Research Paper

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Spatial Depiction of Variability in Health Care Facilities and Health Achievements in Murshidabad District, West Bengal

Geography

KEYWORDS : Primary healthcare centres, Overall Development Index, Modified Overall Gini, IMR-based Concentration Index

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ABSTRACT

Aim: The present study aims to assess the extent of spatial variation in quality of Primary Healthcare facilities in Murshidabad District, West Bengal. Method: Using data from Office of Chief Medical Officer of Health, Govt. Of West Bengal, on availability of structural inputs for the year 2013-14 in Primary Healthcare Centres (PHCs) from 26 Blocks, an Overall Development Index (ODI) is constructed. ODI is a composite measure of the relative importance of all available structural inputs in PHCs. A spatial variation of ODI is then depicted in map to present the shortfall of existence of structural inputs across different blocks. Mean and Standard Deviation is used to compute the spatial variation in health achievements. Results: The result shows intra district variation in availability of facilities for each selected indicator. The Development Index varies from 0.18 in Beharampur to 0.67 in Suti-II. Infant and Maternal Death also shows variation in various blocks. Conclusion: Different Blocks are performing differently in Murshidabad with respect to both availability of services and manpower and also in health achievements. Detection of blocks with low quality of primary healthcare facilities will help in effective interventions.

I. Introduction

Regional imbalance is one of the crucial concerns of the planners and policy makers as it is essential to address this imbalance to achieve a holistic regional development in any place. Healthcare facilities in various parts of West Bengal is also included within the preview of regional imbalance. Since health achievement of an individual, community or region determines the number of productive days contributed in economic growth, the problem of inequitable distribution and utilization of healthcare facilities become even more fundamental.

Primary healthcare facilities in West Bengal is operating under the flagship programme National Rural Health Mission launched in 2005.Primary healthcare facilities include Sub-centres, Primary Health Centres and Community Health Centres and is a three tier-system meant to cater to the needs of rural population including women, children, disabled and aged. The national norm for primary health care facilities is that Sub Centres (SCs) must serve 5000 population in plain area and 3000 in tribal and hilly area, Primary Healthcentres (PHCs) must serve 30000 population in plain area and 20000 population in tribal area and Community Health centres (CHCs) will cater to 1 to 1.2 lakh population as a referral institution. West Bengal still lacks behind in achieving this national goal (RHS Bulletin, 2012). There is huge shortfall in the number of primary healthcare facilities so the existing facilities are overburdened. The primary healthcare system in West Bengal is performing differently in different districts although they are functioning under same flagship programme. Health achievements are presenting similar regional differences. Infant Mortality Rate and Maternal Mortality Rate, two crucial indicators of health outcome are high in some Districts while lower in others. Thus regional imbalance in health care facilities and health outcome is prominent in West Bengal

Murshidabad District with total population of 7102430 occupies 6% of the total land area of West Bengal. The sex-ratio is 957 females per 1000 males. The literacy rate is 67% and 63.67% of the population are Muslims (Census of India, 2011). Murshidabad District is one of the backward districts of West Bengal in terms of Primary Healthcare Facilities. There is 10 CHCs, 69 PHCs, and 832 SCs in Murshidabad District. Only 1219 beds are serving in rural areas with a bed patient ratio of 1: 4674 (Health on The March-2011-12).Against this backdrop it is important to identify the intra district disparities in health facilities and identify the backward regions for proper policy interventions.

