Assam's Inter-District Disparity in Education Sector

Research Article

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Abstract: This paper documents the extent of inequality in educational opportunity amongst the districts of Assam spanning the data of the year 2013-2014. The level of educational development is estimated with the help of composite index based on optimum combination of different developmental indicators. The main objective of the study is to classify the districts into different stages of development such as high level, medium level, developing and low level developed. The composite indicators are obtained with the help of two different methods. The district-wise data in respect of twenty five indicators are used for twenty seven districts of the State. Irrespective of the indicators used, the district of Dima Hasao stands out as the least unequal in terms of educational opportunities. However, the district of Tinisukia stands at the bottom of the list in this regard. Ranks of the districts in the level of educational development obtained from both the methods are compared. For bringing out uniform regional development, potential targets have been estimated for low developed districts.

Keywords: Composite index, Model districts, Development indicators, Potential targets.

1. Introduction

What are educational disparities? It is the difference in learning results, or efficacy, experienced by students coming from different groups. Racial and ethnic minorities, people with disabilities, residents of rural areas and other vulnerable groups more often face barriers to good education system. Education is also affected by social, political and economic status of people. Literacy plays a major role to develop a nation. It spreads awareness among the people and gives good employment opportunities. If literacy rate is high in a nation then there will be more number of entrepreneurs and flow of money will be huge and it finally puts a great impact on nation's economy. Everyone benefits when educational disparities are eliminated and education equity becomes a reality. It is time to refocus, reinforce and repeat the message that education disparities exist and that educational equality benefits everyone. So, we have made an attempt to throw light on the developmental disparities in educational opportunity sector in twenty-seven districts of Assam and to find the potential targets for the low developed districts which in turn may help in reducing the disparities amongst the districts of the state.

In India, literacy rate has increased from 18.3 percent in 1951 to 74.04 percent as per 2011 census with an increase of 14 percent to that in 2001. The rural and urban literacy rates are 69.34 percent and 88.47 percent respectively in Assam, which presents wide disparity in her literacy front. Any effort for fulfillment of reducing educational disparities, primary education in the state must pay utmost attention. Assam, the most populous state of North East shows her literacy rate (72.19 percent) below the national average (82.14 percent) as census report, 2011. The bitter fact before all of us that, in

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spite of increase in literacy growth after independence, the increase in the absolute number of illiterates could not be stopped till the last decade. Elementary education covers the primary (6-11 years) and upper primary (11-14 years) age group. The essence of the goal is for every 14- year old to have 'acquired foundation skill such as ability to read and write with fluency, innumeracy, comprehension, analysis, reasoning and social skills such as teamwork. A deep analysis using the district level data on socio-economic indicators was made for the states of Orissa [1992, 1993], [5, 6], Kerala [1994], [7], Maharashtra [1996], [8], Karnataka [1997], [10], Tamil Nadu [2000], [9] and Assam [2004, 2010, 2016, 2017] [1–4, 15, 16]. In all, the study for evaluating the level of socio-economic development was conducted in one hundred twenty one districts belonging to these states and it was found that 53 districts were low developed which require special attention for undertaking future development programmes.

In this study, an attempt has been made to rank the districts of Assam using district level data on educational indicators. Knowledge of the level of development at district level will help in identifying where a given district stands in relation to others. The region and the population under different stages of development have been evaluated and the model districts have been identified for fixing up the potential targets of different indicators for low developed districts so that these districts may make improvements in the present level of development.

2. Method of Analysis

Development is a multi-dimensional continuous process. The impact of development in different dimensions cannot be fully measured by any single indicator. Moreover, a number of indicators when analyzed individually do not provide an integrated and comprehensible picture of reality. Hence, there is a need for building up of a composite index of development based on various indicators combined in an optimum manner. For this study, the districts have been taken as the unit of analysis. Twenty seven districts of the state of Assam are included in the study. Two methods have been separately used to rank the districts of the state, viz Narain et. al. method and Michela et. al. method.

2.1. Narain Et. Al., Method

Let a set of n points represent districts $1, 2, \ldots, n$ for a group of indicators $1, 2, \ldots, k$, which can be represented by a matrix (X_{ij}); $i = 1, 2, \ldots, n$ and $j = 1, 2, \ldots, k$. As the developmental indicators included in the analysis are in different units of measurement and since our objective is to arrive at a single composite index relating to the dimension in question. There is a need for standardized as shown below:

$$Z_{ij} = \frac{X_{ij} - \bar{X}_j}{S_j}$$

$$S_j^2 = \frac{\sum\limits_{i=1}^{n}(X_{ij} - \bar{X}_j)^2}{n}, \text{ and}$$

$$\bar{X}_J = \sum_{i=1}^{n} \frac{X_{ij}}{n}, i = 1, 2, \ldots, n; j = 1, 2, \ldots, k)$$

