

Inter District Disparities in Health Care Service of Assam

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Abstract

The status of development in health care services of Assam has been estimated with the help of composite index based on optimum combination of 35 development indicators. The specific objective of the study is to evaluate the inter districts imbalances in the level of development of health care system and to classify the districts in to different stages of development such as high level, medium level, developing and low level. To get a clear picture of health care situation of Assam developmental index are computed separately for basic infrastructure, Performance it had shown, Demographic rate, Maternal health and Overall health care status in the districts separately. Wide disparities in the levels of development have been observed in different districts of the state. For bringing about uniform regional development in the state, model districts have been identified for fixing up the potential target of different developmental indicators for low developed districts. It is found that Kamrup, Jorhat, Nalbari are high-developed district and they occupy 12.05 percent area and 17.52 percent population of the state. Karimganj, Dhemaji, Dhubri and N.C.Hills are low developed districts; they cover 16.23 percent area and 12.78 percent population of the state.

Key words: Composite Index, Potential targets, and Model district.

1. Introduction

It is an attempt to throw light on the developmental disparities in Health care sector in twenty-three districts of Assam. Development is a multidimensional process and its impact cannot be captured fully by any single indicator. Moreover a number of indicators when analyzed individually do not provide an integrated and easily comprehensible picture of reality. Hence there is need for building up of a composite index of development on some key factors, related to health of people, combined in an optimum manner. To improve the quality of life, health care facilities are extremely important. A better health care system can improve the health status of its population; reduce birthrate, death rate, infant mortality rate, child mortality rate and maternal mortality rate. Since health is influenced by a number of factors, such as adequate food, housing, basic sanitation, healthy lifestyles, protection against environmental hazards and communicable diseases. The term “health care” embraces a multitude of services provided to individuals or communities by agents of the health services or profession, for the purpose of promoting, maintaining, monitoring or restoring health. It operates in the context of the socio economic and political framework of the country and involves management and organizational matters.

There is a saying that health is wealth. An alarming health care system can control the disease like malaria, tuberculosis, HIV/AIDS etc. There is symbiotic relationship between health and poverty. A sound health can do any hard work when it is necessary. The availability of health care facilities in a region depends on health care delivery system i.e. health care institution and infrastructure that are available in a region and mostly depend on the people which are involved in the system, An assessment of the health status is possible from key indicators such as infant mortality, crude birth rate, crude death rate, life expectancy and nutritional status There is a rural – urban divide, and a gender gap reflected across almost all indicators. Of concern also is the fact that the commonly used indicators for the measurement of the health status of a population show that while there has been improvement in the all indicators, Assam's performance in the last decade has been lower than the average for the country. Life expectancy at birth (LEB) in Assam is below that of the country as a whole, and is one of the lowest amongst major Indian States. In the 1970's men could expect to live longer than women. This has since been reversed; women can now expect to live longer than men. This is a trend that began to take place initially in urban areas, but is now true of rural areas as well. There is still a very significant gap between the LEB for rural and for urban areas. In the period 1992- 96, the LEB in urban areas was 64.6 years. In rural areas it was almost ten years less, at 55.6 years. The Birth rates in Assam continued to be higher than the all India average birth rates from 1951 to 1971. Although census was not conducted in Assam in 1981, as per interpolated figures, the birth rate in Assam was lower than the all India average birth rate, this continued till 1991. But in 2001, the rural birth rate in Assam with 27.8 was higher than the all India average rural birth rate of 27.1 although the birth rates for urban areas for the same year was lower in Assam with 18.5 against the all India urban birth rate of 20.2. The SRS data for the period 1998-2001 confirm that the birth rates in rural Assam continued to be higher than the corresponding all India rates, whereas for urban areas, it was the reverse. As per the SRS Bulletin, October 2002, in 1998, the death rate in Assam decreased to 10.0 and thereafter the steady decreasing rate continued and dropped down to 9.5 in 2001 but remained higher than the all India average rate of 8.4. Over the period between 1998 and 2001, the rural death rates declined in Assam as well as at the all India level. But the rates for urban Assam had a fluctuating increase during the period. In 2001, the rural death rate in Assam was 9.8, marginally higher than the all India rate of 9.0, while the death rate in urban Assam was 6.6, 0.3 per cent higher than the all India rate of 6.3. The IMR for urban Assam is substantially lower than the all India average (36 per 1,000 as against 44 per 1000 for India), while in rural Assam the IMR is higher than that for rural India (79 per 1000 against 75 per 1,000 for India) in 1999. Under-5 mortality is substantially higher in rural areas, a fact corroborated by National Family Health Survey (NFHS) - 2 data. The under-5 mortality rate is 81 deaths per 1,000 live births for rural children, and 55 deaths per 1,000 live births for urban children. Sanitation and water supply are two important components of well being and good health. Poor sanitation and water supply leads to ill health and disease. The districts with the highest percentage of population with access to toilet facilities were Karimganj (73.17 percent), Cachar (63.27 percent) and Hailakandi (60.97 percent). In Kokrajhar, Dhemaji, Darrang and Nalbari less than 20 percent of the population had access to a toilet facility. Only about 30 percent of the population in Jorhat and Sibsagar had access to toilets. Access to safe drinking water in Assam is substantially less than the national average. The population in Assam with access to safe drinking water is 45.86 percent, compared to the all India figure of 62.30 percent. Households with access to safe drinking water stand at 43.28 percent in rural areas and 64.07

