Spatial Disparity in Education and Medical Facilities: A Case Study of Barddhaman District, West Bengal, India

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Abstract—The economic scenario of any region does not show the real picture for the measurement of overall development. Therefore, economic development must be accompanied by social development to be able to make an assessment to measure the level of development. The spatial variation with respect to social development has been discussed taking into account the quality of functioning of a social system in a specific area. In this paper, an attempt has been made to study the spatial distribution of social infrastructural facilities and analyze the magnitude of regional disparities at inter- block level in Barddhman district. It starts with the detailed account of the selection process of social infrastructure indicators and describes the methodology employed in the empirical analysis. Analyzing the block level data, this paper tries to identify the disparity among the blocks in the levels of social development. The results have been subsequently explained using both statistical analysis and geo spatial technique. The paper reveals that the social development is not going on at the same rate in every part of the district. Health facilities and educational facilities are concentrated at some selected point. So overall development activities come to be concentrated in a few centres and the disparity is seen over the blocks.

Keywords—disparity, inter-block, social development, spatial variation.

I. INTRODUCTION

THE term development in spatial context refers to the development in the quality of functioning of a regional system. A regional system is a set of mutually integrated regions where the whole is related to the part in the same way as the part is related to the whole. The broad parameters of quality of functioning of a regional system could include the regional economic growth, social development, trends in the political system, environmental preservation, etc. Keeping in view such parameters, the concept of development is both area specific and time specific. It implies that the concept of development may vary from area to area also from time to time in the same area [3]. Imbalances in the level of development in different regions are mainly due to the allocation of facilities without considering the corresponding population size [4]. Social development mainly depends on the availability and quality of local infrastructural facilities. Bhatia [1], Wanmali and Islam [10] and Majumder [7] observe that there is a relationship between infrastructure and development. Development activities come to be concentrated

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in a few centres. These centres grow so rapidly that it accentuates the inequality within the areas as well as regions [8]. In the context of a high rate of growth of the development that goes side by side with rising inter-state as well as inter-regional inequality, developmental facilities are distributed unequally leading to differential levels of development across the regions. Such unchecked and uncontrolled process of growth leads to regional disparities [9]. The balanced development can be achieved if selfless efforts are made by the local political parties, the government and policy makers.

II. OBJECTIVE

The main objectives of the study are
- To analyze the spatial distribution of social facilities at the block level.
- To identify regional disparities and its magnitude at inter-block level based on social development Index.

III. STUDY AREA

In this context, this study focuses on the district of Barddhman, which is an important district of West Bengal in terms of the contribution to the state gross domestic product and both sectors - Agriculture and Industry contribute significantly to state and nation. Barddhman district is a comparatively developed district in West Bengal. Still certain parts of Barddhman district are backward. Analyzing block level data, this paper tries to identify the disparity among the blocks in the levels of social development. A review of the studies on the issue of regional disparities reveals that most of the studies are based on broad area and restrained from the study at the smallest unit like block level in the district. So here we have taken the 31 Community Development (CD) Blocks of Barddhman district. The blocks have been chosen as the unit area of the study. Municipal Corporation and Municipalities have been excluded from the study because these urban units consist only urban population whereas blocks consist both rural and urban population. The work is an attempt to examine the spatial distribution of facility-utility services and inter-block disparities in levels of social development of Barddhman district.

The present study is based on secondary sources of data obtained from District Statistical Handbook, Barddhman, West Bengal and Census of India [2]. The blocks have been chosen as the unit area of the study. In order to find out the regional disparities in the social development in the district, 12

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variables were taken, out of which eight were from educational sector and four from the health sector. Social Development Index technique has been applied to find out regional disparities in the levels of social development in the study area. Realizing the importance of formulating a composite index of social development, different statistical methods have been used.