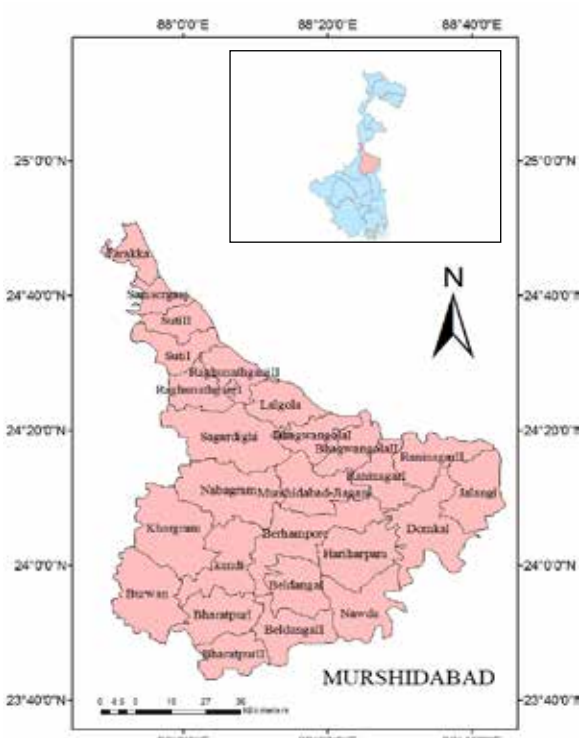
Objectives

To highlight the spatial disparity in primary healthcare facilities in different blocks of Murshidabad District, West Bengal.

To highlight the spatial disparity in health achievements in different blocks of Murshidabad District, West Bengal.

Study Area:

The geographical coordinates of the Murshidabad District are 23° 40'00"N to 25° 0' 00"N and 88° 0' 00" E to 88° 40' 00"E.It comprises 7103807 population (census 2011) having an area of 5341 sq. Km with a population density of 1334 persons per sq. km. This district is divided into two equal portions by Bhagirathi River, the western part known as Rarh and the eastern part known as Bagri.(Fig 1)



Data and Methods

Data:

The data has been gleaned from various secondary sources like Health on the March 2011-12, District Statistical Handbook 2011, Office of Chief Medical Officer of Health, Zilla Parishad of Murshidabud District, Directorate of Census Operations for the present analysis. For analysis of disparity in healthcare facilities we have considered five indicators. They are:

1) Number of primary health centre (PHC).

2) Beds per 1000 population in PHC.

3) Doctors per 1000 population.

4) Number of sub health centre per 1000 population.

5) Number of ASHA worker per 1000 population.

For analysis of spatial disparity in health outcome we have considered four indicators. They are:

1) Institutional Delivery
2) Home Delivery
3) Infant Death
4) Maternal Death

Methods:

For analysis of the intra district spatial disparity of healthcare facilities we use the Deprivation Index and Development Index using the selected five indicators. The value ranges from 0 to 1. To minimize the problem of extreme values each indicator is standardised by calculating the percentage of each indicator out of rural population in each block as the areal unit of study.

Deprivation Index (D.I)

$$D.I(I_{ji}) = \frac{Max_i - X_{ij}}{Max_i - Min_i} \text{----------1}$$

I_{ji} denotes deprivation index of the i variable at j unit of study, Max_i and Min_i denotes the maximum and minimum values of ith variable in the series respectively, and X_{ij} denotes original value of i variable at j unit of study.0 means absence of deprivation and 1 means most deprived block.

Average Deprivation Index (A.D.I)

$$A.D.I(I_j) = \sum_{i=1}^{n} I_{ji}/n \text{----------2}$$

Ij denotes the Index of Deprivation of jth unit of study

Development Index

$$Dev.I = \left(1 - \sum I_{ji}/n\right) \text{----------3}$$

Development Index ranges from 0 to 1 value. 0 value reflects undeveloped areas and 1 represents perfectly developed Block.

For highlighting the performance of Murshidabud in various health outcomes at block level we used mean and standard deviation. Two Health indicators has been considered for the calculation, they are:

1. Maternal Death
2.Infant Death

In this method mean and standard deviation method of the single variable dataset are computed first using the following equations

$$Mean(\mu) = \sum \frac{x_i}{n} \text{.....4}$$

$$StandardDeviation(\sigma) = \sqrt{\frac{\sum(x_i - \bar{x})}{n}} \text{.....5}$$

While drawing the choropleth table the value of Standard deviation is taken as the class interval and classes are drawn originating from the Mean of the distribution till the extremes are included as follows:

1. $(\mu - 3\sigma)$ to$(\mu - 2)\sigma$
2. $(\mu - 2\sigma)$ to $(\mu - 1\sigma)$
3. $(\mu - \sigma)$ to (μ)
4. $(\mu$to $(\mu + 1\sigma)$
5. $(\mu + 1\sigma)$to $(\mu + 2\sigma)$
6. $(\mu + 2\sigma)$ to $(\mu + 3\sigma)$