percent in urban areas. At the all India level 55.54 percent of people in rural areas have access to safe drinking water, while in urban areas, 81.38 percent of people have access to safe water.

For focusing the attention of scientist, planners, policy makers and administrators on the regional disparities and socio- economic development in the country, a seminar was organized jointly by the Planning Commission, Government of India and State Planning institute, Government of Uttar Pradesh during 1982. Realizing the importance and seriousness of the problem of estimation of level of development, the Indian Society of Agricultural Statistics conducted a series of research studies in this direction. Analyzing the data at state level for the year 1971-72 and 1981-82, it was found that there were disparities in the level of development between different states. There after a deeper analysis using the district level data on socio-economic indicators was made for the States Orissa [Narain,1992-93], Andhra Pradesh [Narain,1994], Kerala [Narain,1994] Uttar Pradesh [Narain,1995], Maharastra [Narain,1996], Karnataka [Narain,1997], Tamilnadu [Narain,2000] , Madhya Pradesh [Narain,2002] and Assam [Rai,2004].

In all, the study for evaluating the level of socio-economic development was conducted in two hundred twenty eight districts belonging to the states of Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharastra, Orissa, Tamil Nadu and Uttar Pradesh and it was found that 73 districts were low developed which require special attention for undertaking future developmental Programmes.

2. MATERIALS AND METHODS:

The following methods are used for preparing my research paper.

2.1 Composite index of development and developmental distances between different Districts

The crucial issue of regional disparity analysis lies in the construction of a Composite Index out of the several indicators chosen for the purpose. All the selected indicators are to be converted in to a common base either by rank ordering or indexing and finally they are to be converted in to a single index of overall development.

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

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

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

$$\bar{X}_j = \frac{\sum_{i=1}^n X_{ij}}{n} \quad (i=1,2,\dots,n), (j=1,2,\dots,k)$$

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:

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

where Z_{0j} is the standardized value of the j th indicator of the best district and C_i denotes the pattern of development of i th 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 districts. The composite index of development is obtained through the following formula:

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

$$C = \bar{C} + 2S, \quad \bar{C} = \sum_{i=1}^n \frac{C_i}{n}$$

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

2.2 The Socio-Economic Distance and fixation of Potential Target

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

$$D_{ip} = \left(\sum_{j=1}^k (Z_{ij} - Z_{pj})^2 \right)^{1/2}$$

($i=1,2,\dots,n$ and $p=1,2,\dots,n$)

Here $D_{ii} = 0$ and $D_{ip} = D_{pi}$.

The distance matrix will take the form

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

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

$$C. D. = \bar{d} \pm 2\sigma_d, \quad (1)$$

$$\text{where } \bar{d} = \sum_{i=1}^n \frac{d_i}{n},$$

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

The distance matrix can also be used for fixing targets for different districts on each indicator. For setting out the targets, for example, for district A, the model districts are to be identified on the basis of composite index lower than that of district A and their individual distance with district A not exceeding the upper limit of C.D. given in (1), will serve as model districts for district A on all the indicators considered in the analysis. The best values among the model districts will be taken as potential target for district A for a given indicator. This procedure will be repeated for a given district for all indicators considered

3. RESULTS AND DISCUSSION:

Composite indices of development have been worked out for different districts for infrastructure of health sector, performance it had shown, demographic rates, maternal health and overall health care system separately. The number of indicators is used for each case are ten, thirteen, six, six and thirty five respectively. The districts have been ranked on the basis of developmental indices. The composite indices of development along with the rank of the districts

are presented in Table-3.1.

