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Spatio-temporal Variation in Literacy among the Scheduled Caste Population: A Sub-divisional Scenario of Koch Bihar District, West Bengal, India

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ABSTRACT: Literacy is one of the vital qualitative factors for the improvement of a person as well as socio-economic development of human society. Literacy helps to acquire a higher social status through the process of social mobility. Being one of the most important key factors of socio-economic change, study of literacy pattern and its differential on gender of an area is very valuable. In India, a person aged 7 and above who can both read and write with proper understanding in any language has been considered as literate by the Indian Census. This paper attempt to show the spatio-temporal variation and gender disparity in literacy among scheduled caste population of rural and urban areas in Koch Bihar District of West Bengal. Scheduled castes have been identified as the backward groups of Indian society. In Koch Bihar district, there are 53% scheduled caste population to total population as per Indian Census, 2011. Literacy rate of total population is 75.49% which is slight less than state average (77.08%) but higher than country average (74.67%). In this district SC literacy rate is 73.56% (Male and Female literacy 80.67% and 58.04% respectively). Standard Score (Z-Score) and Sopher's Disparity Index (Kundu & Rao, 1986) has been employed in this study. Cartographic techniques such as maps and diagram have been applied for the depiction of result with the help of GIS Software.

Key words: Literacy, Scheduled Caste, Gender Disparity, Z- Score, Sopher's Index.

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I. INTRODUCTION

India is a land of unity in diversity according to Rabindranath Tagore, there is a wide diverse found in different sectors such as religion, race, culture and social group [1]. In Indian Caste system Scheduled Caste are recognized as backward, untouchables, impure and fifth caste [2]. Scheduled Caste is regionally backward in education, social aspect, and political participation and in the sector of employment opportunities than the other castes in Indian context [3]. Literacy is one of the vital qualitative factors for the improvement of a person as well as socio-economic development of human society [4] that ensure to acquire a higher social status and quality of life through the process of social mobility as it is directly proportional to overall skill development [5 & 6]. The United Nations Educational Scientific and Cultural Organization (UNESCO) has defined literacy as the, "ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying context. Literacy involves a process of learning to enable an individual to achieve his or her goals to develop his or her knowledge and potential and to participate fully in the wider society" [7]. Being one of the most important key factors of socio-economic change, study of literacy pattern and its differential on gender of an area is very valuable [8]. Many previous work shows that the positive impacts of education and literacy on population dynamics, health, child's education, maternal health as well as women empowerment in the developing countries [9]. In British rule the narrow growth in literacy was the result of faulty and neglected educational policy where the deprived sections such as scheduled caste and scheduled tribes were far distance from the educational opportunities [10 & 11]. Though after that Indian Government take many progressive strategies and policies for the development of literacy and educational status among Scheduled Caste and scheduled Tribes [12]. As a result the growth of literacy and educational status has been increased since 20th century [13]. Without education any human being as well as human society cannot be developed. For the proper development of the society both male and female have to educate [14]. Due to low degree of urbanization, low status of economic condition and political background, low development of transport and communication, lack of educational facilities [15], very few number of educational institutions, low status of women in society and standard of living are the factors which influence directly on the rate of

difference in literacy among male and female in rural and urban areas [16 & 17]. The developing countries of the world, of which India is a part, are characterized not only by low literacy rates but also by a great disparity in the literacy rates found in between urban and rural areas, between males and females and between young and the aged people [18]. Female literacy is one of the most prerequisite factors in one hand for reducing gender gap in all aspect and other hand it leads to women empowerment [19]. But the status of female literacy and education of the districts in West Bengal is not impressive and having a wide gender disparity which leads to spatial difference in literacy over the state [20]. The analysis of spatio - temporal variation and gender gap in literacy shows the areas of deficiency in education which can help the policy or planning makers to further development.

Objectives:

i) To discuss the temporal and spatial variation in literacy of different sub-divisions in Koch Bihar district.
ii) To show the sub-division wise gender disparity in literacy among Scheduled Caste population in rural and urban areas in the Koch Bihar District.

II. MATERIALS AND METHODS:

The present paper aims to study the sub-division wise gender disparity in rural and urban areas among scheduled caste population in Koch Bihar district. The entire paper has been completed with the help of secondary data which collected from District Census Handbook 2001 & 2011, Census of India 2001 & 2011.The essential cartographic techniques such as maps, diagrams and tables used with the help of GIS-Arc software. For the fulfilment of the study many parametric measures have been used such as –

i) Effective Literacy Rate: Effective Literacy Rate has been defined as the percentage of total number of literates among the population aged 7 years and above.

$$\textbf{Effective literacy rate} = \frac{(\textbf{Total number of literates aged 7 and above} \times 100)}{(\textbf{Population aged 7 and above})}$$

ii) Standard Score (Z-Score): To analyze the spatial distribution of gender gap in literacy standard score has been applied which is the sign number of standard deviations an observation or datum is above the mean. It is a dimensionless quantity that involves the varying means and varying standard deviations and therefore, it can be suitably used to examine the pattern of regional distribution of a variable [21]. Standard Score (Z-Score) has been calculated using the following formula-

$$\mathbf{Z} = \frac{(\mathbf{X} - \mathbf{Mean})}{\mathbf{Standard\ Deviation}}$$