The area belonging to the higher class is more positively deviated from the area with the regional average; similarly the area belonging to the lower classes are more negatively deviated from the area with the regional average. Hence area of regional surplus and deficit areas with different degrees as specialisation or distinctiveness or development can be easily identified and mapped. Thus it has got special importance to the planner who identifies the regional "poor" areas and frame relevant strategies in order to erase the degrees of regional disparities.(Sarkar.A 2013)

III. Results and Discussion

Disparities through Deprivation

The deprivation index of each indicator and each block is determined with the help of five indicators by equation 1. The calculation of Deprivation index of different health indicators show that, in case of primary health centres, Nabagram and Jalangi, Suti-II, Farakka, Samserganj blocks show minimum deprivation and the blocks of Beldanga-I, Beldanga-II, Berhampore, Bhagawangola- I, Murshidabad-Jiaganj, Lalgola, Raghunathganj- I, Raninagar- I, Raninagar- II are completely deprived as the deprivation value is closer to 1. The blocks of Suti-I, Kandi, Khargram, and Bhagawangola-II have the considerable no. of PHC. In case of number of sub centres, only Suti-II and Sagardighi blocks are least deprived while Beldanga- I and Bhagawangola- I have highest deprivation. In case of number of bed per thousand population Suti-II is leading but Murshidabad-Jiaganj, Samserganj are the deprived blocks. In case of number of doctors Suti-II is leading to others but Murshidabad-Jiaganj, Beldanga-II and Berhampore are the deprived blocks. In case of number of ASHA worker Nowda is leading but Berhampore, Bhagawangola-I are the deprived blocks. Farakka, Sagardighi having the deprivation Index of developing.

II Disparities through Development Index:

With the help of different Deprivation Index, the Average Deprivation index (equation 2) and Development Index (equation 3) is determined. Highest value of Development Index (Table 2, Fig 7,8) is in the block Suti-II (0.67). So, Suti- II is the most developed block in Murshidabud District in respect to selected healthcare facilities at primary stage. Burwan (0.64) and Nowda (0.62) ranked second and third respectively. Bharatpur-II and Raninagar-II has medium value .Nabagram is the most under developed block among the blocks of Murshidabud District (0.14). The. Beldanga- I, Beldanga- II, Berhampore, Bhagawangola-I, Bhagawangola-II are also the under developed blocks in respect to selected health care facilities.

The Development Index significantly identifies the backward areas with respect to the selected indicators in this study. Regional identification is imperative for the geographers which will draw attention of the policy makers for fund channelization from already developed areas of medical facilities to the much needed

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backward areas of medical facilities. Each indicator selected is mapped separately in this paper to identify the surplus areas and deficit areas for individual facilities then a composite index called Development index is mapped to provide a holistic picture of the availability of all the facilities together.

