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REGIONAL IMBALANCES IN THE LEVELS OF LITERACY AND ITS DETERMINANTS IN WEST BENGAL: A QUANTITATIVE ANALYSIS

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Abstract

Education is a crucial social factor that initiates the process of social, economic and cultural development. In the present paper an attempt has been made to study the regional imbalances in the levels of literacy consequent upon the various socio-economic and educational factors, which are also unequally distributed in West Bengal. To fulfill the objectives standard statistical techniques like Z-score, Karl Pearson's correlation coefficient and 't' test have been applied and spatial variations of the phenomena have also been presented with choropleth technique.

In the analysis it is observed that the districts of Darjeeling and Kolkata have attained the top position in the aspects of literacy and educational factors while Uttar Dinajpur district is at the bottom. On the other hand, the districts of Hugli, Medinipur, Haora and Kolkata have attained high levels in both socio-economic and literacy rates, while Uttar Dinajpur, Murshidabad and Birbhum districts are at low level. Viewing the existing wide regional imbalances, planners and decision-makers should make comprehensive policies to reduce the gap between literacy rate as well as socio-economic development.

Introduction

The process of development of any economy is characterized by regional inequalities in respect of different socio-economic factors and infrastructural facilities. Education is a crucial social factor that plays a pivotal role in the initiation of the process of social, economic and cultural advancement. It helps to overcome the social barriers, and enhances earning potentials and productivity of people through acquisition of skill and information for various job opportunities. Again it may be said that education plays a dominant role in influencing the quality of human resources as it helps in conveying ideas, thoughts and events over time and space.

Therefore it is an instrument for conveying and containing informations.

As per definition of the census of India 2001, a person who can both read and write with understanding in any language is taken as literate. All children below the age of six years are treated as illiterate. According to the census of 2001, 68.64 per cent literacy rate has been registered in the state, while male literacy rate is 77.02 per cent and female literacy rate is 59.61 per cent. The highest literacy rate is recorded in the Kolkata district (80.86 per cent), where both male (83.79 per cent) and female (77.30 per cent) literacy rates are also the highest. While the lowest male literacy

rate is registered in Uttar Dinajpur district (47.88 per cent) and lowest female literacy rate in Murshidabad district (47.63 per cent). The highest rural literacy rate is recorded by Medinipur (73.95 per cent) district whereas the North 24 Parganas district (85.19 per cent) recorded highest urban literacy rate.

Several research studies have been conducted on the regional inequalities in educational development in India. Some of the significant studies on educational status have been attempted with reference to literacy rate in general and literacy by sex and residence (Gosal, 1964; Siddiqui, M., 1977; Burke 1983; Mathur 1988; and Tiwari and Tripathi, 1993), while some scholars dealt with the correlation of educational development and working population (Acharya, 1984; and Singh, 1986). Some scholars like Kumar (1982), Raza and Aggarwal (1982), Zaidi (1986), Nuna (1989), Mehta (1990), Dash (1993), Hazra (1997) Chaubey and Chaubey (1998), Joshi (2000) and Yasmeen, N., Siddiqui, F.A. and Khan, K., (2005), have attempted to highlight the educational level and its relation to socio-economic spectrum.

It is found from the work done by above scholars that they show only the feature of regional disparities in literacy, while in the present study, an attempt has been made to find out the regional disparities of socio-economic development and educational facilities and their role in the regional disparities of literacy. It will enable planners in drafting out the plan for improvement of literacy rate identifying the effective factors for that.

Objective

The main aims of this paper are; (i) to find out the district level regional variations in the rate of literacy in West Bengal, (ii) to correlate the literacy rate with different educational and socio-economic factors which are the possible causes of differentials in rate of literacy,

(iii) to suggest some policy measures to remove regional imbalances in educational as well as socio-economic development in West Bengal.

Study Area

The state of West Bengal have been taken as the study area, which is comprised of eighteen districts (according to the census of India, 2001). The study area lies within the latitudinal extension of 21°25' north to 26°50' north and the longitudinal extension of 86°30' east to 89°58' east (Fig.1). The state covers an area of about 88,752 sq. km. extending from the foot of the Darjeeling Himalaya in the north to the Bay of Bengal in the south. The state inhabits a total population of 80,176,197 persons comprising 41,465,985 males and 38,710,212 females.

Data Base and Methodology

The data for the present analysis have been obtained from the secondary sources like, Statistical Hand Book, District Statistical Hand Book and Primary Census Abstract.

The data obtained has been got standardized or computed in to standard score based on the Z-score technique, which explain the departure of individual observations, expressed in a comparable form. In other words it is the linear transformation of the original data. The model is as follows:

$$Z_i = \frac{(X_i - \bar{X})}{\delta}$$

Where: Z_i is the standard score of i th variable,

X_i is the individual observation,

\bar{X} is the mean of variable,

δ is the standard deviation of variable.

The obtained Z-score of each indicator is added district-wise and the average is taken to be known as composite Z-score(s) for each spatial unit of the study area.