Let $[Z_{ij}]$ denotes the matrix of standardized indicators. The best district for each indicator (with maximum/minimum standardized value depending upon the direction of the indicator) is identified and from this the deviations of the value for each district has been taken for all indicators in the following manner:

$$C_i = \left(\sum_{j=1}^{k}(Z_{ij} - Z_{0j})^2\right)^{\frac{1}{2}},$$

where Z_{0j} is the standardized value of the jth indicator of the best district and C_i denotes the pattern of development of ith district. The pattern of development is useful in identifying the districts which serve as 'models' and it also helps in fixing the potential target of each indicator for a given district. In this study, the composite index of development is obtained through the following formula:

$$D_i = \frac{C_i}{C},$$

$$C = \bar{C} + 2S, \quad \text{where}$$

$$\bar{C} = \sum_{i=1}^{n} \frac{C_i}{n} \quad \text{and}$$

$$S = \left(\sum_{i=1}^{n} \frac{(C_i - \bar{C})^2}{n} \right)^{\frac{1}{2}}$$

D_i gives the composite index of development with which ranking of the districts is done.

2.2. Michela Et. Al., Method

Theoretical frame work and methodology is followed from Michela et. al. (2005). The aggregated values give the composite index of development to rank the districts. A theoretical framework should be developed to provide the basis for the selection and combination of single indicators into a meaningful composite index. The indicators should be selected on the basis of their analytical soundness, measurability, country coverage, relevance to the phenomenon being measured and relationship to each other. The use of proxy variables should be considered when data are scarce. A multivariate analysis should be done to investigate the overall structure of the indicators, assess the suitability of the data set and explain the methodological choices. The first step is normalization in which the indicators should be normalized to render them comparable and is given by:

$$Z_{ij} = \frac{X_{ij} - \bar{X}_j}{S_j}$$

A correlation study is done to find the redundancy in the indicators, where the correlation co-efficient between the indicators are found by the following formula:

$$r_{zi,zj} = \frac{\sum (z_i - \overline{z_i})(z_j - \overline{z_j})}{\sqrt{\sum (z_i - \overline{z_i})^2} \sqrt{\sum (z_j - \overline{z_j})^2}}$$

We discard the indicators having high correlation co-efficient with other indicators and as such the number of indicators reduces. Finally weighting and aggregation is done in which the indicators should be aggregated and weighted according to the underlying theoretical framework.

$$A_i = \sum_j z_{ij}$$

The aggregated values give the composite index of development to rank the districts.

2.3. Relative Share of Area and Population under Different Level of Development

A simple ranking of district on the basis of composite indices is sufficient but a suitable classification of districts formed on the basis of mean and standard deviation of the composite indices will provide a more meaningful characterization of various stages of development. For relative comparison it appears appropriate to assume the districts having composite index less than or equal to (Mean - SD) as highly developed districts. And the districts having composite index greater than or equal to (Mean + SD) be low developed districts. Similarly districts with composite index lyingbetween (Mean and Mean - SD) are classified as middle level developed district and districts with composite index lying between (Mean and Mean + SD) are classified as developing districts.

2.4. Fixation of Potential Targets

Using the standardized variates $[Z_{ij}]$, the economic distance between different districts may be obtained as follows:

$$D_{ip} = \left(\sum_{j=1}^{k} \left(Z_{ij} - Z_{pj} \right)^2 \right)^{\frac{1}{2}}, \; i = 1, 2, \ldots, n; \; \text{ and } \; p = 1, 2, \ldots, n$$

Here $D_{ii} = 0$ and $D_{ip} = D_{pi}$. The distance matrix will take the form:

$$\begin{bmatrix} 0 & d_{12} & d_{13} & \cdots & d_{1n} \\ d_{21} & 0 & d_{23} & \cdots & d_{2n} \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ d_{n1} & d_{n2} & d_{n3} & \cdots & 0 \end{bmatrix}$$

The minimum distance for each row, $(d_i, \, i = 1, 2, \ldots, n)$ will be obtained from the distance matrix for computation of upper and lower limits (C.D.) as indicated below:

$$C.D. = \bar{d} \pm 2\sigma_d,$$

where

$$\bar{d} = \sum_{i=1}^{n} \frac{d_i}{n} \; \text{ and } \; \sigma_d = \left(\sum_{i=1}^{n} \frac{(d_i - \bar{d})^2}{n} \right)^{\frac{1}{2}}$$

The distance matrix can also be used for fixing targets for different districts on each indicator, which would be in the direction of reducing the disparities. The districts should be identified which are homogeneous with a close proximity to each other with the district under consideration, in terms of considered indicators. For setting out the targets, the model districts are to be identified on the basis of composite index and individual distance with districts. The best values among the model districts will be taken as potential target for a particular district for a given indicator. This procedure will be repeated for a given district for all indicators considered. This would give the extent of improvement required in different indicators for balanced development in the district. It also provides avenues to bring about uniform regional development in the state. Such information helps the planners and administrators to readjust the resources to reduce inequalities in level of development among different districts of the state. The study utilizes data on most of the educational indicators for the year 2013-2014. A total of twenty-five development indicators have been included in the study.