Fig 2

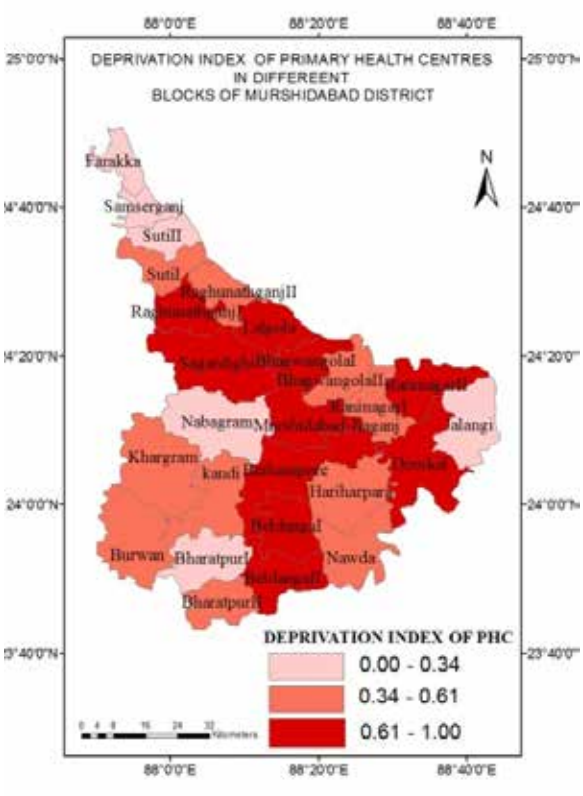


Fig 3

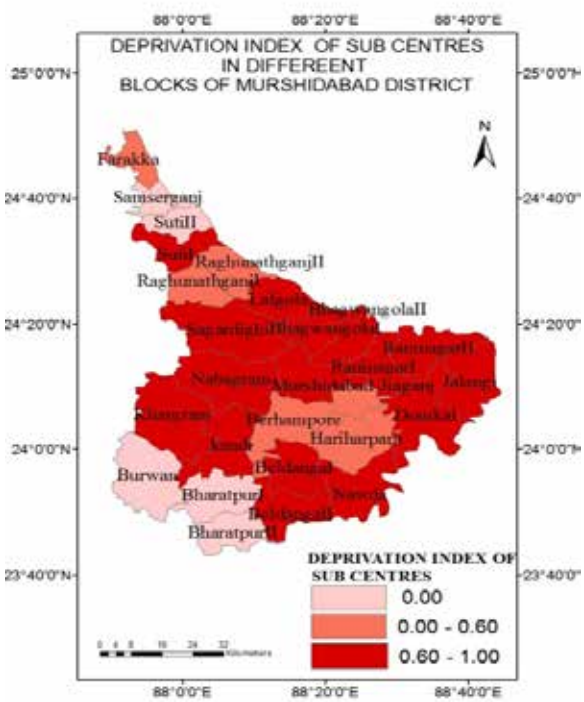


Fig 4

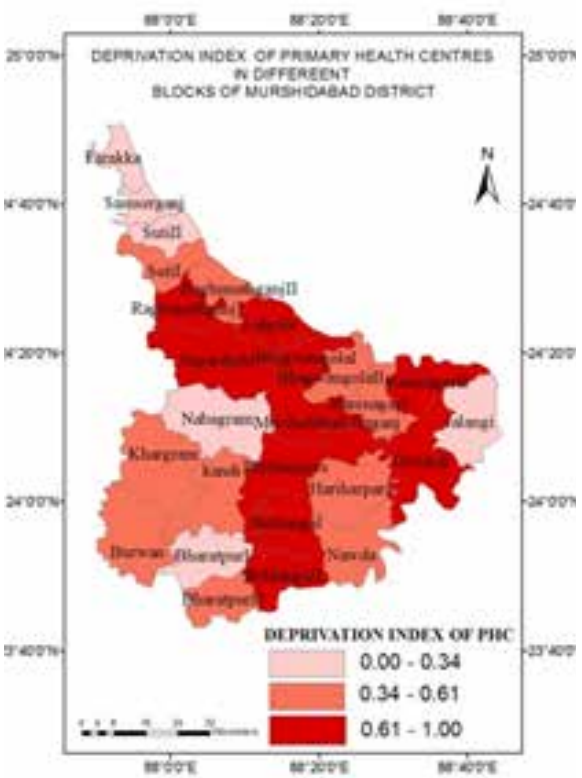


Fig 5

