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Geographical Variation Of Human Development Elements In Kharagpur Sub-Division (West Bengal) – A GIS Based Study

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Abstract

Geographers and regional planners have long faced difficulties due to geographic disparities in human development results. There are many various methods for measuring the development gap, and each one offers a distinct way of classifying the world according to its level of development. Present study is to investigate the geographical variation of human development index (HDI) and socio economic elements that have an impact on sustainable regional development. The study is based on the secondary data, and sources are from Census of India, United National Development Programme (UNDP) and district human development report at different time intervals. The social development indices have been calculated like adult literacy index, female literacy index, gender parity index, child health index, adult health index ,malnutrition index, work participation rate etc .All these information have been integrated into GIS platform. Spatial and overlay analysis have been performed to determine the regions under high, medium and low development within the study site. The very high value of education index is calculated for Pingla and Sabang block. The low value of education index is calculated for Dantan-I, Kharagpur-I and Kharagpur-II block. The results' clear-cut implications show that Debra Block has already succeeded in making a 69.3% improvement in her health, while the remaining 30.70% still has to be made. Cultivators and agricultural labourers made the largest contribution to the labour force out of all occupations. In Pingla, farmers made up 45.10percent of the overall workforce, whereas in KharagpurI, they madeup 38.07percent.This information would then be used to help plan more effectively and take mitigating measures.

Keywords:Human development index, GIS, Regional development, Kharagapur sub-division.

Introduction:

The Human Development Index (HDI) ,which was designed to be a straightforward and clear tool for comparing the advancement of human development (Morse, 2003).Specifically, HDI is an amalgamation of life expectancy, education, and gross domestic product per capita. Compared to simple economic figures, it is a more accurate measure of a region, s total development since it can show the proper distribution of resources and the balance between economic growth and social development. Most crucially, it can to a certain measure, reflect the equity of health (Thapa,1995;Chua at al..,2014).

Literature review :

1)In 2015,Alves et al,(2016) looked at the HDI of 187 nations.Three BoD models (convectional,SBM,and Multiplicative models),two extensions(inverted frontier and common weights techniques),and two types of data were used by the authors(raw and normalized).they also looked into the possibility of include fake countries in the sample.

2)The country that stood out the most was HongKong ,hatefi and torabi(2018) on the other hand proposed a version of the prior model that could be used to defile targets for nation with low HDI.

3) Khan et al .,(2013) A block-by- block analysis of social settings of human vulneravility in Paschim Medinipur District,West Bengal,in light of regional space economic connections .

The jamboni Block is the most vulnerable , followed by Naygram Binpur-1 and others.On the other hand Daspur-II is the most succetible, followed by Daspur-I and Ghatal.

Research Gap and Emergence of the problem:

The spatio- temporal characteristics of HDI in the Kharagpur Sub-Division during the past decades have not before been the subject of research which is the research gap in this context. Although the Kharagpur Sub-Division is considered and advance division in Paschim medinipur District,West Bengal in terms of Physical,social and economic development,it featured a few Backwared regions, particularly in the Western section which highlighted the difficulties of extreme regionl imbalances among the blocks.

Objectives of the Study area :

To investigate the spatiotemporal pattern of HDI and socio- economic elements that have and Impact on sustainable development in Kharagpur Sub-Division.

Study Area :

Kharagpur sub-division is a part of Paschim Medinipur District in West Bengal, India. Ten blocks made this sub-division. These are Pingla, Sabang, Narayangarh,Mohanpur,Keshiary, ,Dantan-l&ll,Kharagpur l&ll, and Debra. The District agriculture relies heavily on river water. Rivers run in either a north-south or a south-east direction. Kangsabati, Haldi, Rasoolpur, Keleghai, Subarnarekha are some of the prominent rivers. It expresses regional diversity in terms of physiographic,agro-climatic,economic and social aspects, among other things. The mean annual rainfall during the monsoon season ranges from 997.3 to 1354.7mm.Kharagpur sub-division had a literacy rate of 80.51%.