IV. SELECTED INDICATORS

To find the nature and degree of social disparities in the blocks of Barddhaman district of West Bengal the following social indicators have been used-

X1: Primary Schools per hundred square kilometer area
X2: Primary schools per lakh of population
X3: Middle schools per hundred square kilometer area
X4: Middle schools per lakh of population
X5: High schools per hundred square kilometer area
X6: High schools per lakh of population
X7: Higher secondary schools per hundred square kilometer area
X8: Higher secondary schools per lakh of population
X9: Medical institutions per hundred square kilometer area
X10: Medical institutions per lakh population
X11: Beds available in medical institutions per lakh of population
X12: Number of doctors per lakh of population

V. METHODOLOGY

The Social Development Index (SDI) can be calculated by using the following formula (Range Equalization Method or Relative Distance Method [6]

Let X_{ij} represent the value of the ith development indicator in j^{th} blocks, (i = 1, 2, 3… 12; j = 1, 2, and 3… 31). Let us write

$$Y_{ij} = \frac{XIJ - Minj\ Xij}{Maxj\ Xij - Minj\ Xij}$$

where, $Min_j\ X_{ij}$ and $Max_j\ X_{ij}$ are the minimum and maximum of X_{ij} respectively. Therefore, Social Development

Index (SDI) for j-th Blocks= $\dfrac{\sum_{i=1}^{n} I_{ij}}{n}$.

VI. RESULTS AND FINDINGS

A. Measuring the Levels of Social Development

Economic opportunities promote growth and social opportunities and add to the quality of life of the people that leads to overall development of the region. For analyzing the level of development, one cannot rely upon any single indicator. For social development, education and health play an important role in the process of development. There are number of factors used for measuring regional disparities. But, based on availability of data the present study used twelve variables as mentioned earlier, to measure the regional disparities in the level of development in the study area. Hence, an area having better facilities may carry on its development more effectively. These variables are broadly divided into of two groups: education and health.

B. Education

Regional disparities in the levels of educational development have been measured on the basis of eight variables of educational facilities identifying with symbolic nomenclature X1 to X8. It is observed from Table I.A that, there exist wide regional disparities in educational development in the district. Table I.A reveals that, highest development index i.e. 0.656 of educational development is scored by Andal block while lowest, i.e. 0.222 is in Pandeswar block.

TABLE I.A
RANK AND DEVELOPMENT INDEX OF EDUCATIONAL FACILITIES

Rank	School Development Index	CD Blocks	Rank	School Development Index	CD Blocks	Rank	School Development Index	CD Blocks
1	0.656	Andal	11	0.456	Monteswar	21	0.383	Ketugram-II
2	0.561	Purbasthali-I	12	0.444	Purbasthali-II	22	0.376	kanksa
3	0.554	Barddhaman -II	13	0.436	Barddhaman -I	23	0.368	Jamuria
4	0.553	Raina-II	14	0.433	Raina-I	24	0.349	Galsi-I
5	0.504	Jamalpur	15	0.432	Barabani	25	0.338	Salanpur
6	0.495	Galsi-II	16	0.423	Ketugram-I	26	0.319	Ausgram-I
7	0.485	Khandaghosh	17	0.419	Kalna-II	27	0.318	Bhatar
8	0.484	Raniganj	18	0.413	Memari-I	28	0.308	Mongalkote
9	0.479	Katwa-II	19	0.397	Kalna-I	29	0.298	Katwa-I
10	0.474	Memari-II	20	0.394	Ausgram-II	30	0.235	Faridpur-Durgapur
						31	0.222	Pandabeswar

TABLE I.B
LEVEL OF DEVELOPMENT OF DIFFERENT BLOCKS OF BARDDHMAN EDUCATIONAL FACILITIES

Level	CD Blocks
High (>.469)	Andal, Purbasthali-I, Barddhaman -II, Raina-II, Jamalpur, Galsi-II, Khandaghosh, Raniganj, Katwa-II, Memari-II
Medium (.372-.469)	Monteswar, Purbasthali-II, Barddhaman -I, Raina-I, Barabani, Ketugram-I, Kalna-II, Memari-I, Kalna-I, Ausgram-II, Ketugram-II, Kanksa
Low (<.372)	Jamuria, Galsi-I, Salanpur, Ausgram-I, Bhatar, Mongalkote, Katwa-I, Faridpur-durgapur, Pandabeswar