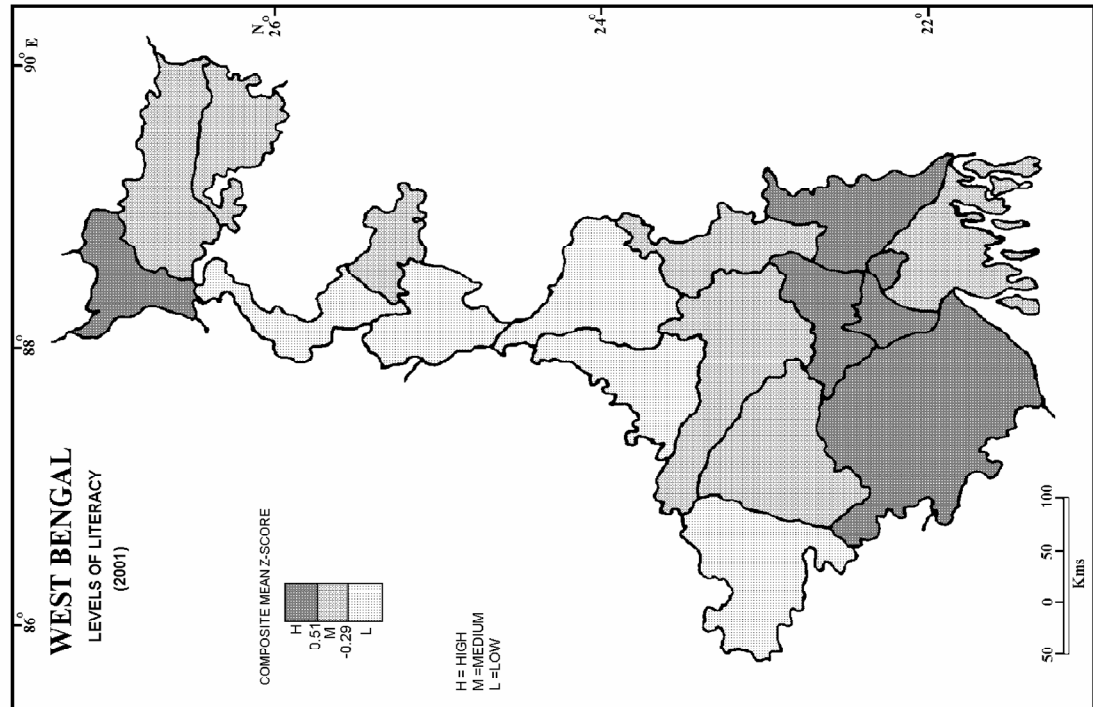


FIG. 2

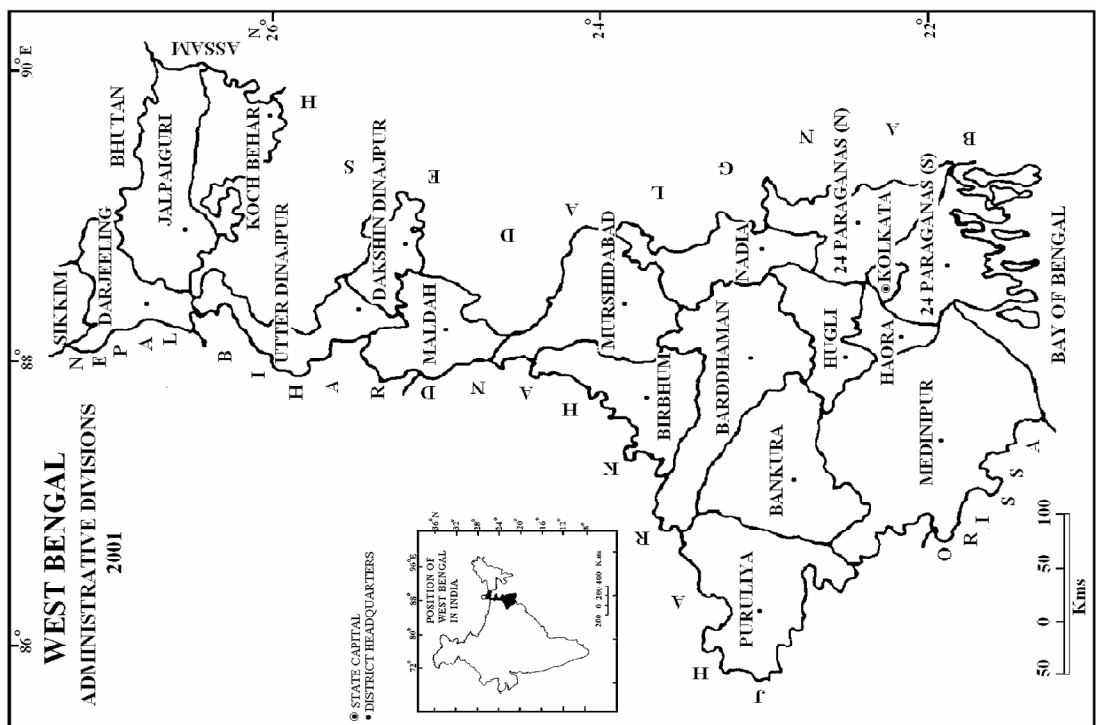


FIG. 1

Source: Census of India 2001

The model is thus:

$$Z_i = \frac{\sum Z_{ij}}{N}$$

Where: N refers to the number of indicators and Z_{ij} indicates the sum of Z-scores of indicators j in district i.