2.5. Developmental Indicators

Each district faces situational factors of development unique to it as well as common administrative and financial problems. The composite indices of development for different districts have been obtained by using the data on the following indicators.

1. Number of Lower Primary schools (LPS) per 1000 students in LPS.

2. Number of Upper Primary schools (UPS) per 1000 students in UPS.

3. Number of High schools (HS) per 10000 students in HS.

4. Number of Higher Secondary schools (HSS) per 10000 students in HSS.

5. Number of Schools for general education per 10000 population.

6. Number of Schools for general education per 100 sq. km.

7. Number of Schools per 10000 students.

8. Number of Junior College (JC) per 10000 students in JC.

9. Number of Junior College (JC) per 10 sq. km.

10. Number of Law Colleges per 100000 population.

11. Number of Engineering and Technology Colleges per 100000 population.

12. Number of Medical Colleges per 100000 population.

13. Number of General Degree Colleges per 100000 population.

14. Number of Universities per 100000 population

15. Number of teachers in LPS per 1000 students in LPS.

16. Number of teachers in UPS per 1000 students in UPS.

17. Number of teachers in HS per 1000 students in HS.

18. Number of teachers in HSs per 100 students in HSS.

19. Number of teachers in JC per 1000 students in JC.

20. Number of teachers for general education per 10 sq. km.

21. Number of teachers for general education per 1000 students.

22. Number of teachers for general education per 10000 populations.

23. Male Literacy rate.

24. Female Literacy rate

25. Total Literacy rate.

A total of twenty five indicators have been included in the analysis. These indicators may not form an all-inclusive list but these are the major interacting components of educational development.

2.6. Comparison of Ranks

We have used Spearman rank correlation co-efficient to test if there is any significant difference in the ranks obtained by the two methods. The rank correlation co-efficient is given by Ronald et. al. (1985).

$$r_s = 1 - \frac{6 \sum_{i=1}^{n} d_i^2}{n(n^2 - 1)}$$

where d_i is the difference between the ranks assigned by the two methods and n is the number of pairs of data. We have test the hypothesis that the correlation between the ranks obtained by Narain et. al., method and the Michela et. al., method is zero against the alternative that it is greater than zero. At both 0.01 and 0.05 level of significance, it is observed that the two methods are correlated and there is no significance difference between the ranks obtained from the two methods.

3. Results and Discussions

3.1. The Level of Development

The districts have been ranked on the basis of the developmental indices. Table 1 presents the ranks of different districts obtained from both the methids. It may be seen from the above table that out of 27 districts of the state, the district of Dima-Hasao was ranked the first and the district Tinisukia was ranked last in the overall educational development.

It is seen that, for most of the districts, ranks calculated by the two methods are almost same whereas for a few other districts, ranks calculated by the two methods are very much different. An important aspect of the study is to test whether there is any significant difference in the ranks obtained from the two methods. In this regard, a rank test is carried out. It is a nonparametric measure of association between two variables given by the Spearman rank correlation co-efficient.

S. No.	Districts	Rank by Narain et.al.	Rank by Michela et. al.	S. No.	Districts	Rank by Narain et.al.	Rank by Michela et. al.
1	Kokrajhar	18	18	15	Karbi Anglong	23	24
2	Dhubri	22	16	16	Dima Hasao	1	1
3	Goalpara	14	10	17	Cachar	15	21
4	Barpeta	13	11	18	Karimganj	12	12
5	Morigaon	10	8	19	Hailakandi	7	6
6	Nagaon	16	14	20	Bongaigaon	20	19
7	Sonitpur	25	26	21	Chirang	26	25
8	Lakhimpur	5	3	22	Kamrup	9	15
9	Dhemaji	8	7	23	Kamrup Metro	2	9
10	Tinisukia	27	27	24	Nalbari	6	4
11	Dibrugarh	11	23	25	Baksa	21	20
12	Sivsagar	3	2	26	Darrang	19	13
13	Jorhat	4	5	27	Udalguri	24	22
14	Golaghat	17	17				

Table 2.   **Ranks of all the districts of Assam obtained from the two methods**

3.2.   Area and Population in Different Stages of Development

It would be quite interesting and useful to find out the relative share of area and population affected under different levels of development in the State. The area and population covered by the districts falling under different levels of development are presented in Table 2.