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Table I.B shows that the blocks of high level of educational development (above 0.469) category are Andal, Purbasthali-I, Barddhaman II, Raina-II, Jamalpur, Galsi-II, Khandaghosh, Raniganj, Katwa-II, Memari II which lie in the Southern part of the district (Fig. 1). With development index ranging from 0.372-0.469 are the medium level of development on education, twelve blocks i.e. are Monteswar, Purbasthali-II, Barddhaman -I, Raina-I, Barabani, Ketugram-I, Kalna-II, Memari-I, Kalna-I,Ausgram-II, Ketugram-II, Kanksa falling under the medium level of educational development. Remaining ten blocks, i.e. Jamuria, Galsi-I, Salanpur, Ausgram-I, Bhatar, Mongalkote, Katwa-I, Faridpur-Durgapur, Pandabeswar with development index below 0.372 are categorized under the lower level of educational development,

lie in two different parts, i.e. middle and some western part of the district. Unplanned allocation of educational institution in accordance with the size of population of settlements attributed to the lower level of educational development in the region.

C. Health

Regional inequalities in the level of health development have been analyzed based on four variables of healthcare facilities ($X8$ to $X12$). It is observed from the Table II.A that the highest development index of health development is recorded by Andal (0.869) while the lowest is in Barddhaman I (0.039).
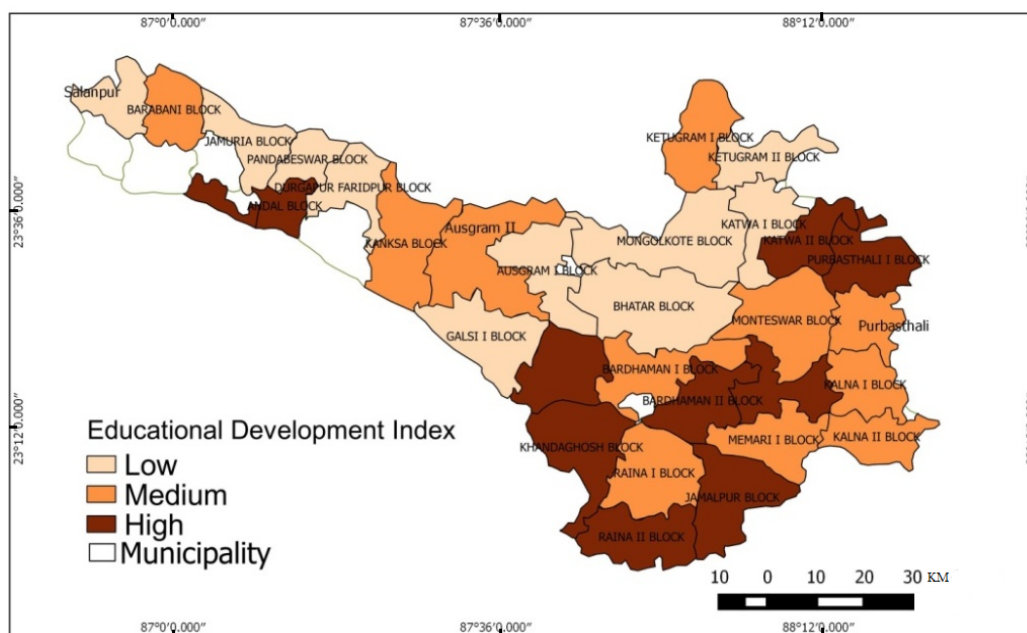

Fig. 1 Block-Wise Educational Facilities, 2011-12 [5]

TABLE II.A
RANK AND DEVELOPMENT INDEX OF HEALTH FACILITIES

Rank	Health Development Index	CD Blocks	Rank	Health Development Index	CD Blocks	Rank	Health Development Index	CD Blocks
1	0.869	Andal	11	0.201	Raina I	21	0.127	Kalna-I
2	0.804	Raniganj	12	0.197	Bhatar	22	0.125	Katwa-I
3	0.687	Salanpur	13	0.183	Kalna-II	23	0.106	Jamalpur
4	0.389	Barabani	14	0.173	Memari-II	24	0.105	Barddhaman -II
5	0.353	Jamuria	15	0.16	Purbasthali-II	25	0.104	Katwa-II
6	0.247	Raina-II	16	0.159	Faridpur-Durgapur	26	0.101	Khandaghosh
7	0.234	Kanksa	17	0.145	Ketugram-II	27	0.098	Galsi-II
8	0.232	Ausgram-I	18	0.138	Mongalkote	28	0.091	Monteswar
9	0.224	Ausgram-II	19	0.137	Purbasthali-I	29	0.077	Ketugram-I
10	0.213	Galsi-I	20	0.129	Memari-I	30	0.041	Pandabeswar
						31	0.039	Barddhaman -I