Karl Pearson's Correlation Coefficient technique and student's 't' test have been employed to find out the nature and extension of relationship, between the dependent variables (viz. literacy rate) and independent variables (viz.

educational and socio-economic factors), and to identify the level of significance respectively. Choropleth technique has been adopted to represent the spatial variations of the phenomena.

Levels of Literacy

In the present analysis five variables, viz. literacy rate, male literacy rate, female literacy rate, rural literacy rate and urban literacy rate have been taken to show the spatial variation of levels of literacy in terms of their composite mean Z-score (Table-1). The districts of West Bengal have been arranged into three categories (viz. high, medium and low) in terms of level of literacy (Table-2) and presented in Fig. 2.

High level of literacy (over +0.51)

The districts with mean composite Z-score over +0.51 are categorized under the high level of literacy wherein six districts are counted.

The districts included in this category are Darjeeling, North 24 Parganas, Hugli, Medinipur, Haora and Kolkata. The highest mean composite Z-score is obtained by North 24 Parganas (1.28) district, followed by Hugli (1.05) and Haora (1.05) districts respectively.

Medium level of literacy (-0.29 to 0.51)

The mean composite Z-score of this category ranges from -0.29 to +0.51. Table-2 depicts that seven districts namely, Jalpaiguri, Koch Behar, Dakshin Dinajpur, Bardhaman, Nadia, Bankura and South 24 Parganas fall in this category. Among them Koch Behar district scored the highest mean composite Z-score (0.37) followed by Bardhaman (0.35), South 24 Parganas (0.35) and Nadia (0.30) districts, while least mean composite Z-score in this category is scored by the district of Jalpaiguri (-0.13) (Table 1).

Low level of literacy (under -0.29)

Five districts with mean composite Z-score of less than -0.29 fall in this

Table 1

West Bengal: District-wise Mean Composite Z-Scores

District	Mean Composite Z-score		
	Literacy Rate	Educational Facilities	Socio-Economic Development
Darjeeling	0.77	0.43	-0.12
Jalpaiguri	-0.13	-0.14	-0.19
Koch Behar	0.37	-0.04	0.03
Uttar Dinajpur	-1.35	-0.33	-0.18
Dakshin Dinajpur	0.05	-0.16	0.13
Maldah	-1.14	-0.125	0.09
Murshidabad	-1.36	-0.12	-0.11
Birbhum	-0.32	-0.10	-0.09
Bardhaman	0.35	-0.17	0.01
Nadia	0.30	-0.11	0.09
North 24 Parganas	1.28	-0.10	-0.24
Hugli	1.05	-0.16	0.19
Bankura	0.04	-0.20	0.36
Puruliya	-0.83	-0.20	0.09
Medinipur	0.88	-0.12	0.12
Haora	1.05	-0.26	0.10
Kolkata	0.63	2.23	0.20
South 24 Parganas	0.35	-0.22	-0.37

Source: Computed from Primary Census Abstract, Series-I, 2001, and Statistical Abstract, West Bengal, 2002-03.

Table 2
West Bengal: Levels of Literacy, 2001

Category	Composite Mean Z-Score	Number of Districts	Name of the Districts
High	Over +0.51	06	Darjeeling, 24 Parganas (North), Hugli, Medinipur, Haora, and Kolkata.
Medium	-0.29 to 0.51	07	Jalpaiguri, Koch Behar, Dakshin Dinajpur, Bardhaman, Nadia, Bankura and 24 Parganas (South).
Low	Under -0.29	05	Uttar Dinajpur, Maldah, Murshidabad, Birbhum and Puruliya.

Source: Computed from Primary Census Abstract, Series-I, 2001 and Statistical Abstract, W.B., 2002.

category. Among the districts of this category, the Birbhum district has obtained highest mean composite Z-score (-0.32), followed by Puruliya (-0.83), Maldah (-1.14), Uttar Dinajpur (-1.35) and Murshidabad (-1.36) districts.

Levels of Educational Facilities

Here, the spatial variation of educational factors or educational facilities has been presented, which are perhaps responsible for spatial variations in the levels of literacy. The availability of educational institutions culminates into the literacy of the region. The ten indicators selected to find out the levels of educational facilities are; number of

primary schools per 100,000 persons and per 100 sq. km of geographical area, number of middle schools per 100,000 persons and per 100 sq.km. of area, number of high and higher secondary schools per 100,000 persons and per 100 sq.km of area, number of colleges per 100,000 persons and per 100 sq.km of area, school-student ratio (number of students per school) and teacher-student ratio (number of students per teacher). The mean composite Z-score of these indicators has been obtained (Table-1) to categorize the districts in to different levels of educational facilities (Table-3 and Fig. 3).