Where,
X is the variable to be examined
In standard score analysis, a positive value specifies a datum above the sample mean, where a negative value shows the result a datum below the sample mean.

iii) Disparity Index: Sopher's Disparity Index (1974) is well accepted technique to measure the gender disparity in literacy between male and female.

$$\mathbf{DI_s} = \log \frac{X2}{X1} + log \frac{(100 - X1)}{(100 - X2)}$$

Where,
X1= Value of Deprived Group (Female)
X2= Value of Dominant Group (Male)

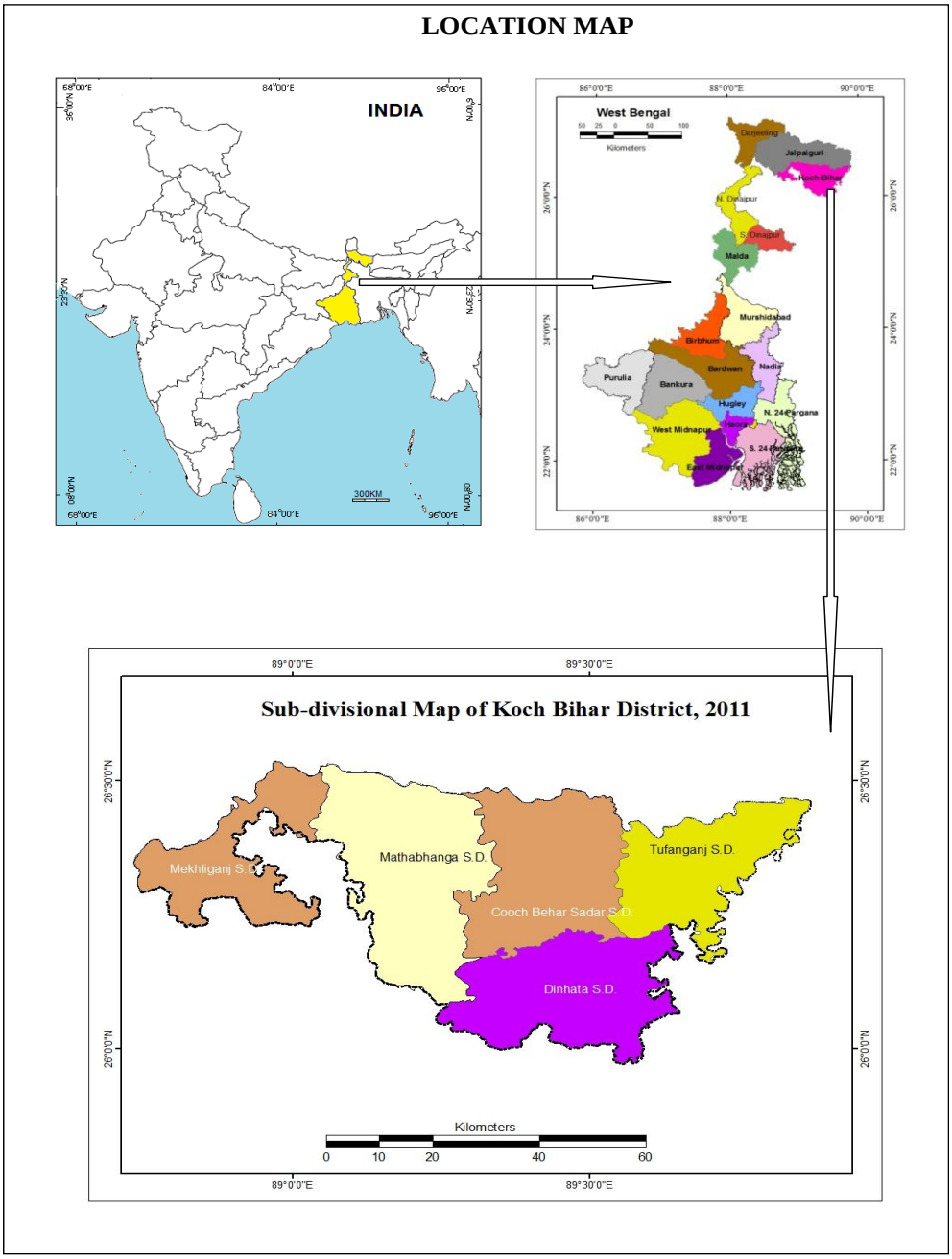
The index measures disparity between two groups in their possession of a particular property in terms of the logarithm of the odds ratio. The objective of taking log is to reduce the levelling off effect i.e. regions with higher literacy rate may show a lower level of disparity than the regions having lower level of literacy rate even though the gender gap is remain same for both region [22]. But this index fails to satisfy the additive monotony axiom [23]. The additive monotony axiom specifies that if a constant is added in all observations in a non-negative series, the inequality index must show the decline trend. The modified disparity index proposed by Kundu & Rao (1986) is-

$$\mathbf{DI_{KR}} = \log \frac{X2}{X1} + log \frac{(200 - X1)}{(200 - X2)}$$

This (Disparity Index by Kundu & Rao) method is most suitable to measure the inequality between two variables. The value of DI '0' means the perfect equality between two variables. Greater the value indicates higher gender inequality.