TABLE II.B
LEVEL OF DEVELOPMENT OF DIFFERENT BLOCKS OF BARDDHMAN IN MEDICAL FACILITIES

Level	CD Blocks
High (>0.325)	Andal, Salanpur, Raniganj, Barabani, Jamuria,
Medium (0.120-0.325)	Kanksa, Ausgram-I, Ausgram-II, Galsi-I, Raina-I Bhatar, Kalna-II, Memari-II, Purbasthali-II, Faridpur-Durgapur, J Ketugram-II, Mongalkote, Purbasthali-I, Memari-I, Kalna-I, Katwa-I, Raina-II
Low (<0.120)	Jamalpur, Barddhaman -II, Katwa-II, Khandaghosh, Galsi-II, Monteswar, Ketugram-I, Pandabeswar Barddhaman -I

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Table II.B shows the level of development in different blocks of Barddhman and it can be seen that high development index of more than 0.325 is seen in five blocks, i.e. Andal, Salanpur, Raniganj, Barabani, Jamuria where health care facilities are high. It is mainly concentrated in western part of the district (Fig. 2). This group of blocks enjoys an advantage of location of being industrial headquarter and mining headquarter respectively and are having different types of good medical facilities, moreover, good connectivity with means of transportation and communication facility has also helped them.

Good connectivity by means of transportation and communication has made easy accessibility to the available medical facilities. These are the causative factors of high level of health development in this area. The blocks with development index ranging 0.120-0.325 are categorized under the medium level of health development. It consists of seventeen blocks of the district which are, Kanksa, Ausgram-I, Ausgram-II, Galsi-I, Raina-I, Bhatar, Kalna-II, Memari-II, Purbasthali-II, Faridpur-Durgapur, Ketugram-II, Mongalkote, Purbasthali-I, Memari-I, Kalna-I, Katwa-I, Raina-II. Low level of health development (below 0.120) comprises nine blocks of the district i.e., Jamalpur, Barddhaman II Katwa-II, Khandaghosh, Galsi-II Monteswar Ketugram-I Pandabeswar, Barddhaman - I. Government's allocation of medical facility is not sufficient enough to meet the demand of growing population which led to the gradual declining of the level of health development in these blocks.
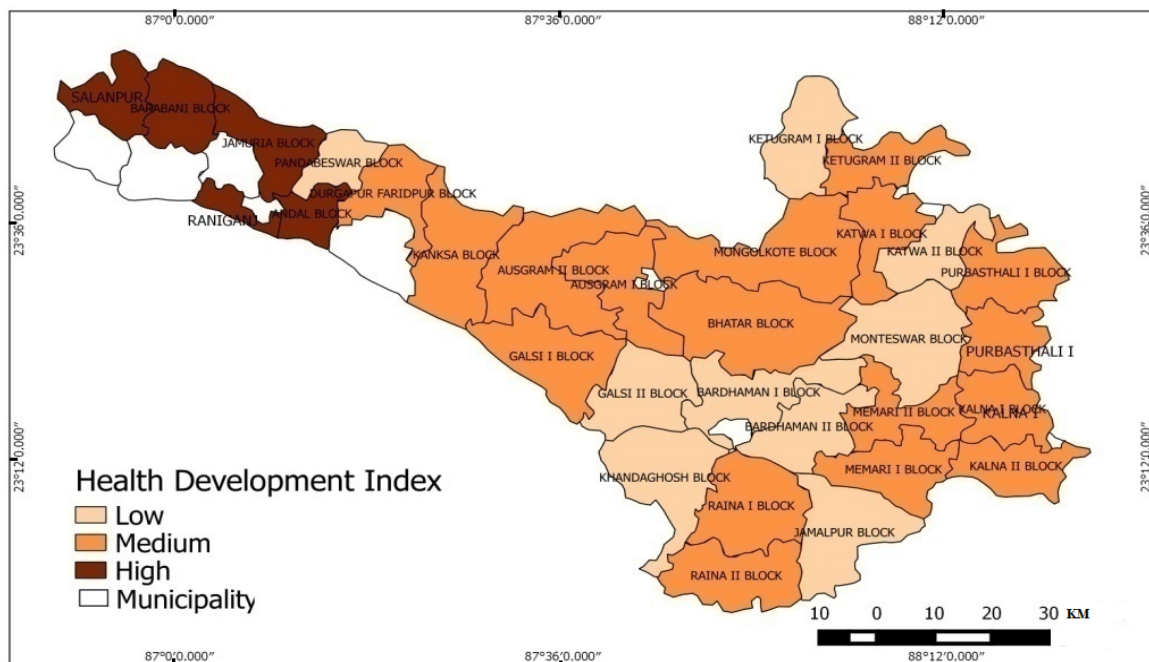