Table 3
West Bengal: Levels of Educational Facilities, 2001

Category	Composite Mean Z-Score	Number of Districts	Name of the Districts
High	Over +0.28	02	Darjeeling and Kolkata
Medium	-0.28 to +0.28	15	Jalpaiguri, Koch Behar, Dakshin Dinajpur, Maldah, Murshidabad, Birbhum, Bardhaman, Nadia, 24 Parganas (North), Hugli, Bankura, Puruliya, Medinipur, Haora and 24 Parganas (South).
Low	Under -0.28	01	Uttar Dinajpur

Source: Computed from Primary Census Abstract, Series-I, 2001 and Statistical Abstract, W.B., 2002.

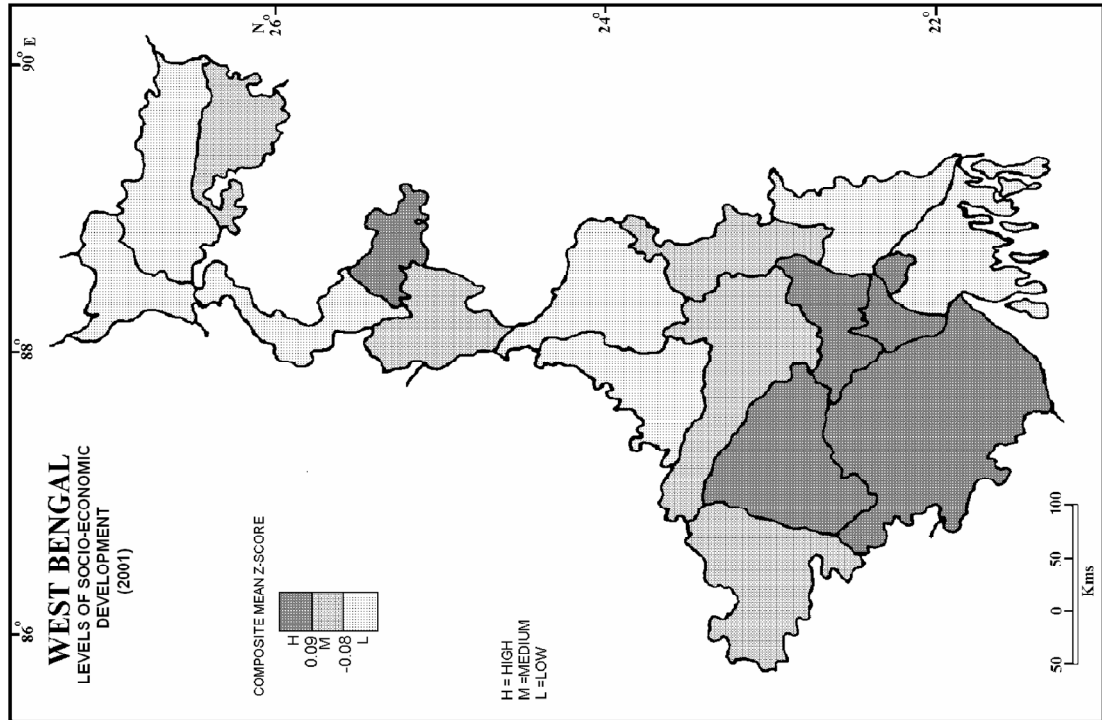


FIG. 4

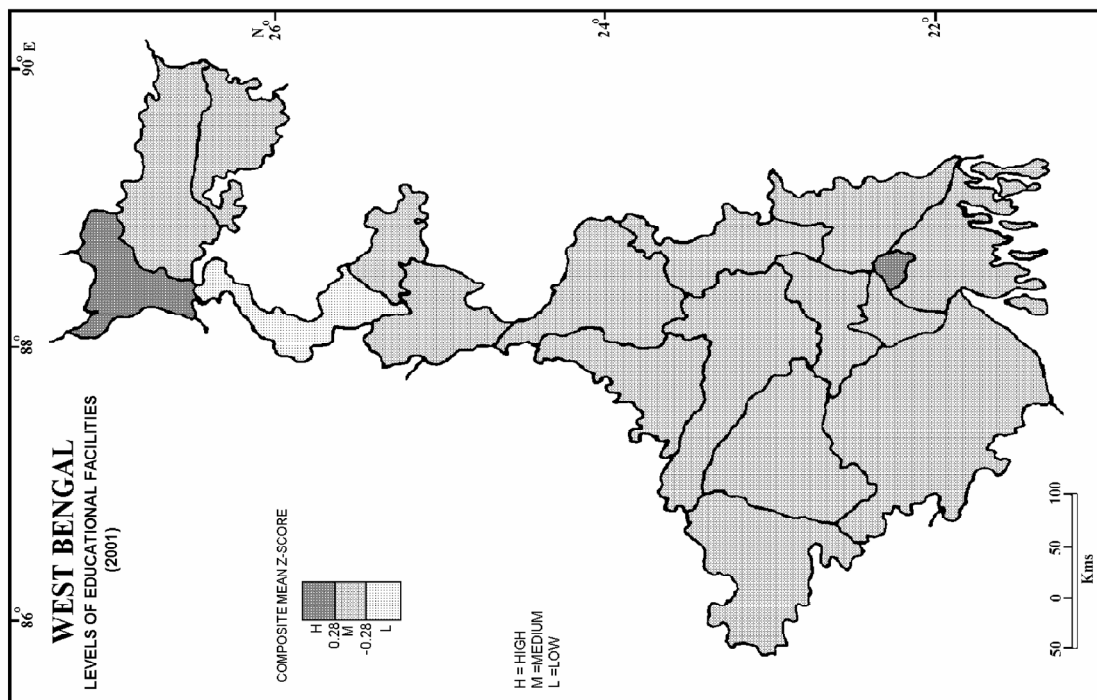


FIG. 3

**High level of educational facilities
(Over +0.28)**

Higher the level of composite z-score more is the availability of educational facilities and vice-versa. The districts with mean composite Z-score above +0.28 are included in this category. Table 3 and Fig. 3 depict that only two districts i.e. Kolkata and Darjeeling with mean composite Z-score of 2.23 and 0.43 respectively have recorded high level of educational facilities.

**Medium level of educational facilities
(-0.28 to +0.28)**

The mean composite Z-score of this category ranges between -0.28 and +0.28. The highest numbers of the districts (15 districts) have comprised this category. Among these districts, the Koch Behar district scored the highest mean composite Z-score (-0.04) followed by North 24 Parganas (-0.10) whereas the Haora district scored the lowest mean composite Z-score (-0.25) in this category. Other districts falling in this category are; Jalpaiguri, Dakshin Dinajpur, Maldah, Murshidabad, Birbhum, Bardhaman, Nadia, Hugli, Bankura, Puruliya, Medinipur, and South 24 Parganas.

**Low level of educational facilities
(under -0.28)**

The districts scoring the mean composite Z-score of less than -0.28 are categorized under low level of educational facilities. Table-3 and Fig. 3 exhibit that only one district i.e. Uttar Dinajpur (-0.33) fall in this category of low level of educational facilities.

It is observed from the above analysis that a vast part of the state is having moderate availability of educational facilities while a wide difference between two districts having top and bottom positions in respect of availability of educational facilities (composite mean z-score +2.23 and -0.33) exist in the study region.

Levels of Socio-Economic Development