III. STUDY AREA

The Koch Bihar District (also known as Coochbehar or Cooch Behar) lies in the North Eastern part of the state of West Bengal. Geographically, Koch Bihar district is surrounded by Jalpaiguri district to the North and West, State of Assam (Kokrajhar and Dhubri districts) to the East and International Boundary with Bangladesh towards South, South-East and South-West. The location of the district is spread over from $26^0 10'$N to $26^0 30'$ N Latitude & $88^0 50'$ E to $89^0 40'$ E Longitude (Fig. 1). The district Koch Bihar in its present statute was formed by an agreement dated 28th August, 1948 declaring cessation of full and extensive authority, transfer of jurisdiction and power from the previous princely rulers of feudatory Cooch Behar State to the Dominion of India. The Transfer of administration from the monarchal rulers to that of Indian Union took place in 12th September, 1949 and few months later in 19th January, 1950 the present district Koch Bihar of the State of West Bengal was officially formed. The total geographical area of the district is 3387 sq. Km. According to 2011 census, the total population of the district is 2,819,086 having population density of 832 persons/ sq km. Koch Bihar (Cooch Behar) district has recorded the maximum concentration of scheduled caste population near about 52% among the different district of West Bengal. In the district, there are 1194 villages, out of these 62 villages are un-habituated and five sub-divisions namely Cooch Behar Sadar, Mekhliganj, Mathabhanga, Dinhata and Tufanganj.



V. ANALYSIS

5.1. Comparative Analysis of Scheduled Caste literacy with the State and National Average: Following table (Table - 1) shows the comparative analysis of SC literacy with Total literacy of Koch Bihar district with the context of State and National average (Fig. 2). It is found that the total literacy in India is about 74.4% where SC literacy is 66.07%. From this point of view it can be said that there is a wide difference in literacy rate between Scheduled Caste and Total population which is also found in case of State average.

Table – 1.

Region	Total Literacy (%)	SC Literacy (%)
India	74.4	66.07
West Bengal	77.02	69.43
Koch Bihar	75.49	73.56

Source: Calculated From DCHB, 2011

But in Koch Bihar district there is the more or less same literacy rate between Scheduled Caste (73.56%) and Total population (75.49%) because of Scheduled Caste population contributes 52% to total population (as per 2011 census) and they take all the Governmental facilities which provided for their development. Though mainly males are fully benefited by these, females are neglected which create the gender disparity in literacy and educational attainment.

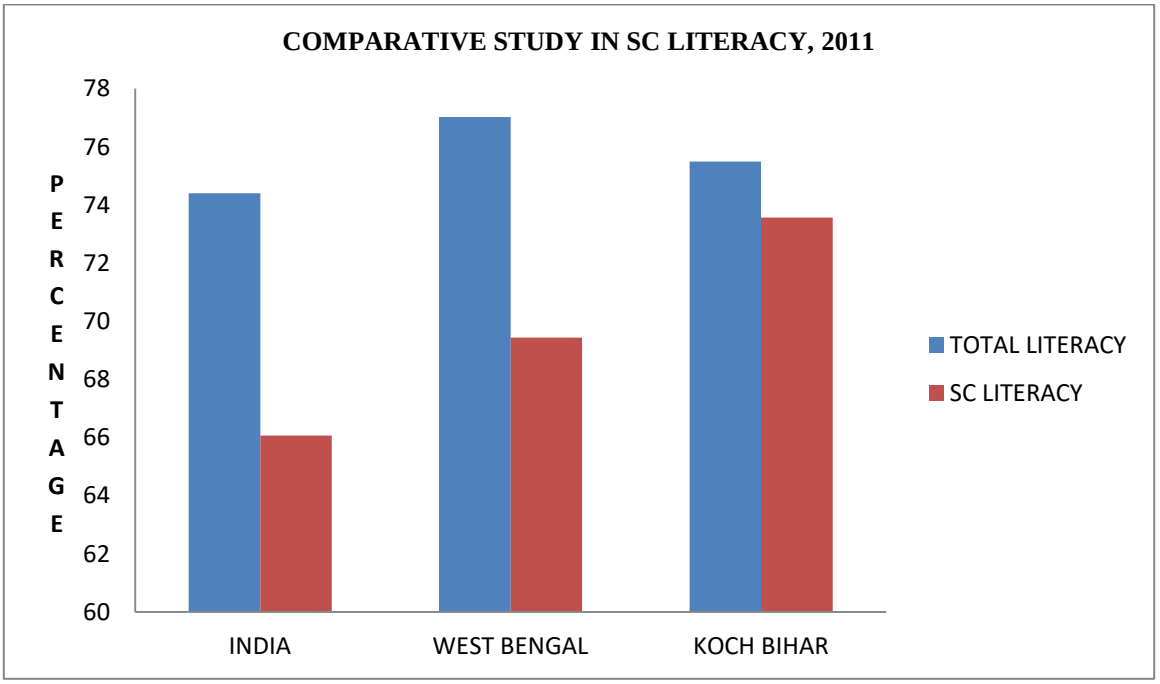


Figure - 2.

