gazole, Chanchal-I blocks fluctuate between highly and moderately developed regions due to changes in PCs. (Figure 4). It is important to note that while the English Bazar block is the headquarter of the Maldah district and also has a municipality, this C.D. block only occupies highly developed blocks once suggested by PC 3, even though English Bazar is once in poorly developed blocks as per PC 2. Harischandrapur-I, Ratua-II, Chanchal-II and Kaliachak-II blocks are always in moderately developed blocks as per three PCs. On the other hand, Manikchak, Ratua-I, Harischandrapur-II, Kaliachak-I and Kaliachak-III blocks retained their place in the poorly developed category blocks within the district suggested by all three PCs (Figure 4), which should be of concern to the Government.

Conclusion

Socio-economic growth in the district of Maldah co-relates to regional inequalities. Therefore, differences in growth inequalities need to be reduced from one block to another. Therefore, this will lead to a decrease in socio-economic status inequalities. It is hoped that this type of study will certainly provide sufficient indication of the problems and prosperity of micro-level areas' socio-economic development. It is therefore anticipated that the current research efforts would definitely contribute to the awareness of the regional dimensions of socio-economic growth of India in general, and of the district of Maldah in particular.

References

Abdi, H., & Williams, L. J. (2010). Principal component analysis. *WIREs Computational Statistics*, 2(4), 433-459. <https://doi.org/10.1002/wics.101>

- Agarwala, A., & Hazarika, P. (2002). Regional disparities in economic development of Assam: A district level study. *Indian Journal of Regional Science*, 34(2), 121-133.
- Ahmed, N., & Hussain, N. (2013). Identification of Micro Regional Disparities in The Level of Development in The Rural Areas: A Case Study of Malda District of West Bengal (India). *International Journal of Management and Social Sciences Research (IJMSSR)*, 2(5).
- Ahmed, S. M., Adams, A. M., Chowdhury, M., & Bhuiya, A. (2000). Gender, socioeconomic development and health-seeking behaviour in Bangladesh. *Social science & medicine*, 51(3), 361-371.
- Baig, M. W. B. R. (2014). *A Study of Regional Planning, Statistical Variations and Distribution of Socio-Economic Facilities in Malda District of West Bengal* Shri Jagdishprasad Jhabarmal Tibrewala University, Rajasthan].
- Bell, N., Schuurman, N., & Hayes, M. V. (2007). Using GIS-based methods of multicriteria analysis to construct socio-economic deprivation indices. *International Journal of Health Geographics*, 6(1), 17. <https://doi.org/10.1186/1476-072X-6-17>
- Biswas, R., & Anwaruzzaman, A. (2019). Measuring hazard vulnerability by bank erosion of the Ganga river in Malda district using PAR model. *Journal of Geography, Environment and Earth Science International*, 22(1), 1-15.
- Bureau of Applied Economics & Statistics, G. o. W. B. (2011). *District Statistical Handbook: Malda*. DSPI.
- Development and Planning Department, G. o. W. B. (2004). *West Bengal Human Development Report*. Kolkata.
- Development and Planning Department, G. o. W. B. (2007). *District Human Development Report: Malda*. HDRCC.
- Ewetan, O. O., & Urhie, E. (2014). Insecurity and socio-economic development in Nigeria. *Journal of Sustainable Development Studies*, 5(1).
- Fávero, L. P., & Belfiore, P. (2019). Chapter 12 - Principal Component Factor Analysis. In L. P. Fávero & P. Belfiore (Eds.), *Data Science for Business and Decision Making* (pp. 383-438). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-12-811216-8.00012-4>
- Ghosh, A., & Kar, S. K. (2018). Application of analytical hierarchy process (AHP) for flood risk assessment: a case study in Malda district of West Bengal, India. *Natural Hazards*, 94(1), 349-368. <https://doi.org/10.1007/s11069-018-3392-y>
- Gilani, N., Waheed, S. A., Hussain, B. (2020). Multiculturalism and Integration: Challenges, Strategies and Prospects of Students' Integration in Educational Environment and Society. *Global Social Sciences Review*, 5(2), 174-181.
- Iqbal, S. (2010). Flood and erosion induced population displacements: a socio-economic case study in the Gangetic riverine tract at Malda district, West Bengal, India. *Journal of Human Ecology*, 30(3), 201-211.
- Ismail, M., & Mustaqim, M. (2013). Socio-economic status of population in flood prone areas of Chanchal sub-division in Malda district, West Bengal. *International Journal of Research in Applied, Natural and Social Sciences 1* (3), 141-152.
- Ismali, M. (2012). Status of Household Food Security in Some Selected Villages in Malda District. *Asia Pacific Journal of Social Sciences*, 4(2), 64-87.
- Jamal, H. (2016). Spatial disparities in socioeconomic development: the case of Pakistan. *The Pakistan Development Review*, 421-435.