In the present analysis fourteen (14) variables namely percentage of net sown area (NSA) to total reporting area, cropping intensity, work participation rate, male work participation rate, female work participation rate, percentage of workers in agriculture and cultivation, percentage of workers in household industries, percentage of workers employed in registered factories, percentage of urban population, metalled road density, per

Table 4**West Bengal: Levels of Socio-Economic Development, 2001**

Category	Composite Mean Z-Score	Number of Districts	Name of the Districts
High	Over +0.09	06	Dakshin Dinajpur, Hugli, Bankura, Medinipur, Haora and Kolkata.
Medium	-0.08 to +0.09	05	Koch Behar, Maldah, Bardhaman, Nadia and Puruliya.
Low	Under -0.08	07	Darjeeling, Jalpaiguri, Uttar Dinajpur, Murshidabad, Birbhum, 24 Parganas (North), 24 Parganas (South).

Source: Computed from Primary Census Abstract, Series-I, 2001 and Statistical Abstract, W.B., 2002.

capita income, number of commercial banks per 1,000 persons, number of hospital per 100,000 persons and number of hospital beds per 100,000 persons have been taken to calculate and find out spatial patterns in the levels of socio-economic development in the state. Composite mean Z-scores have been calculated (Table 1) and on the basis of the composite mean Z-scores the districts have been grouped into various categories (Table 4 and Fig. 4).

High level of socio-economic development (over +0.09)

Six districts of the state, which obtained mean composite Z-score of more than 0.09, are included in category of high level of socio-economic development (Table-4 and Fig. 4). The district Bankura attained the highest mean composite Z-score i.e., 0.36, followed by Kolkata (0.20), Hugli (0.19), Dakshin Dinajpur (0.13), Medinipur (0.12) and Haora (0.10) districts.

Medium level of socio-economic development (-0.08 to 0.09)

The mean composite Z-score of this level ranges between -0.08 to 0.09 and five districts comprising this category are Puruliya (0.09), Maldah (0.09), Nadia (0.09), Koch Behar (0.03) and Bardhaman (0.01).

Low level of socio-economic development (under -0.08)

This category of the levels of socio-economic development contains seven districts of the state with mean composite Z-score below -0.08. Birbhum (-0.09), Murshidabad (-0.11), Darjeeling (-0.12), Uttar Dinajpur (-0.18), Jalpaiguri (-0.19), North 24 Parganas (-0.24) and South 24 Parganas (-0.37) are the districts comprising this category of socio-economic development.