5.2. Spatio-temporal pattern of literacy of scheduled caste population in Koch Bihar District: Without analysis of literacy population geography will not be complete. It is very important in population geography to know the literacy pattern, variation and affecting different socio-economic factors of literacy in one region to another region [24]. Even within the same region or country literacy varies between rural and urban context among male and females, among different occupational groups and social castes .A large numbers of socio economic factors, such as nature of economy, levels of urbanization, standard of living, place of females in society, educational opportunities and levels of technological development influence the pattern of the literacy [25]. In the Koch Bihar district total literacy rate is 75.49% where Scheduled Caste literacy is 73.56% which is not very far from total literacy rate (Table-1). The temporal variation of Scheduled Caste literacy rate of different sub-division in Koch Bihar District was shown by table-2 (Fig. 3).

Table - 2

Sub Division	Sc Literacy Rate In %						increased from 2001 to 2011		
	2001			2011					
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Cooch Behar Sadar	68.04	79.46	56.61	80.22	84.68	70.98	12.18	5.22	14.37
Dinhata	61.46	72.66	50.26	77.31	77.51	64.15	15.85	4.85	13.89
Mekhliganj	60.84	73.79	47.88	72.5	78.31	62.46	11.66	4.52	14.58
Mathabhanga	60.69	73.59	47.8	77.46	79.15	63.1	16.77	5.56	15.3
Tufanganj	66.16	77.2	55.13	75.84	82.51	68.5	9.68	5.31	13.37