Methodology:

The data will be arranged classified and presented in form of tables and figures. Statistical tools and technitues like percentage ,mean correlation coefficient etc.have used whatever applicable.The social development indices have been calculated like adult literary Index, female literacy index, gender parity index, child health index, adult health index, malnutrition index, work participation rate etc. The ALI is calculated using the following formula:

$$\textbf{ALI} = \frac{\text{Adult literacy rate-0}}{\text{100-0}}$$

The average adult literary index in the study area is calculated as o.698 with a standard deviation of 0.067. The index of female literacy is calculated based on the below equation:

$$\textbf{FLI} = \frac{\text{Number of female literate population}}{\text{Total Population}} \times 100$$

GPI is calculated using the following formula:

$$\textbf{GPI} = \frac{\text{No of Female pupils enrolled in a particular level}}{\text{No of male pupils enrolled of that particular level.}}$$

Two dimensions, CHI and AHI form the basis of the composite index. Where Immunization index and Institution Delivery index combined to form CHI and Drinking Water Facility index and Adult survival index are combined to form AHI. According to an investigation of the subject areas occupational structure conducted in 1951,agricultural laborers cultivators make up the research areas workforce. In addition to this, there are domestic industry, manufacturing, building, trade and commerce as well as transportation and communication.

Data Collection :

Secondary data collected for this paper from the Census of India 2001,2011 and the District Information System for Education (DISE), the District Statistical Handbook of the Paschim Medinipur District and also using the methodology of UNDP (United Nations Development Programme).

Analysis of Collected Data :

In the study area, the highest adult literacy index is observed in Pingla (0.81),followed by Sabang 0.78).The moderate adult literacy index is observed in Dantan-ll,Mohanpur and Debra block.The lowest adult literacy is observed in Dantan-l,Keshiary and Kharagpur-ll block as shown in the Table-1.

Table 1: Computation of Adult Index (ALI) for Kharagpur sub-division for the period between 2005 and 2015

Block	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Average	Rank
Debra	0.72	0.76	0.77	0.80	0.82	0.84	0.84	0.78	0.90	0.92	0.81	1
Pingla	0.71	0.71	0.74	0.75	0.77	0.80	0.82	0.83	0.87	0.90	0.79	2
Keshiari	0.39	0.42	0.43	0.52	0.29	0.37	0.46	0.50	0.55	0.61	0.45	10
Datanl	0.37	0.42	0.43	0.46	0.49	0.51	0.53	0.48	0.56	0.59	0.48	9
Datanll	0.61	0.64	0.65	0.67	0.74	0.76	0.77	0.73	0.83	0.84	0.72	4
Narayangarh	0.54	0.56	0.57	0.61	0.69	0.72	0.76	0.76	0.79	0.79	0.68	6
Mohanpur	0.60	0.63	0.64	0.67	0.71	0.73	0.75	0.76	0.77	0.77	0.70	5
Sabang	0.63	0.66	0.71	0.72	0.76	0.77	0.79	0.77	0.80	0.83	0.74	3
Kharagpurl	0.86	0.78	0.64	0.55	0.59	0.61	0.64	0.61	0.67	0.69	0.66	7
Kharagpurll	0.47	0.48	0.49	0.49	0.54	0.54	0.55	0.51	0.59	0.64	0.53	8

Source: I.**Census of India,1991,2001,2011**; II: **District Statistical Hand Book 2005 to 2015**