Correlates

An attempt has been made to find out the levels of association between the literacy, educational facilities and socio-

economic development by calculating the correlation between them.

Correlates of literacy and educational facilities

Fig. 5 exhibits that among the six districts of high level of literacy only two districts, viz.; Darjeeling and Kolkata fall in the category of high level of educational facilities. These districts are therefore, categorized under high level of both literacy and educational facilities. Though the districts of 24 Parganas (North), Hugli, Medinipur and Haora fall in the category of medium level of educational facilities yet these have attained high level of literacy. Seven districts i.e. Jalpaiguri, Koch Behar, Dakshin Dinajpur, Bardhaman, Nadia, Bankura and 24 Parganas (South) have recorded medium levels of both literacy and educational facilities. Uttar Dinajpur is the only district in the state that has witnessed low level of literacy and educational facilities. It has been observed that not a single district of high level of literacy falls under low level of educational facilities and vice-versa. It may therefore be generalized that the literacy and educational facilities are positively correlated (Fig. 5). The value of correlation (r) between literacy rate and education facilities is 0.224 at 16 degree of freedom.

Correlates of literacy and socio-economic development

Fig. 6 depicts that the districts of Hugli, Medinipur, Haora and Kolkata which appear in high level of literacy and socio-economic development, while Darjeeling and 24 Parganas (North) are embracing the low level of socio-economic development though they have recorded high level of literacy. The districts of Uttar Dinajpur, Murshidabad and Birbhum are occupying the low level of literacy and socio-economic development. Among the seven districts of medium level of literacy, two districts (i.e., Dakshin Dinajpur and Bankura), three districts (i.e., Koch Behar, Bardhaman and Nadia) and two