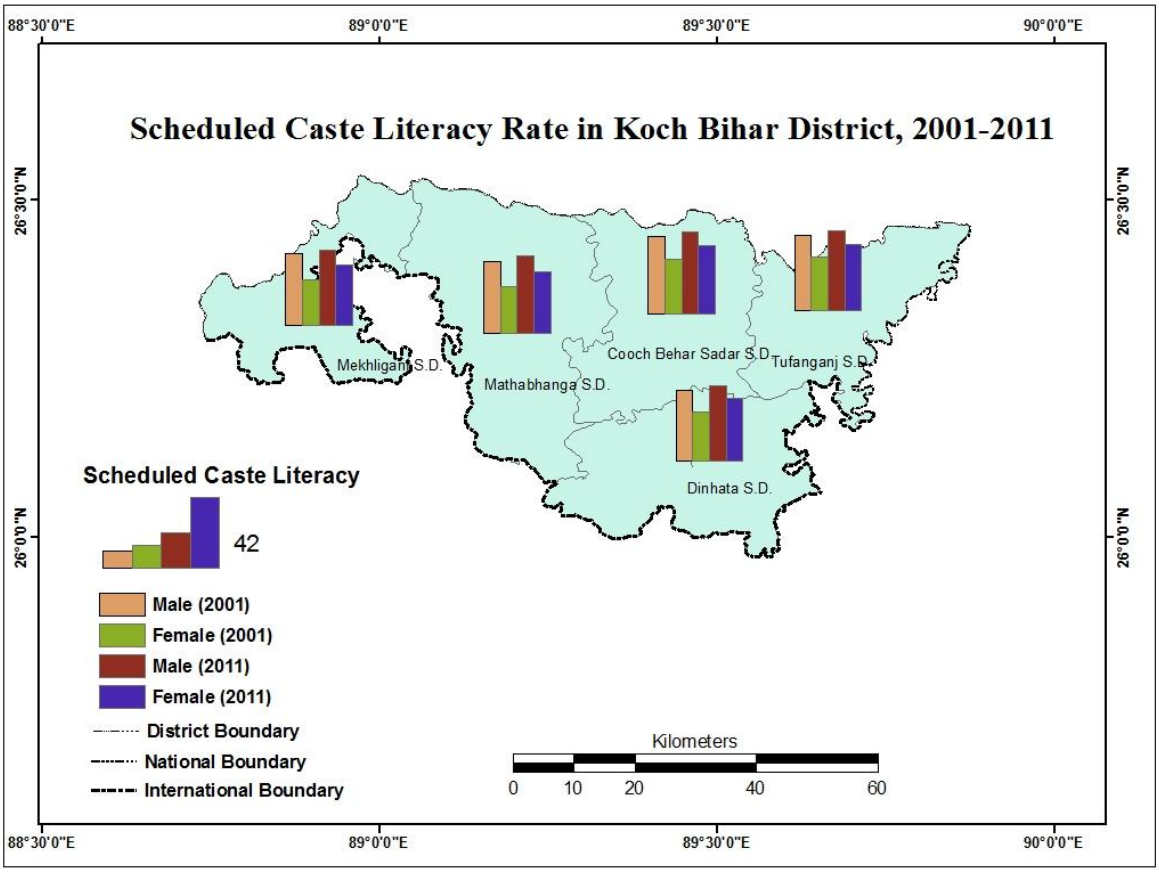


Figure-3

Source: Calculated From DCHB, 2001 & 2011

Scheduled Caste male literacy was highest in Cooch Behar Sadar sub-division i.e. 79.46% and 84.68% in 2001 & 2011 respectively. Lowest was Dinhata sub-division i.e. 72.66%, 77.51% in 2001 and 2011 respectively. Where female literacy rate was highest in Cooch Behar Sadar sub-divisions in 2001 and 2011 i.e. 57.61% and 70.98%. The increasing rate (2001 to 2011) in male and female literacy is found in Mathabhanga sub-division i.e. 5.56% and 15.3% (Table- 2). It can be obviously said that the progress line in literacy is very appreciate from 2001 to 2011. In every sub-division, the growth rate in literacy is near about 10% and above. The highest growth in total literacy is found in Mathabhanga sub-division (60.69% in 2001 to 77.46% in 2011) i.e. 16.77%. Male literacy rate in every sub-division is quiet good (highest literacy rate in Cooch Behar Sadar) and very nearer to the total male literacy rate, but in case of female literacy rate among the Scheduled Caste population is quiet far from total female literacy rate in every sub-division. Gender gap in every field is not good for the proper development which is very clearly seen to this study (Table – 3).

Table - 3

Sub-Divisions	Rural/Urban	Literacy Rate In % (2011)			Gender Gap	Urban-Rural Difference	
		Persons	Male	Female		Literacy	Gender Gap
Cooch Behar Sadar	Total	80.22	86.13	74.22	11.91	6.22	4.81
	Rural	77.11	84.26	69.95	14.31		
	Urban	83.33	87.99	78.49	9.5		
Dinhata	Total	77.31	82.73	71.89	10.84	13.32	5.23
	Rural	70.65	77.38	63.92	13.46		
	Urban	83.97	88.08	79.85	8.23		
Mekhliganj	Total	72.5	79.48	65.53	13.95	4.98	4.41
	Rural	70.01	78.09	61.94	16.15		
	Urban	74.99	80.86	69.12	11.74		
Mathabhanga	Total	77.46	83.96	70.95	13.01	12.99	6.26
	Rural	70.96	79.03	62.89	16.14		
	Urban	83.95	88.89	79.01	9.88		
Tufanganj	Total	75.84	80.38	71.28	9.1	8.41	4.01
	Rural	71.63	75.17	68.08	7.09		
	Urban	80.04	85.59	74.49	11.1		

Source: Source: Calculated From DCHB, 2011

5.3. Rural – Urban Variation in Scheduled Caste Literacy in Koch Bihar District, 2011: As per 2011 census the total population of Koch Bihar District is 2819086 where 2,529,652 (89.73 %) is rural and 146,626 (10.27 %) is urban in nature. Scheduled Caste population comprise 50.17% to total population in the district who are most deprived section in our society. Though there are many sub-castes of Scheduled Caste are found in Koch Bihar district, Rajbanshi (enlisted as Scheduled Caste in West Bengal) is the leading which comprise 37.72% to total population. The average sex ratio of the district is 942 where Scheduled Caste sex ratio is 941 female per 1000 male (Census of India, DCHB, 2011). There is a wide variation in sex ratio among Scheduled Caste population between rural and urban areas i.e. 939 and 974 respectively (Census of India, 2011).