Sector of Economy	Level of Development	No. of Districts	Population (%)	Area (%)
Education	High (≤ 0.598)	5	15.23	17.38
	Medium ($0.598 - 0.731$)	3	6.84	7.15
	Developing ($0.731 - 0.862$)	16	66.03	61.57
	Low (≥ 0.862)	3	11.96	13.9

Table 3.   **Area and Population under Different Levels of Development**

It is evident from the table that about 17.38% area consisting of about 15.23% population of the state fall in the districts which are high developed in the education sector. About 7.15% area and 6.84% population come from the districts which are medium level developed. About 61.57% area and 66.03% population come from the districts which are developing. The remaining 13.9% area and 11.96% population fall in the districts which are low developed in the education sector. The low developed districts which have been found in this study are Sonitpur, Chirang and Tinisukia. List of model districts for these low developed districts is presented in Table 3.

S. No.	Low Developed Districts	Model Districts
1	Sonitpur	Kamrup-Metro, Sivaagar, Dima-Hasao
2	Tinisukia	Kamrup-Metro, Jorhat, Lakhimpur, Nagaon
3	Chirang	Kamrup-Metro, Dima-Hasao, Jorhat

Table 4.   **Model districts for low developed districts**

Model districts are better developed. The districts of Kamrup- Metro, Dima-Hasao are found to be model districts for most of the low developed districts.

3.3.   Potential Targets of Indicators for Low Developed Districts

It would be useful to examine the extent of improvements required in different indicators of the low developed districts for enhancing the level of development. The best values of the indicators of better developed districts will be taken as potential

targets for the low developed districts. The extent of improvement needed in various indicators of the low developed districts is given below:

Indicators	Sonitpur	Tinisukia	Chirang
1	85.07 (60.73)	76.43 (61.73)	85.07 (56.65)
2	92013 (73.65)	87.63 (77.19)	92.13 (70.24)
3	36.6 (16.67)	35.94 (11.04)	34.7 (7.65)
4	107.4 (44.18)	85.89 (81.43)	107.40 (40.74)
5	34.68 (16.07)	50.71 (0.88)	34.68 (12.47)
6	34.8 (10.7)	44.69 (29.76)	44.69 (16.67)
7	45.77 (12.54)	24.34 (10.45)	34.89 (14.07)
8	89.39 (46.38)	23.96 (10.54)	45.77 (18.89)
9	217.84 (74.16)	124.52 (36.93)	80.20 (47.34)
10	52.7 (22.87)	131.47 (71.69)	217.84 (90.70))
11	106.89 (36.56)	72.13 (17.26)	52.7 (21.91)
12	224.61 (61.85)	67.97 (33.51)	106.89(41.95)
13	85.65 (40.05)	149.36 (49.28)	224.61 (87.39)
14	224.61 (61.85)	73.28 (39.30)	85.65 (41.96)
15	85.65 (40.05)	105.76 (69.83)	146.69 (82.59)
16	146.69 (62.96)	75.97 (26.78)	75.97 (35.43)
17	69.96 (42.9)	48.73 (29.77)	124.09 (41.14)
18	124.09 (35.29)	88.10 (33.89)	92.51 (40.09)
19	92.51 (33.63)	111.74 (45.45)	140.02(56.46)
20	140.02 (46.94)	82.15 (69.66)	88.71 (63.55)
21	88.71 (67.34)	0.549 (0)	0.549 (0)
22	0.478 (0.156)	1.34 (1.05)	2.63 (0.20)
23	2.80 (0.727)	0.13 (0.075)	0.399 (0)
24	0.115 (0.052)	0.092 (0)	0.159 (0)
25	0.159 (0.104)	0.275 (0)	0.638 (0)

Table 5. **Estimate of Potential Target and Actual achievement (given under the bracket)**

4.   Conclusions

In addition to above trends of regional variation, knowledge of variation of the indicators which greatly influence the creation of regional disparity is very important. Through the period, the facilities of higher education with special emphasis on technical education show a wide variation among other indicators. The foregoing analysis of disparity in education sector development in Assam reveals that the basic characteristic feature of development of this sector in the State is the improvement in the general literacy. The disparity in development in this sector is mainly due to the skewed availability of higher and technical education.

The variation of education sector development among districts has varied over the period. The distance between the bottom and top ranked districts has widened recently. Over time there has been a decrease in percentage of backward districts and increase in number of moderately developed districts. It indicates that the development disparity in education sector in Assam has not been so extreme in any point of time. However, certain backward districts such as Udalguri, Sonitpur, Tinisukia and Chirang could not make much improvement in any period.

On detailed examination of the level of development, it was found that the entire area of the district is not backward. Some parts of the district are low developed whereas other parts are well developed or average developed. In order to reduce the disparities, district level studies or setting the objective in the district level may not be a wise idea. So, looking for the

potential areas for development in taluka or block level may be of great importance and emphasis on over all developmental indices will be of good use to reduce the developmental disparities.

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