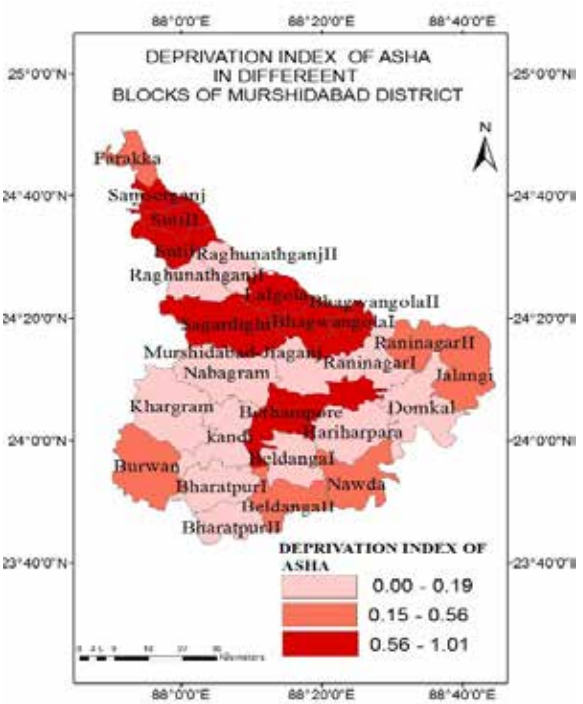


Fig 6

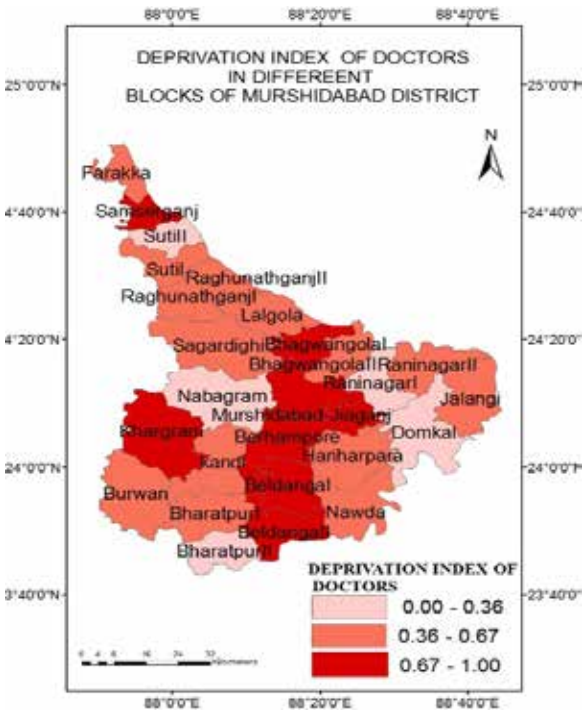


Fig 7

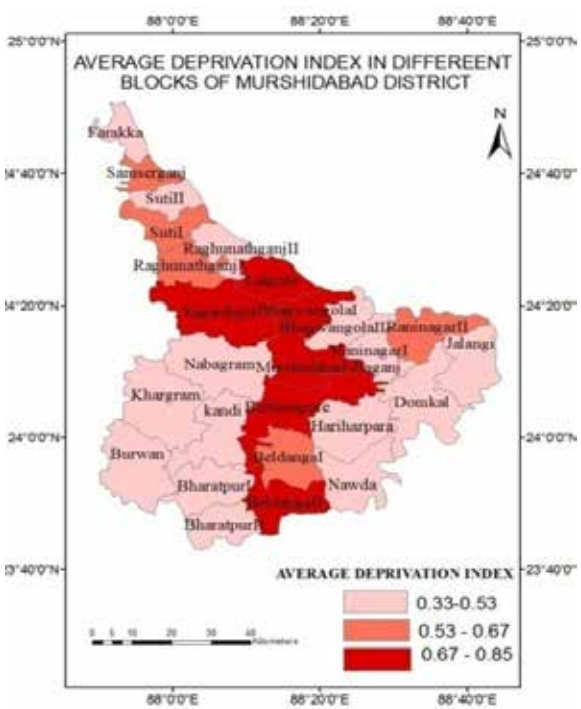
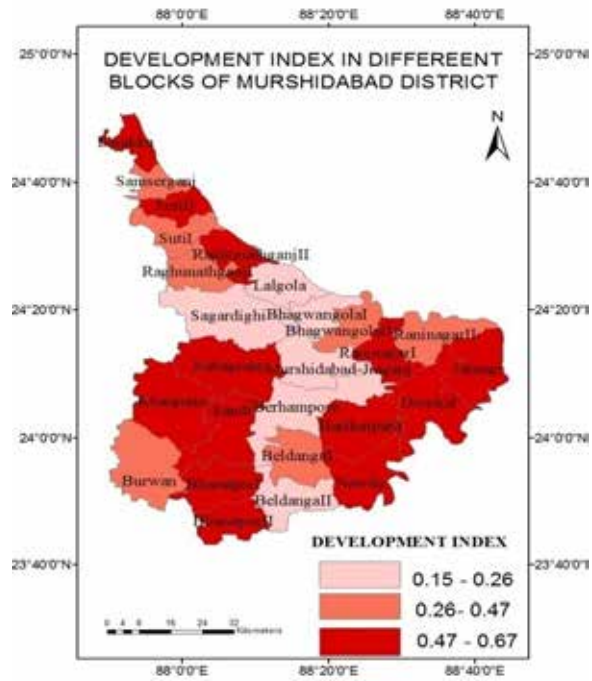