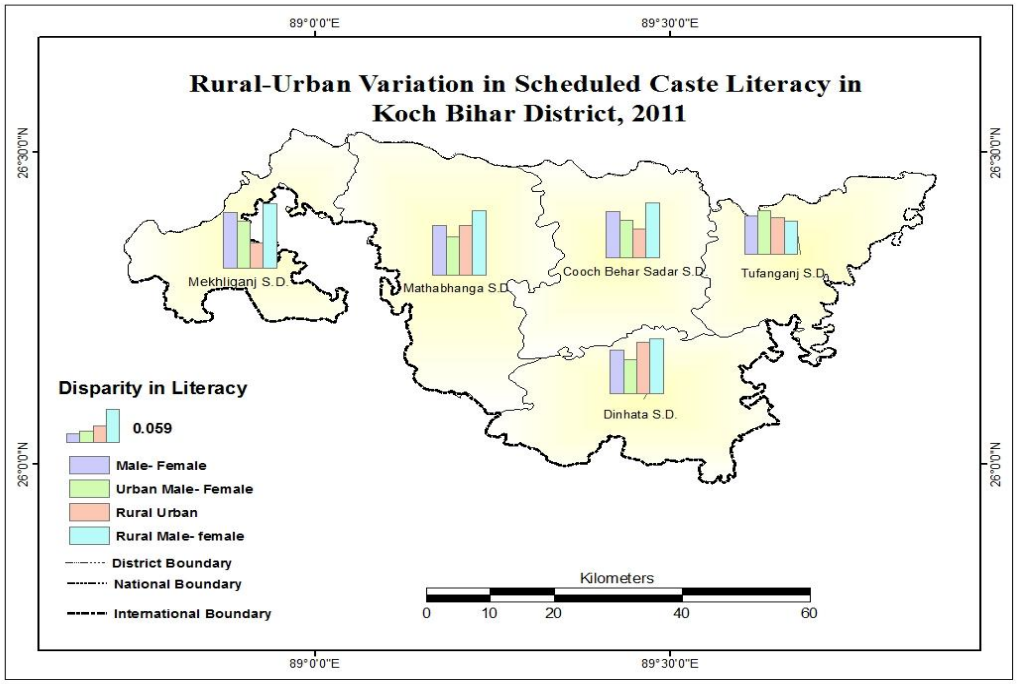


Figure-4

Scheduled Caste Literacy rate of Koch Bihar District is 73.56% (Table-1) which is higher to the state average i.e. 69.43% (Table- 1) though the total literacy rate of Koch Bihar District is 75.49% (Table-1) which is lower to the state average i.e. 77.02% (Table-1). The SC male literacy rate of the district is 80.67% and the female literacy rate is 66.01% (Census of India, 2011). Literacy rate of the district is higher in urban areas (82.23%) and comparatively lower in rural (55.15%) areas. In Koch Bihar district among the five sub-divisions the difference in literacy rate between urban and rural areas highest in Dinhata (13.32 %, Table- 3) followed by Mathabhanga (12.99%, Table-3) and lowest in Mekhliganj Sub-division (4.98%, Table - 3) followed by Tufanganj Sub-division (8.41%, Table-3). The rural-urban difference in gender gap (Fig. 4) depicts the inequality in literacy rate between male and female population in rural and urban areas (Table-3). The highest gender gap is found in Mathabhanga (6.26%) followed by Dinhata (5.23%), Cooch Behar Sadar (4.81%), Mekhliganj (4.41%) and Tufanganj (4.01%). (Table - 3).

Gender gap in literacy is the difference between male and female in terms of literacy rate which is found in the table - 4.by using the Standard Score (Z- Score) which is a dimensionless quantity involves the varying mean and standard deviation. The Z- Score shows (Table - 4) the average gender gap in literacy of different sub-divisions of Koch Bihar district as per 2011 census. From the table-4 it is found that three sub-divisions namely Mekhliganj (1.158), Mathabhanga (0.660) and Cooch Behar Sadar (0.078) have scored above the mean which states the gender disparity in literacy is higher in these sub-divisions. Dinhata (-0.488) and Tufanganj (-1.408) is below the datum which interpret the gender disparity is comparatively low in these two sub-divisions (Table-4).

Table - 4

Sub Divisions	Average Gender Gap In Literacy(Xi)	Z- Score
Cooch Behar Sadar	11.91	0.078
Dinhata	10.84	-0.488
Mekhliganj	13.95	1.158
Mathabhanga	13.01	0.660
Tufanganj	9.1	-1.408
Mean	11.762	
SD	1.89	

Source: Source: Calculated From DCHB, 2011

But in case of rural areas (Table-5) it is found that four sub-divisions have the Z- Score above the mean i.e. Cooch Behar Sadar (0.236), Mekhliganj (0.729), Mathabhanga (0.727) and Dinhata (0.008) which means the gender gap in literacy is above the datum (Fig. 5). On the other hand only one sub-division (Tufanganj, -1.700) has score negative means lower the gender disparity in literacy (Table-5).

Table - 5

Sub Divisions	Rural Gender Gap In Literacy(Xi)	Z- Score
Cooch Behar Sadar	14.31	0.236
Dinhata	13.46	0.008
Mekhliganj	16.15	0.729
Mathabhanga	16.14	0.727
Tufanganj	7.09	-1.700
Mean	13.43	
SD	3.73	