Table-3.1: Ranking of the districts based on composite index (CI) of development

Source: (a) Census of India 2001, Govt of India

	Districts	Infrastructure		Demography rate		Maternal health		Performance		Overall health	
		CI	Rank	CI	Rank	CI	Rank	CI	Rank	CI	R
1	Kokrajjar	.8071	16	.5163	10	.6222	12	.6221	6	.7271	9
2	Dhubri	.6898	6.5	.9989	23	.8962	22	.8295	18	.9119	21
3	Goalpara	.8594	20	.7308	22	.6751	15	.6285	7	.7991	16
4	Bongaigaon	.8407	18	.7291	21	.6628	13	.8060	17	.8448	18
5	Borpeta	.6717	5	.7235	20	.7154	18	.8724	21	.8201	17
6	Kamrup	.4264	1	.2654	5	.1769	1	.5026	1	.4269	1
7	Nalbari	.6974	8	.4233	8	.2131	2	.6140	4	.6045	3
8	Darrang	.6997	9	.6422	14	.4511	7	.7939	15	.7384	11
9	Marigaon	.7944	14	.7175	19	.6717	14	.6204	5	.7678	14
10	Nagaon	.4514	2	.5909	13	.7596	20	.7452	11	.6952	8
11	Sonitpur	.6564	4	.3756	7	.3397	5	.7255	10	.6385	5
12	Lakhimpur	.8137	17	.6884	17	.5576	10	.6846	8	.7690	15
13	Dhemaji	.9387	23	.7159	18	.8069	21	.8594	19	.9250	22
14	Tinsukia	.7748	13	.2872	6	.5861	11	.7961	16	.7392	12
15	Dibrugarh	.6245	3	.0910	2	.2930	3	.7749	13	.6178	4
16	Sibsagarh	.7450	12	.2257	4	.3171	4	.7560	12	.6665	6
17	Jorhat	.6898	6.5	.0172	1	.3743	6	.5486	2	.5633	2
18	Golaghat	.7313	10	.2150	3	.4653	8	.7752	14	.6894	7
19	Karbi Anglong	.7997	15	.5527	12	.7316	19	.5901	3	.7448	13
20	N.C.Hills	.8689	21	.5499	11	.9618	23	.9998	23	.9785	23
21	Cachar	.7448	11	.4791	9	.6777	16	.6971	9	.7313	10
22	Karimganj	.8564	19	.6472	15	.7055	17	.8943	22	.8743	20
23	Hailakandi	.9253	22	.6531	16	.5061	9	.8650	20	.8592	19

(b) Assam Human Development Report 2003, Govt of Assam

(c) Statistical Hand Book (2007-08) Directorate of Economics and Statistics, Assam, Guwahati.

3.1 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 lying between (Mean and Mean - SD) are classified as medium level developed and district with composite index lying between (Mean and Mean + SD) are classified as developing districts.

An important aspect of the study is to find out the relative share of area and population affected under various stages of development in the state. The details are given in Table-3.2

Table-3.2 Area and Population under Different levels of Development

Sectors	No of indicators	Level of development	Serial no of districts according to level of development	Area %	Population %
Infrastructure	10	High	[6],[10]	10.60	18.15
		Medium	[11],[15],[8],[17],[5],[7],[2],[18]	34.22	40.33
		Developing	[3],[4],[21],[9],[12],[14][16],[20],[22]],[1],[19]	49.36	37.34
		Low Developed	[13],[23]	5.82	4.18
Performance	13	High	[6],[17],[19]	12.58	17.16
		Medium	[7],[9],[1],[16],[12],[21],[11],[3]	26.21	28.77
		Developing	[10],[2],[4],[8],[13][14],[15],[18],[23]	48.54	43.4
		Low Developed	[5],[22],[20]	12.67	10.67
Demographic Rate	06	High	[15],[17],[18],[16],[6]	21.35	25.15
		Medium	[14],[11],[7],[21]	19.32	15.48
		Developing	[10],[8],[23],[9],[3],[1],[5][12],[19],[22],[20],[4],[13]	55.76	53.23
		Low Developed	[2]	3.57	6.14
Maternal Health	06	High	[6],[7],[15],[16],[11]	22.92	28.47
		Medium	[17],[8],[18],[23],[12]	17.13	18.31
		Developing	[1],[3],[4],[5],[22],[9],[10][14],[19],[21]	46.02	44.32
		Low Developed	[13],[2],[20]	13.93	8.99
Overall Health care	35	High	[6],[17],[7]	12.05	17.52
		Medium	[11],[16],[18],[10],[15][21],[1],[19],[8],[14]	55.94	48.76
		Developing	[3],[4],[5],[9],[12],[23]	15.78	20.94
		Low Developed	[22],[13],[2],[20]	16.23	12.78