Fig 8



Maps are computed in Arc Gis version 9.3 by the authors

Spatial Disparity in Heath Outcome

For highlighting the performance of Murshidabud in health outcome at block level we use mean and standard deviation. Two heath outcome are considered for the calculation (equation 3, 4) they are:

a) Infant death b) Maternal death

Fig 8

Fig 9

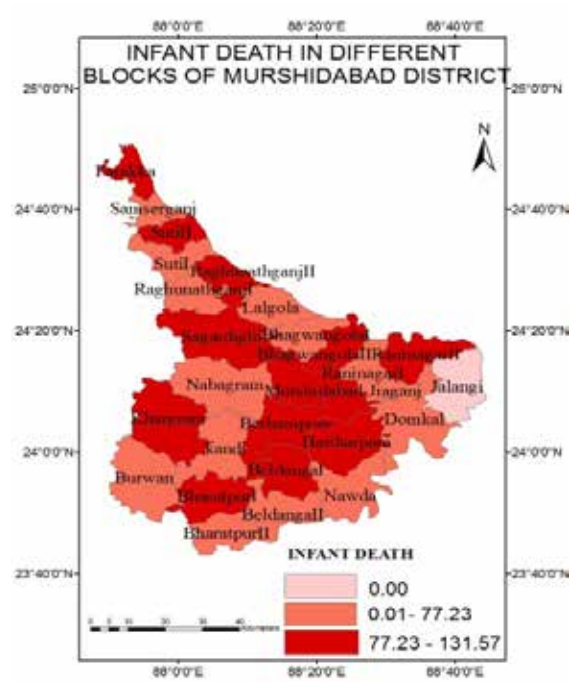


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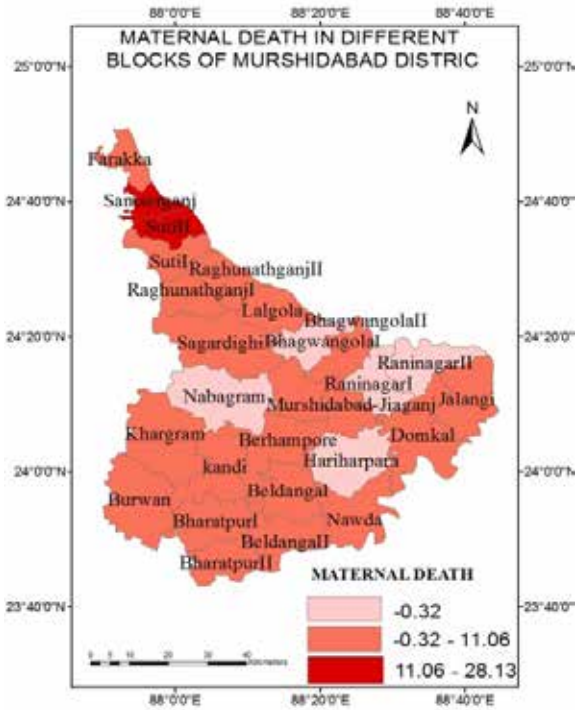
Fig 10



In case of infant death the blocks of Murshidabud District shows spatial variation. Different blocks are having different rate of infant death. Jalangi is the only block with lowest infant death .Twelve blocks have very high infant death including Suti II which is the most developed block in selected health care facilities (fig 9). Maternal death is also highest in Suti-II (fig 10) which indicates that heath outcome like infant and maternal death depends lesser on these heath facilities. There must be other economic and socio-demographic factors that influence these health outcomes more. Identification of such factors is a field of further research. However correlation coefficient between number of ASHA and maternal death is 0.54 which indicates that increase in deprivation of ASHA will enhance maternal death and the correlation can explain the relation between these two indicators up to 54% which is not very trivial.