Source: Source: Calculated From DCHB, 2011

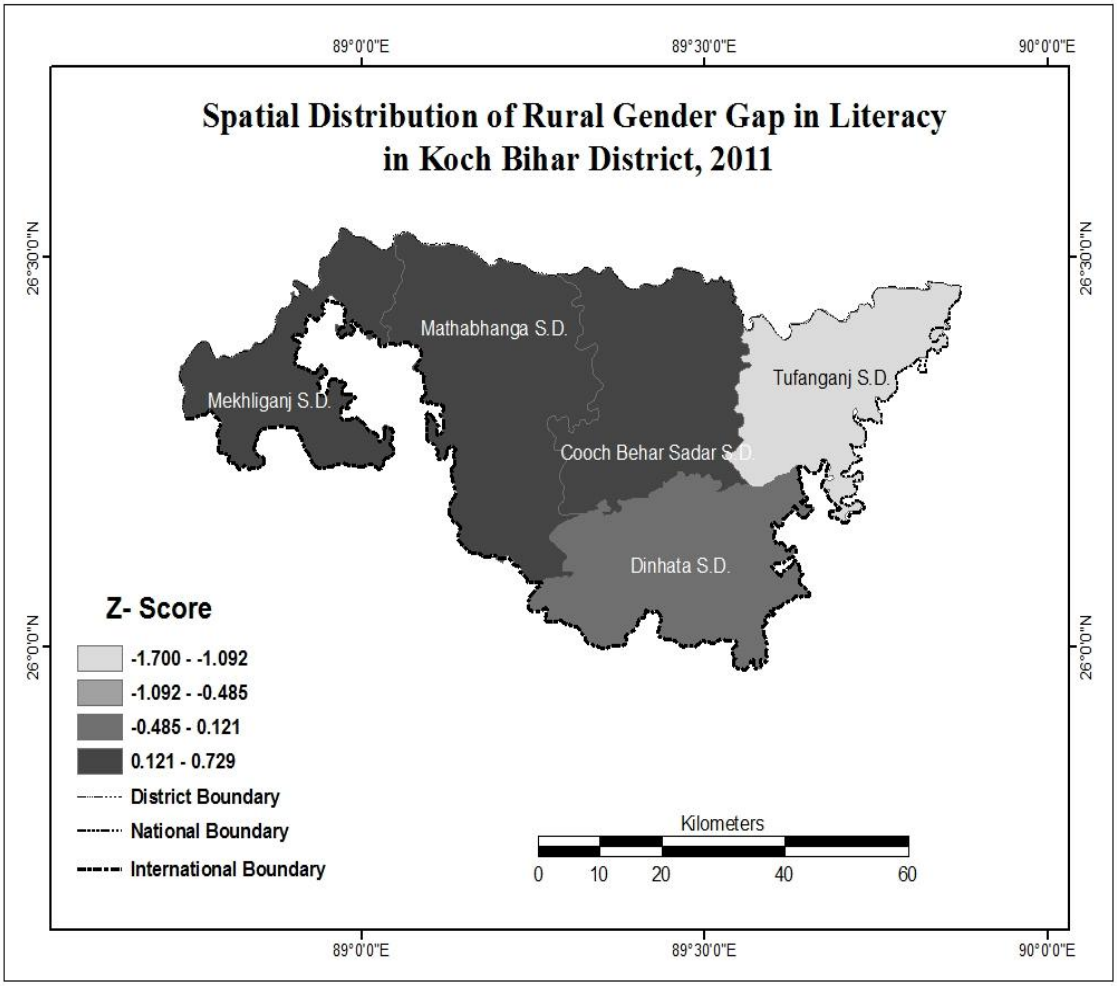


Figure- 5

In urban areas (Fig. 6) the condition is comparatively less good; two sub-divisions i.e. Mekhliganj (1.196) and Tufanganj (0.732) have scored of positive that means the gender disparity is high in literacy above the mean value. Remaining three sub-divisions namely Cooch Behar Sadar (-0.428), Dinhata (-1.348) and Mathabhanga (-0.152) scored of negative which indicates the gender disparity in terms of literacy is comparatively less in urban areas (Table-6).

Table – 6

Sub Divisions	Urban Gender Gap In Literacy(Xi)	Z Score
Cooch Behar Sadar	9.5	-0.428
Dinhata	8.23	-1.348
Mekhliganj	11.74	1.196
Mathabhanga	9.88	-0.152
Tufanganj	11.1	0.732
Mean	10.09	
SD	1.38	