Model districts for the low developed districts, for thirty-five indicators on the basis of composite index of development and the developmental distances between different districts are obtained and given in table-3.3. An important aspect of the study is to suggest potential target for different indicators in respect to poor developed districts for bringing improvement in the level of development. The best values of different indicators among the model districts will be taken as potential target of the low developed districts .It would show the path how much improvement required in different indicators for balanced development in the district. It would be quite interesting to examine the extent of improvement required in different indicators of the low developed districts. It will also provide avenues to bring about uniform regional development in the state. The potential targets of important indicators have been estimated and presented in Table 4. Such information helps the planners and administrators to readjust the resources to reduce inequalities in level of development among different districts of the state. Some of the low developed districts require improvement of various dimensions in almost all the indicators. However, actual achievement in some of the low developed districts is found to be better than their potential target. Here at best three model districts are selected for low developed districts on priority basis.

Table-3.3: Low Developed District along with their Model Districts

Low developed districts	Model districts
Karimganj	Goalpara, Bongaigaon, Darrang,
Dhemaji	Goalpara, Bongaigaon, Borpeta,
Dhubri	Goalpara, Bongaigaon, Borpeta,
N.C.Hills	Darrang

Table-3.4: Potential Target along with their actual achievement
(Figures in the bracket indicate the best values of the model districts)

Sl No	Development Indicators	Karimganj	Dhemaji	Dhubri	N.C.Hills
1	No. of Hospitals	11(2)	8(3)	8(11)*	8(3)
2	No of PHC	42(16)	41(9)	41(23)	35(12)
3	No of Dispensaries	20(5)	20(5)	20(12)	14(2)
4	No of FWPC	30(5)	30(1)	30(7)	7(3)
5	No of Sub Centre	351(232)	351(95)	351(303)	322(173)
6	No of CHC	9(1)	7(3)	6(6)	7(2)
7	Hospitals bed per 10,000 population	10(2)	7(4)	7(3)	3(14)
8	Achievement of BCG (%)	98.91 (73.02)	98.91(87.26)	98.91(97.26)	81.33(45.92)
9	Achievement of DPT-3 (%)	90.1(59.74)	90.1(76.88)	89.26(77.27)	79.91(40.65)
10	Achievement of OPV-3 (%)	90.19(68.85)	90.19(76.88)	86.17(77.27)	80.34(37.23)
11	Achievement of measles (%)	83.90 (49.18)	83.90(70.05)	76.47(70.62)	63.73(31.03)
12	Achievement of TT (%)	84.01(50.30)	84.11(58.09)	84.11(73.48)	56.67(26.24)
13	Sterilization(%) (2006-07)	87.80(17.45)	59.76(44.80)	59.76(.08)	6.33(15.00)
14	IUD insertion(%) (2006-07)	90.25(27.75)	90.25(27.80)	90.25(17.58)	35.40(43.50)
15	CC users(%) (2006-07)	110.50(51.43)	110.50(23.25)	110.50(49.50)	13.67(56.29)
16	OP users(%) (2006-07)	100.43(43.47)	95.93(6.73)	95.93(56.33)	36.13(76.50)
17	Sterilization(%) (2007-08)	187.03(44.65)	187.03(36.94)	187.03(2.74)	187.03(19.35)
18	IUD insertion(%) (2007-08)	98.90(27.55)	98.90(73.63)	98.90(27.29)	57.54(97.51)*

19	CC users(%) (2007-08)	89.07(38.61)	81.85(7.16)	81.85(49.24)	23.94(60.11)*
20	OP users(%) (2007-08)	137.16(59.07)	137.16(12.59)	107.12(59.23)	76.64(107.12)*
21	IMR for male	75(105)	76(113)	76(123)	118(109)*
22	IMR for female	70(97)	75(117)	75(132)	86(100)
23	MCMR	113(132)	120(140)	122(169)	131(119)*
24	FCMR	101(131)	111(138)	111(162)	131(116)*
25	CBR	23(29)	25.3(27.7)	25.3(35.2)	29.1(26.1)*
26	TFR	3(3.6)	3.1(3.5)	3.1(4.3)	3.4(3.1)*
27	Household with toilet facilities (%)	39.42(73.17)*	73.17(16.37)	73.17(29.64)	17.05(34.61)*
28	Household with drinking water facility (%)	64.63(17.83)	62.67(48.58)	62.67(56.10)	46.66(45.54)
29	Any MNC check up (%)	78(58)	74.7(49.6)	64.8(37.8)	74.7(29.4)
30	3+ANC visits(%)	59.1(40.3)	59.1(30.8)	40.3(23.6)	59.1(17.1)
31	At least one TT injection(%)	77.9(63.6)	72.8(48.1)	67.1(48)	72.8(32.2)
32	Recd 100 or more IFA tablet or syrup (%)	28.2(7.6)	28.2(5)	13.5(6.4)	12.6(10.3)
33	Full ANC(%)	18.9(4.2)	14.9(4.6)	7.8(4.9)	8.5(7.3)
34	Safe delivery(%)	55.6(23.4)	44(25.3)	29.3(13)	44(13.9)
35	Village electrified (%)	82.34(72.13)	82.34(23.97)	82.34(62.01)	82.34(20.50)

* Indicates actual achievements which are already better than the potential target.