Conclusion

The National Rural Health Mission is a flagship scheme launched in 2005 to perform necessary architectural correction in the primary healthcare delivery System (Sinha .A, 2009). In this regard, this study shows that primary healthcare system in Murshidabud is lagging behind in some regions. All the blocks in Murshidabud District are not performing similarly even under one flagship programme. The District of Murshidabud is barely functioning compared to IPHC standards. This is astonishing because entire District comes under the same policy and similar funding decision. Thus minimizing geographical variation in healthcare is an ardent need.

Even we are far from commitment of 'Universal Health Coverage' addressing the geographical gaps, the policy planners should concentrate in the correction of anomalies that arises in between the availability and use of the primary healthcare facilities in PHC level in effective way, so that optimum use of limited resources can be ensured at least in favour of the poorer section of population.

Identification of comparatively weak blocks within the preview of PHCs will help planners and policy makers to suggest the strong intervention on urgent basis.

Table:1 Computation of Deprivation Index of Selected Indicators

S L NO.	NAME OF BLOCKS	D.I OF PHC	D.I OF BEDS	D.I OF DOCTORS	D.I OF SUBCENTRES	D.I OF ASHA
1	BELDANGA-I	0.944937813	0.757576	0.755455	0.9	0.010416667
2	BELDANGA II	0.889875625	0.69697	0.8	0.85	0.5625
3	BERHAMPORE	0.834813438	0.818182	0.781818	0.7	0.958333
4	BHAGAWANGOLA-I	0.779751251	0.757576	0.709091	0.9	0.770833
5	BHAGAWANGOLA-II	0.614564689	0.636364	0.472727	0.85	0.010417
6	BHARATPUR-I	0	0.582062709	0.513783175	0.770778226	0.184089622
7	BHARATPUR-II	0.557766762	0.360353999	0.1977074	0.668363064	0.005903416
8	BURWAN	0.419863035	0.384725821	0.651126256	0.74289238	0.452090519
9	DOMKOL	0.724689063	0.393939394	0.309090909	0.9	0.15625
10	FARAKKA	0.339253752	0.515151515	0.4	0.5	0.489583333
11	HARIHARPARA	0.559502501	0.484848485	0.436363636	0.7	0.03125
12	JALANGI	0.229129377	0.636363636	0.581818182	0.85	0.270833333
13	MURSHIDABAD-JIAGANG	0.834813438	1	1	0.9	0.020833333
14	KANDI	0.559502501	0.606060606	0.418181818	0.8	0.135416667
15	KHARGRAM	0.504440314	0.090909091	0.763636364	0.85	0.166666667

16	LALGOLA	1	0.575757576	0.672727273	1	1.010416667
17	NABAGRAM	0.119005002	0.545454545	0.363636364	0.85	0
18	NOWDA	0.559502501	0	0.6	0.8	0.3125
19	RAGHUNATHGANJ -I	0.889875625	0.666666667	0.6	0.7	0.052083333
20	RAGHUNATHGANJ -II	0.449378127	0.606060606	0.454545455	0.45	0.197916667
21	RANINAGAR-I	0.614564689	0.333333333	0.272727273	0.75	0.041666667
22	RANINAGAR-II	0.724689063	0.666666667	0.581818182	0.85	0.3125
23	SAGARDIGHI	0.779751251	0.636363636	0.636363636	0.9	0.770833333
24	SAMSERGANJ	0.284191564	0.96969697	0.981818182	0	1.010416667
25	SUTI-I	0.559502501	0.393939394	0.436363636	0.8	1
26	SUTI-II	0.284191564	0.363636364	0	0.15	0.84375

Computed by authors.