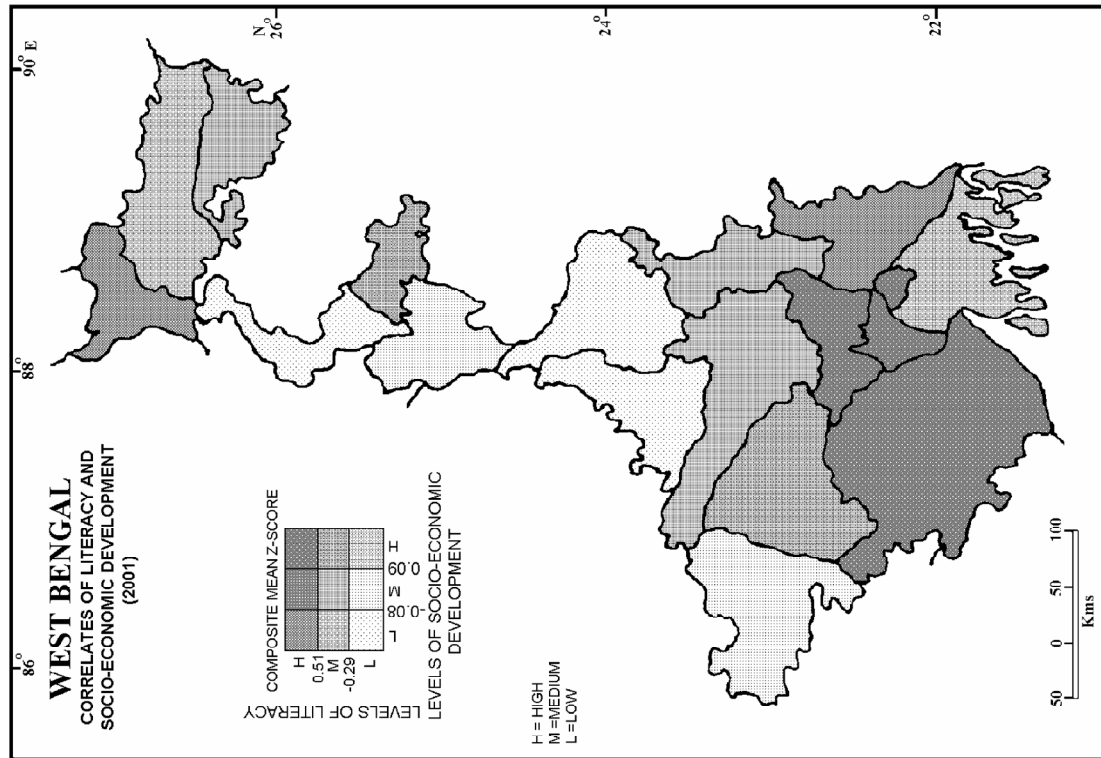


FIG. 6

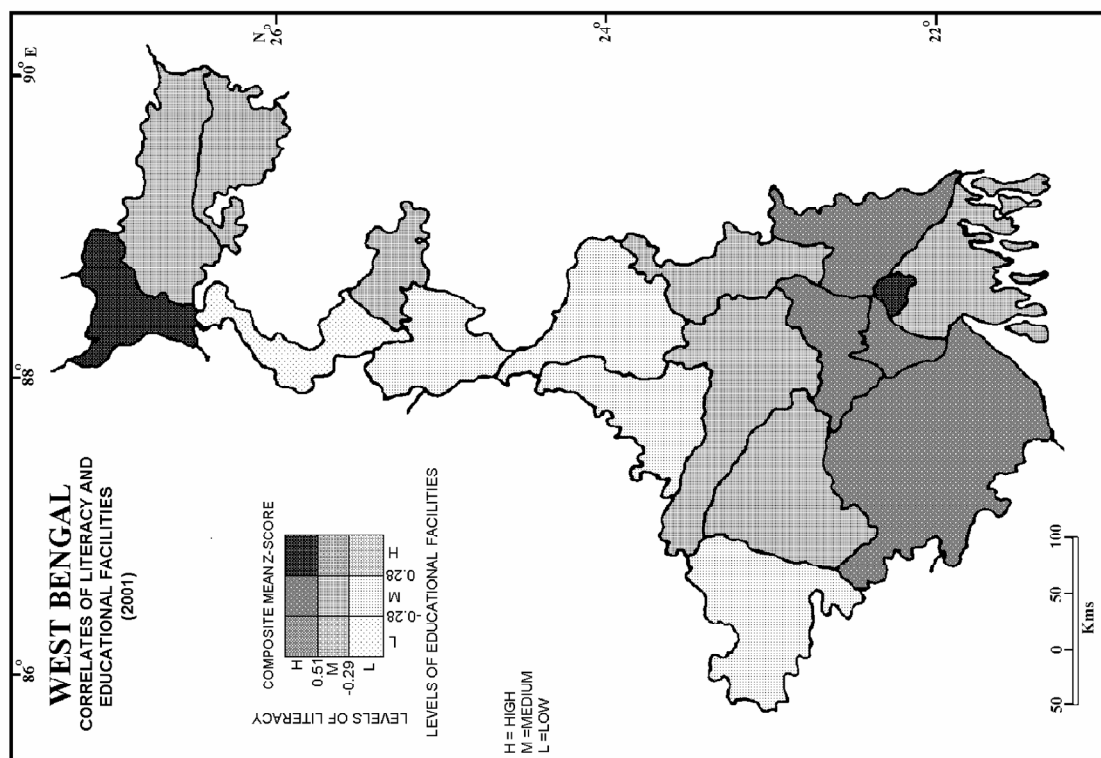


FIG. 5

districts (i.e. Jalpaiguri and South 24 Parganas) exhibit high level, medium level and low level of socio-economic development respectively. It is also interesting to note that not even a single district of low level of literacy lies in the high level of socio-economic development. The value of correlation (r) between literacy rate and socio-economic development is 0.127 at 16 degree of freedom.

Dimensions of Correlation and Levels of Significance

Finally an effort has been made to work out the simple associations of casual relationship between the dependent variables (variables of literacy rate) and independent variables (variables of educational facilities and socio-economic development). These have been symbolized and presented in table 5. Karl Pearson's correlation coefficient technique has been used to find out the relationship among them and the level of significance has been tested by employing student's 't' test technique.

It is observed that some factors number of primary schools per 100 sq.km. of area (X_2), number of Middle Schools per 100 sq.km. of area (X_4), number of High and Higher Secondary Schools per 100,000 persons (X_5), number of High and Higher Secondary Schools per 100 sq.km. area (X_6), number of colleges per 100,000 persons (X_7), number of colleges per 100 sq.km. area (X_8), Teacher-Student Ratio (X_{10}), Male work participation (X_{14}), Female work participation rate (X_{15}), percentage of workers in agriculture and cultivation (X_{16}), percentage of workers in registered factories (X_{18}), percentage of urban population (X_{19}), Density of metalled road (length per 100 sq.km), (X_{20}), Per capita income (X_{21}), number of commercial banks per 1,000 persons (X_{22}), number of hospitals per 100,000 persons (X_{23}) and number of hospital beds per 100,000

persons (X_{24}) are highly correlated with the literacy, and significant at 1 per cent, 2 per cent and 5 per cent levels of confidence. Among the 24 independent variables (socio-economic and educational factors), variable X_5 is correlated with dependent variables, Y_1 , Y_2 , Y_3 and Y_4 at 1 per cent level of significant, X_7 is correlated with Y_1 at 1 per cent level of significant, factor X_{19} is correlated with literacy variables Y_1 , Y_2 and Y_3 at 1 per cent level of significant. All are positively correlated indicating that with the increasing value of these factors literacy rate increases and vice-versa. While some factors like X_{10} , X_{11} , X_{13} , X_{15} , X_{16} , X_{17} and X_{23} , are inversely related to literacy which explain with increasing value of these factors literacy rate decreases and vice-versa. Female work participation rate, workers in agriculture and cultivation and workers in household industries appear to be responsible for low level of literacy. Understanding of such a type of relation among inter-related factors is very essential for those who are engaged in planning and development particularly the literacy.