4. Conclusion:

From the study it is observed that Kamrup, Jorhat, Nalbari and Dibrugarh districts are placed in better position in health care service. Karimganj, Dhemaji, Dhubri and N.C.Hills are low developed in this sector. The study highlights that the district Dhubri is medium developed in infrastructure facilities of health care but it is coming out as low developed in the subsectors maternal health and performance has shown by demographic rate. Borpeta is also medium developed district in infrastructure but it is also low developed in performing programmes those are run by the health department. Karimganj, Dhemaji, and N.C.Hills show poor performance in all the sub sectors. They are poor in infrastructure facilities of health care also. Model districts are found for each low developed district is observed in Table-3.3 and potential target are obtained for each indicator of low developed district in Table-3.4. It is observed from the Table-3.4 the actual achievement of at least two indicators of each low developed district is better than their potential target.

REFERENCES

- [1] Census of India, 2001. Government of India.
- [2] Economic Survey Assam 2008-09, Directorate of Economics and Statistics, Assam, Guwahati.
- [3] Govt. of Assam (2003): "Towards a Healthy society" in Assam Human Development report 2003, <http://planassam.org/report/hdr2003/HDR.html>.
- [4] Narain P., S.C. Rai and Santi Sarup, 1991, Statistical evaluation of development on socio-economic front, *Jour. Ind. Soc. Agril. Stat.*, 43, 329-345.
- [5] Narain, P., S.C. Rai and Santi Sarup, 1992, Classification of districts based on socio-economic development in Orissa, *Yojana*, 36, 23, 9-12
- [6] Narain, P., S.C. Rai and Santi Sarup, 1993, Evaluation of economic development in Orissa, *Jour. Ind. Soc. Agril. Stat.*, 45, 249- 278.
- [7] Narain, P., S.C. Rai and Santi Sarup, 1994, Regional dimensions of socio- economic development in Andhra Pradesh, *Jour. Ind. Soc. Agril. Stat.* 46, 156-165.
- [8] Narain, P., S.C. Rai and Santi Sarup, 1994, Inter-District Disparities in socio-economic development in Kerala, *Jour. Ind. Soc. Agril. Stat.* 46, 362- 377.

- [9] Narain, P., S.C. Rai and Santi Sarup, 1995, Regional disparities in the levels of development in Uttar Pradesh, *Jour. Ind. Soc. Agril. Stat.*, 47, 288-304.
- [10] Narain P., S.C. Rai. and Santi Sarup ,1996, Dynamics of socio-economic development in Maharashtra, *Jour. Ind. Soc. Agril. Stat.* , 48, 360-372
- [11] Narain P., S.C. Rai. and V.K. Bhatia, 1997, Regional pattern of socio-economic development in Karnataka. *Jour. Ind. Soc. Agril. Stat.* , 50, 380-391.
- [12] Narain P., S.C. Rai. and V.K. Bhatia,1999, Inter district variation of development in Southern Region, *Jour. Ind. Soc. Agril. Stat.*, 52, 106-120.
- [13] Narain P., S.D. Sharma, S.C. Rai. and V.K. Bhatia, 2000, Regional disparities in socio-economic development in Tamil Nadu. *Jour. Ind. Soc. Agril. Stat.*, 53, 35-46.
- [14] Narain P., S.D. Sharma, S.C. Rai. and V.K. Bhatia, 2001, Regional dimension of disparities in crop productivity in Uttar Pradesh. *Jour. Ind. Soc. Agril. Stat.*, 54, 62-79.
- [15] Narain P., S.D. Sharma, S.C. Rai. and V.K. Bhatia, 2002, Dimension of regional disparities in socio- economic development in Madhya Pradesh, *Jour. Ind. Soc. Agril. Stat.*, 55, 88-107.
- [16] Rai. S.C. and V.K. Bhatia, 2004, Dimension of regional disparities in socio- economic development of Assam, *Jour. Ind. Soc. Agril. Stat.*, 57, 178- 190.
- [17] Statistical Hand Book (2007-08) Directorate of Economics and Statistics, Assam,Guwahati.