Fig. 2 Block-Wise Health Facilities, 2011-12 [5]

VII. OVERALL SOCIAL DEVELOPMENT

In order to find out the overall development, all the above mentioned indicators have been clubbed together to find out the composite index for over all development. The overall development is more useful because it gives emphasis on the many variables (i.e. X1, X2 … X12). The index of overall development of each unit (block) of the district has been estimated. Blocks of the district have been grouped into three levels of overall development on the basis of their development index.

Table III.A shows the rank of Blocks as per the score of social development index. Andal holds the first position among the thirty one blocks and Pandabeswar lies at the bottom position in the rank table. Table III.A reveals that, the highest development index of 0.727 in overall development is achieved by Andal block, followed by blocks Raniganj (0.591), and Salanpur (0.454). The lowest overall Development index of 0.161 is attained by Pandabeswar block. The magnitude of inter blocks disparity in terms of development of educational and health care facilities in the district is quite high (C.V=29.70).

Table III.B reveals that seven blocks of the study region with development index more than 0.405 are categorized under a high level of overall development. Andal, Raniganj, Salanpur, Barabani located in western part, are all located near Asansol- Durgapur industrial belt, having a number of socio-economic facilities, centres of business and commerce and good accessibility by means of transportation and communication are the multiplier effects for high level of overall development.

The overall development index ranging from 0.302 to 0.40 (Table III.B) are areas of medium level of overall development. Seventeen blocks of the district show medium level overall development i.e. Memari-II, Jamalpur, and Jamuria. Fig. 3 shows that this region spreads from south western part to south eastern part. High density of population,

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less availability of educational, and medical facilities have put them under medium level of development.

TABLE III.A
RANK AND OVERALL DEVELOPMENT INDEX OF SOCIAL FACILITIES

Rank	CD Blocks	Overall Development Index	Rank	CD Blocks	Overall Development Index	Rank	CD Blocks	Overall Development Index
1	Andal	0.727	11	Galsi-II	0.361	21	Ketugram-I	0.307
2	Raniganj	0.591	12	Khandaghosh	0.357	22	Kalna-I	0.306
3	Salanpur	0.454	13	Raina-I	0.356	23	Barddhaman -I	0.304
4	Raina-II	0.451	14	Katwa-II	0.354	24	Galsi-I	0.303
5	Purbasthali-I	0.42	15	Purbasthali-II	0.349	25	Ketugram-II	0.299
6	Barabani	0.418	16	Kalna-II	0.34	26	Ausgram-I	0.291
7	Barddhaman -II	0.405	17	Ausgram-II	0.338	27	Bhatar	0.278
8	Memari-II	0.374	18	Monteswar	0.335	28	Mongalkote	0.251
9	Jamalpur	0.372	19	Kanksa	0.334	29	Katwa-I	0.24
10	Jamuria	0.363	20	Memari-I	0.318	30	Faridpur-Durgapur	0.21
						31	Pandabeswar	0.161