Source: Source: Calculated From DCHB, 2011

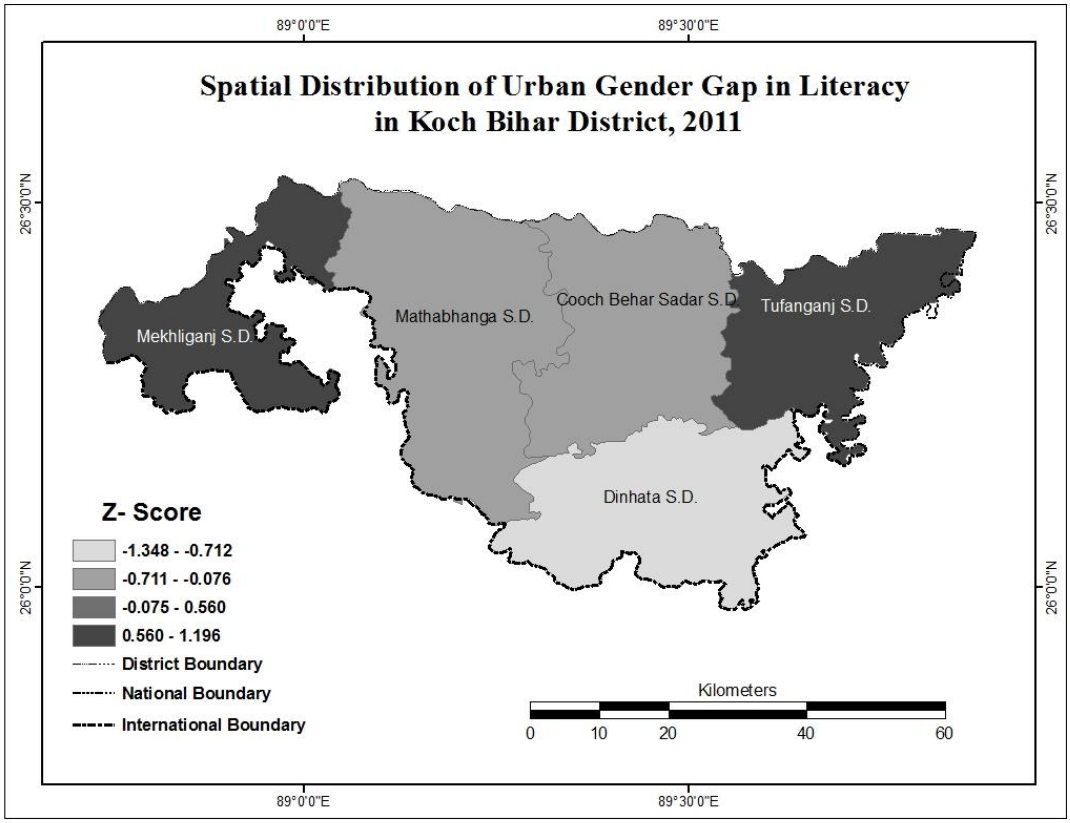


Figure-6

This analysis depicts that Cooch Behar Sadar and Dinhata perform better position in terms of average, male, female literacy which is good for proper gender development as well as society development. On the other hand Mekhliganj sub-division is on very critical situation in terms of female literacy which is not suitable for overall development. In terms of rural-urban disparity in literacy Dinhata (0.093) ranked first followed by Mathabhanga (0.091) while remaining three sub-divisions i.e. Cooch Behar Sadar (0.052), Mekhliganj (0.047) and Disparity Index (Kundu & Rao) shows the relative disparity in terms of literacy among male and female in both rural and urban areas of different sub-divisions of Koch Bihar district (Fig. 5 & 6) (Table-7). Generally in rural areas is experienced higher gender disparity in literacy because of lower attention on education of girl's children, low parental income and lower educational attainment of parents who gave more emphasis on their son child.

Table – 7

Sub-Divisions	Average Literacy Rate		Disparity Index	Rural-Urban Literacy Rate		Disparity Index
	Female(X1)	Male(X2)		Rural(X1)	Urban(X2)	
Cooch Behar Sadar	74.22	86.13	0.083	77.11	83.33	0.052
Dinhata	71.89	82.73	0.079	70.65	83.97	0.093
Mekhliganj	65.53	79.48	0.101	70.01	74.99	0.047
Mathabhanga	70.95	83.96	0.091	70.96	83.95	0.091
Tufanganj	71.28	80.38	0.070	71.63	80.04	0.066

Source: Source: Calculated From DCHB, 2011

In the table-8 the highest gender disparity in literacy in both rural and urban areas found in Mekhliganj sub-division (0.118, 0.086) followed by Mathabhanga (0.117, 0.070) and lowest is on Tufanganj sub-division (0.060) in rural areas and Dinhata (0.061) in urban areas. It is very interesting thing that in Mekhliganj sub-division, both in rural and urban gender disparity is high but in case of rural-urban disparity is very low (0.047) (Table-7).

Table - 8

Sub-Divisions	Rural Literacy Rate		Disparity Index	Urban Literacy Rate		Disparity Index
	Female(X1)	Male(X2)		Male(X1)	Female(X2)	
Cooch Behar Sadar	69.95	84.26	0.099	78.49	87.99	0.068
Dinhata	63.92	77.38	0.100	79.85	88.08	0.061
Mekhliganj	61.94	78.09	0.118	69.12	80.86	0.086
Mathabhanga	62.89	79.03	0.117	79.01	88.89	0.070
Tufanganj	68.08	75.17	0.060	74.49	85.59	0.079

Source: Source: Calculated From DCHB, 2011

IV. CONCLUSION

The literacy rate among the Scheduled Caste population in Koch Bihar district is continuous increasing decade by decades. It is found that, there is a wide variation between the increasing trend of literacy on urban and rural areas. Rural areas are comparatively backward in literacy than the urban areas. It is interesting to know that, in Mekhliganj block difference of total literacy rate between urban and rural areas are not so far and same in case of male literacy rate in urban and rural context but there is a wide difference in female literacy between urban and rural areas. Gender disparity in literacy is very familiar to the all sub-division in Koch Bihar district but some having more and some sub-divisions having less disparity. Gender disparity creates different social, economic, political as well societal problems to the overall development. In present situation the female literacy rate is growing upward with the better implementation of Governmental educational policies, programmes and reservation schemes also which is well for acquire a higher social position as well as socio economic development.

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