- Jolliffe, I. T. (2002). Principal Component Analysis and Factor Analysis. In *Principal Component Analysis* (pp. 150-166). Springer New York. https://doi.org/10.1007/0-387-22440-8_7
- Mathur, A. (1983). Regional Development and Income Disparities in India: A Sectoral Analysis. *Economic Development and Cultural Change*, 31(3), 475-505. www.jstor.org/stable/1153210
- Md, S., & Ahmed, S. (2011). Backward Districts for Planning and Development in West Bengal. *Resource Development and Environmental Change*, 3, 75-98.
- Milenkovic, N., Vukmirovic, J., Bulajic, M., & Radojicic, Z. (2014). A multivariate approach in measuring socio-economic development of MENA countries. *Economic Modelling*, 38, 604-608.
- Nolan, B., & Marx, I. (2012). Economic Inequality, Poverty, and Social Exclusion. *The Oxford Handbook of Economic Inequality*. <https://doi.org/10.1093/oxfordhb/9780199606061.013.0013>
- Office of the Registrar General, G. o. I. (2011). *District Census Handbook - Malda*. D. o. C. O. West Bengal.
- Ohlan, R. (2013). Pattern of regional disparities in socio-economic development in India: District level analysis. *Social Indicators Research*, 114(3), 841-873.
- Pawlas, I. (2017). Regional disparities in development based on taxonomic research: A case of Poland. *Regional Formation and Development Studies*, 23(3), 86-101.
- Prem, N., Bhatia, V., & Rai, S. (2011). Pattern of regional disparities in socio-economic development in West Bengal. *Journal of the Indian Society of Agricultural Statistics*, 65(1), 27-35.
- Rao, H. (1984). *Regional Disparities and Development in India*. Ashish Publishing House. <https://books.google.co.in/books?id=9V2yAAAAIAAJ>
- Rudra, K. (2018). Rivers of the Tarai–Doors and Barind Tract. In *Rivers of the Ganga-Brahmaputra-Meghna Delta: A Fluvial Account of Bengal* (pp. 27-47). Springer International Publishing. https://doi.org/10.1007/978-3-319-76544-0_3
- Siddiqui, F., & Hussain, N. (2010). Analysis of Micro Level Socio-Economic Disparities in Malda District, West Bengal. *Asia Pacific Journal of Social Sciences*, 2(1).
- Sultana, C., & Aktar, N. (2016). Regional Imbalances in the Levels of Socio-Economic Development: A Case Study of Malda District, West Bengal. *The NEHU Journal*. Vol XIV(1), 69-86.
- Taufique, M., & Hoque, M. A. (2017). Assessing the Role of MGNREGA in Alleviating Rural Poverty: A Study of Malda District, West Bengal. *The Geographer*, 64(1), 119-126.
- UNDP. (2007). *Human Development Report*. O. U. P. New York.
- Waheed, S. A., Gilani, N., Raza, M., Sharif, S. (2020). Understanding Students' Experience of Lived Space in Schools: A Phenomenological Perspective. *Hamdard Islamicus*, 43(1), 211-220.
- Weaver, B., & Maxwell, H. (2014). Exploratory factor analysis and reliability analysis with missing data: A simple method for SPSS users. *The Quantitative Methods for Psychology*, 10(2), 143-152.
- Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in quantitative methods for psychology*, 9(2), 79-94.