Table 2: Computation of Average Deprivation Index and Development Index

AVERAGE DEPRIVATION INDEX	PERFORMANCE	DEVELOPMENT INDEX	PERFORMANCE	SL NO.	NAME OF BLOCKS
0.673677096	HIGHLY DEPRIVED	0.326322904	LOW	1	BELDANGA-I
0.759869125	HIGHLY DEPRIVED	0.240130875	LOW	2	BELDANGA II
0.818629288	HIGHLY DEPRIVED	0.181370712	LOW	3	BERHAMPORE
0.78345025	HIGHLY DEPRIVED	0.21654975	LOW	4	BHAGAWANGOLA-I
0.516814538	HIGHLY DEPRIVED	0.483185462	LOW	5	BHAGAWANGOLA-II
0.410142746	MODERATE	0.589857254	MODERATE	6	BHARATPUR-I
0.358018928	LESS DEPRIVED	0.641981072	MODERATE	7	BHARATPUR-II
0.530139602	MODERATE	0.469860398	MODERATE	8	BURWAN
0.496793873	MODERATE	0.503206127	MODERATE	9	DOMKOL
0.44879772	LESS DEPRIVED	0.55120228	MODERATE	10	FARAKKA
0.442392924	LESS DEPRIVED	0.557607076	MODERATE	11	HARIHARPARA
0.513628906	MODERATE	0.486371094	MODERATE	12	JALANGI
0.751129354	HIGHLY DEPRIVED	0.248870646	LOW	13	MURSHIDABAD-JIAGANG
0.503832318	MODERATE	0.496167682	MODERATE	14	KANDI
0.475130487	MODERATE	0.524869513	MODERATE	15	KHARGRAM
0.851780303	HIGHLY DEPRIVED	0.148219697	LOW	16	LALGOLA
0.375619182	LESS DEPRIVED	0.624380818	GOOD	17	NABAGRAM
0.4544005	LESS DEPRIVED	0.5455995	MODERATE	18	NOWDA
0.581725125	MODERATE	0.418274875	LOW	19	RAGHUNATHGANJ -I
0.431580171	LESS DEPRIVED	0.568419829	MODERATE	20	RAGHUNATHGANJ -II
0.402458392	LESS DEPRIVED	0.597541608	MODERATE	21	RANINAGAR-I
0.627134782	MODERATE	0.372865218	LOW	22	RANINAGAR-II
0.744662371	HIGHLY DEPRIVED	0.255337629	LOW	23	SAGARDIGHI
0.649224677	MODERATE	0.350775323	LOW	24	SAMSERGANJ
0.637961106	MODERATE	0.362038894	LOW	25	SUTI-I
0.328315586	LESS DEPRIVED	0.671684414	GOOD	26	SUTI-II

Table 3: Computation of Mean and standard Deviation.

CRITERIA	MEAN	STANDARD DEVIATION	VALUE

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Calculation for maternal Death	77.23	27.17	22.89 to 50.06
			50.06 to 77.23
			77.23 to 104.7
			104.7 to 131.57
Calculation for Infant Death	5.36	5.69	-0.32 to 5.37
			5.37 to 11.06
			11.06 to 16.75
			16.75 to 22.44
			22.44 to28.13

Computed by authors

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REFERENCE

1.Husain.Z (2011): "Health of the National Rural health Mission", Economic and Political Weekly, XLVI (4): 53-60 2.Nayar. K.R (2004): "Rural Health: Absence of Mission or Vision"? Economic and Political Weekly :(4872-4874).Patil.A.V, Somasundaram and R C Gopal(2002): "Current Health Scenario in 3.Rural India", Australian Journal of Rural Health,10(2):129-35 4.Park.K (2009),'Preventive and Social Medicine', 12th edition, Banarasidas Bhanot Publishers,India :29-30 5.Planning Commission of India (2011): High Level Expert Group Report on Universal Health Coverage for India, Government of India, New Delhi. 6.Reddy, K S, V Patel, P Jha, V K Paul, A K Kumar, L Dandona and H Lancet India Group (2011): "Towards Achievement of Universal Healthcare in India by 2020: A Call to Action", Lancet, 377(9767):760-68. 7.Sinha.A (2009): "In Defence of National Rural Health Mission", Economic and Political Weekly, XLIV (14): 72-76 8. Sarkar.A(2013): " Quantitative Geography- Techniques and Presentations", Orient Blackswan.