Conclusion

The present study indicates that there exist a wide variety of regional imbalances and inequalities in literacy and the factors responsible for it. It is evident from the above analysis that the factors like work participation rate (X_{13}), female work participation rate (X_{15}) and workers in agriculture and cultivator (X_{16}) are the leading factors of the regional variation of literacy. While educational factors mainly high schools, higher secondary schools and degree colleges are the positive factors for improvement of literacy rate in the study region. It is also very much clear from the above analysis that the districts Uttar Dinajpur, Murshidabad and Birbhum are supposed to be backward in literacy consequent

Table 5

West Bengal: Correlation Coefficient (r) between Literacy and Factors (Socio-Economic and Educational Facilities), 2001

Independent Variables (Educational and Socio- Economic Facilities)	Dependent Variables (Literacy Rate)				
	Literacy Rate (Y ₁)	Male Literacy Rate (Y ₂)	Female Literacy Rate (Y ₃)	Rural Literacy Rate (Y ₄)	Urban Literacy Rate (Y ₅)
1	2	3	4	5	6
No. of Primary schools per 100,000 persons (X ₁)	-0.29968	-0.09263	-0.39497	-0.00064	-0.02661
No. of Primary schools per 100 sq.km. of area (X ₂)	0.513069***	0.429671	0.54159**	0.511063***	0.187314
No. of Middle schools per 100,000 persons (X ₃)	0.108767	0.14838	0.080478	0.136889	0.218824
No. of Middle schools per 100 sq.km. of area (X ₄)	0.582173**	0.493468***	0.610017*	0.400849	0.281628
No. of High and Higher Secondary schools per 100,000 persons (X ₅)	0.757634*	0.765907*	0.742002*	0.719172*	0.372203
No. of High and Higher Secondary schools per 100 sq.km. area (X ₆)	0.482502***	0.4028395	0.5111726***	0.5321601***	0.1704216
No. of colleges per 100,000 persons (X ₇)	0.588682*	0.542037**	0.585494**	0.433694	0.300201
No. of colleges per 100 sq.km. area (X ₈)	0.452684	0.37747	0.480124***	0.582518**	0.167092
School – Student Ratio (X ₉)	0.234504	0.055473	0.307602	-0.15045	-0.00279
Teacher-Student Ratio (X ₁₀)	-0.55333**	-0.66774*	-0.48501***	-0.57891**	-0.33721
% of NSA to total reporting area (X ₁₁)	-0.1853	-0.30612	-0.08033	-0.23223	0.08690

Contd

1	2	3	4	5	6
Cropping Intensity (GCA/NSA x100), (X ₁₂)	0.031307	-0.17143	0.149363	-0.05254	0.014228
Work Participation rate (X ₁₃)	-0.41806	-0.25793	-0.45707	-0.34732	-0.1284
Male work participation (X ₁₄)	0.461988	0.443866	0.489743***	0.415645	0.392595
Female work participation rate (X ₁₅)	-0.62042*	-0.44974	-0.67086*	-0.49346***	-0.27866
% of workers in agriculture and cultivation (X ₁₆)	-0.71808*	-0.59514*	-0.73819*	-0.50655***	-0.23521
% of workers in household industries (X ₁₇)	-0.33636	-0.45097	-0.33768	-0.24355	-0.7079
% of workers in registered factories (X ₁₈)	0.489433***	0.47794	0.469032***	0.551677**	0.255329
% of urban population (X ₁₉)	0.746686*	0.647853*	0.769436*	0.564721**	0.362967
Density of Metalled roads (length per 100 sq.km), (X ₂₀)	0.541194***	0.453248	0.571844**	0.538346***	0.21255
Per capita income (X ₂₁)	0.320655	0.333377	0.27925	0.559654**	0.176268
No. of commercial banks per 1,000 persons (X ₂₂)	0.500912***	0.445197	0.517276***	0.396089	0.174168
No. of hospital per 100,000 persons (X ₂₃)	-0.47765***	-0.29617	-0.56636**	-0.08971	-0.24205
No. of hospital beds per 100,000 persons (X ₂₄)	0.52130347***	0.47808178***	0.52713474***	0.33581484	0.22307177

Source: Computed and compiled by authors.

* 01 per cent level of significant. ** 02 percent level of significant. *** 05 per cent level of significant.

Note: GCA – Gross Cropped Area, NSA – Net Sown Area

upon the low educational and socio-economic status. The task of regional planners and policy makers is to make a comprehensive policy to reduce such regional imbalances. Any reduction in regional imbalances and inequalities may not be considered as an isolated objective. Indeed it calls for a co-ordinated action in various fields to counter-act the dynamics of socio-economic under-development on one hand and politic institutional framework on the other. This demands a collective effort. The state should provide sufficient amenities and facilities for socio-economic development and improvement in the level of literacy.

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