TABLE III.B
LEVEL OF OVERALL SOCIAL DEVELOPMENT OF DIFFERENT BLOCKS OF BARDDHMAN DISTRICT

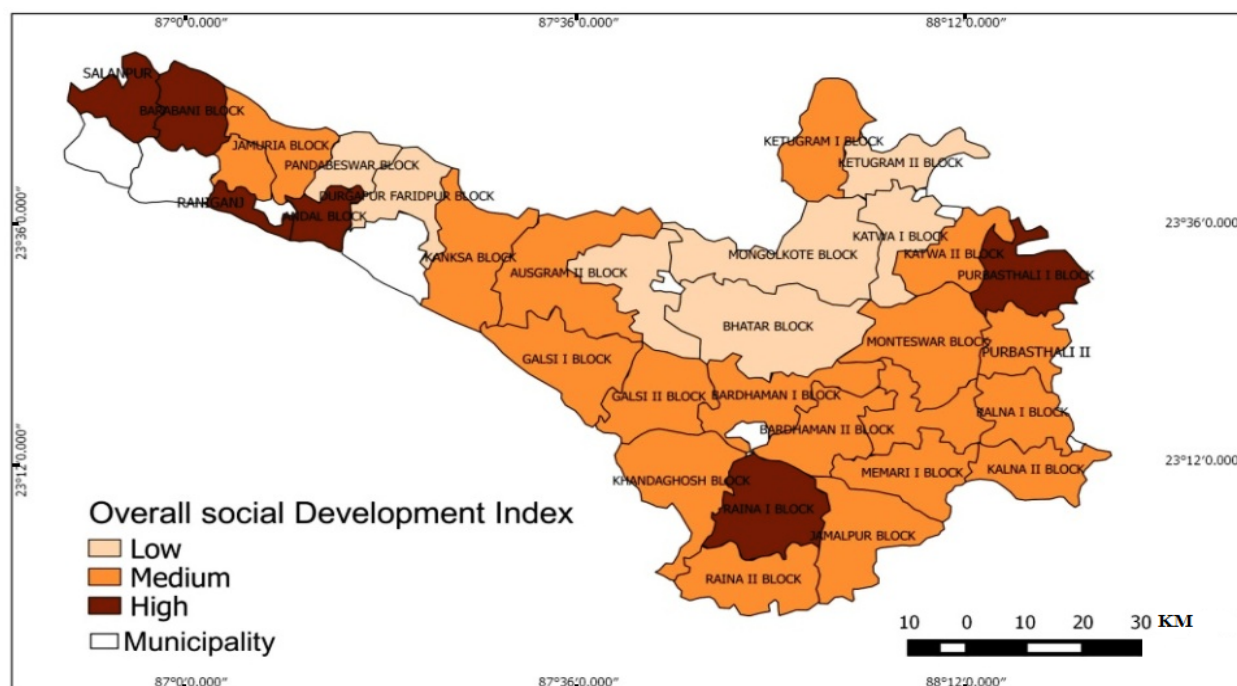| Level	CD Blocks
High (.>405)	Andal, Raniganj, Salanpur, Raina-II, Purbasthali-I, Barabani, Barddhaman -II
Medium (.302-.405)	Memari II, Jamalpur, Jamuria, Galsi-II Khandaghosh, Raina-I,Katwa-II, Purbasthali-II, Ausgram-II, Monteswar, Kanksa, Memari-I, Ketugram-I, Kalna-I, Barddhaman -I, Galsi-I
Low (<.302)	Ketugram-II, Ausgram-I, Bhatar, Mongalkote, Katwa-I, Faridpur-durgapur, Pandabeswar

Fig. 3 Block-Wise Overall Social development [5]

Table III.B shows that development index of less than 0.302 comes under the low level of overall development. Seven Blocks lie in this group. Those are Ausgram-I, Bhatar, Mongalkote, and Pandabeswar which lie in the bottom of the table. The reasons for such a low development are mainly related to less of educational facilities and lack of medical facilities. Besides, due to political biasness the transfer of government funds and proper execution regarding local problems, people's demands as well as requirements for development are not being made at grass root level.

VIII. CONCLUSION

The above analysis reveals that the level of development is not going at the same rate. It clearly indicates that there is a lot of variation among the blocks. So, the social changes do not take place uniformly in different blocks of the district. So, it is possible that even at a higher stage of development there can

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still be imbalances within the area. Because sometimes policy makers focus only on some pockets. Development policies are always introduced to reduce the inequality but sometimes it accentuates inequality among the blocks. It is concluded that the levels of development clearly indicate that there is a lot of variation in it, which needs to be taken care of, at the time of formulating development policies. Therefore, the blocks with low levels of development should be given top priority so that they may come to the level of developed area and the concept of planning with social justice may be fulfilled. A proper attempt has been taken to reducing regional disparities.

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