Figure 1, Spatial variation of female literacy index in Kharagpur Sub-Division

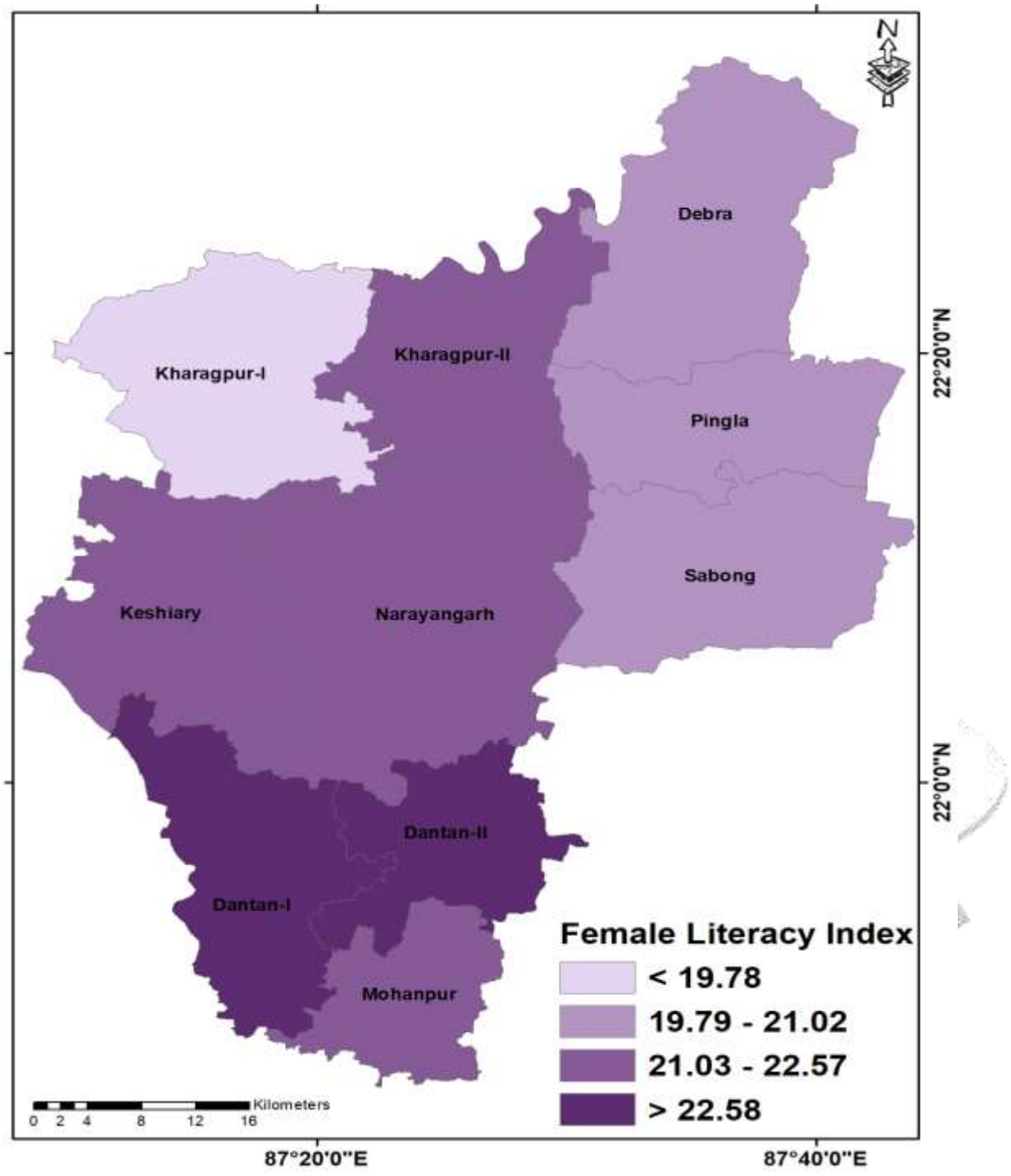

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Figure 1, illustrates the spatial distribution of female literacy in Kharagpur sub-division. The female literacy of the study area is varied between 19.78 and 22.84. The average female literacy index is calculated 21.764.The maximum female literacy index is calculated for Dantan-l(23.6)and Dantan-ll(22.84),located in southern part of the sub-division. The lowest female literacy index is calculated for Kharagpur-l(19.78),located in the north-west of the sub-division.

Table -2, Estimation of gender parity index in Kharagpur Sub-Division

Block	Primary			Upper Primary		
	Boys	Girls	GPI	Boys	Girls	GPI
Debra	8171	7791	0.95	8629	8527	0.99
Pingla	7140	6988	0.98	8549	7502	0.88
Keshiari	5138	4938	0.96	5888	4926	0.84
Dantan I	4702	4517	0.96	5849	5093	0.87
Dantan II	5151	4972	0.97	5240	4824	0.92
Narayangarh	9032	8686	0.96	11219	9580	0.85
Mohanpur	3848	3811	0.99	4262	3333	0.78
Sabang	12544	12146	0.97	10964	10186	0.93
Kharagpur I	5072	5132	1.01	3690	3284	0.89
Kharagpur II	5562	5394	0.97	6129	5622	0.92

Source : DISE, 2014-2015,Paschim Medinipur.

Table 2 shows that in the primary level, the highest GPI is calculated for Kharagpur-l block (1.01),followed by Mohanpur (0.99)and lowest value of GPI is calculated for Debra (0.95).The maximum GPI value index at upper primary level is observed Debra, Kharagpur-ll,Sabang and Dantan-ll block.The lowest GPI value at upper primary level is observed in Mohanpur block.

In the study area, the highest CHI is calculated for Debra, Narayangarh and Dantan-ll and lowest CHI is calculated in Keshiary and Kharagpur-ll, on the other hand highest AHI is calculated in Debra and lowest is Keshiary as shown in the figure 2&3. The highest Child Malnutrition Index (CMI) is calculated for Narayangarh, Pingla and Debra block. The lowest CMI index is calculated for Keshiary Dantan-l&ll and Kharagpur-l&ll block.

Figure -2, Spatial variation of Child Health index in Kharagpur Sub-Division

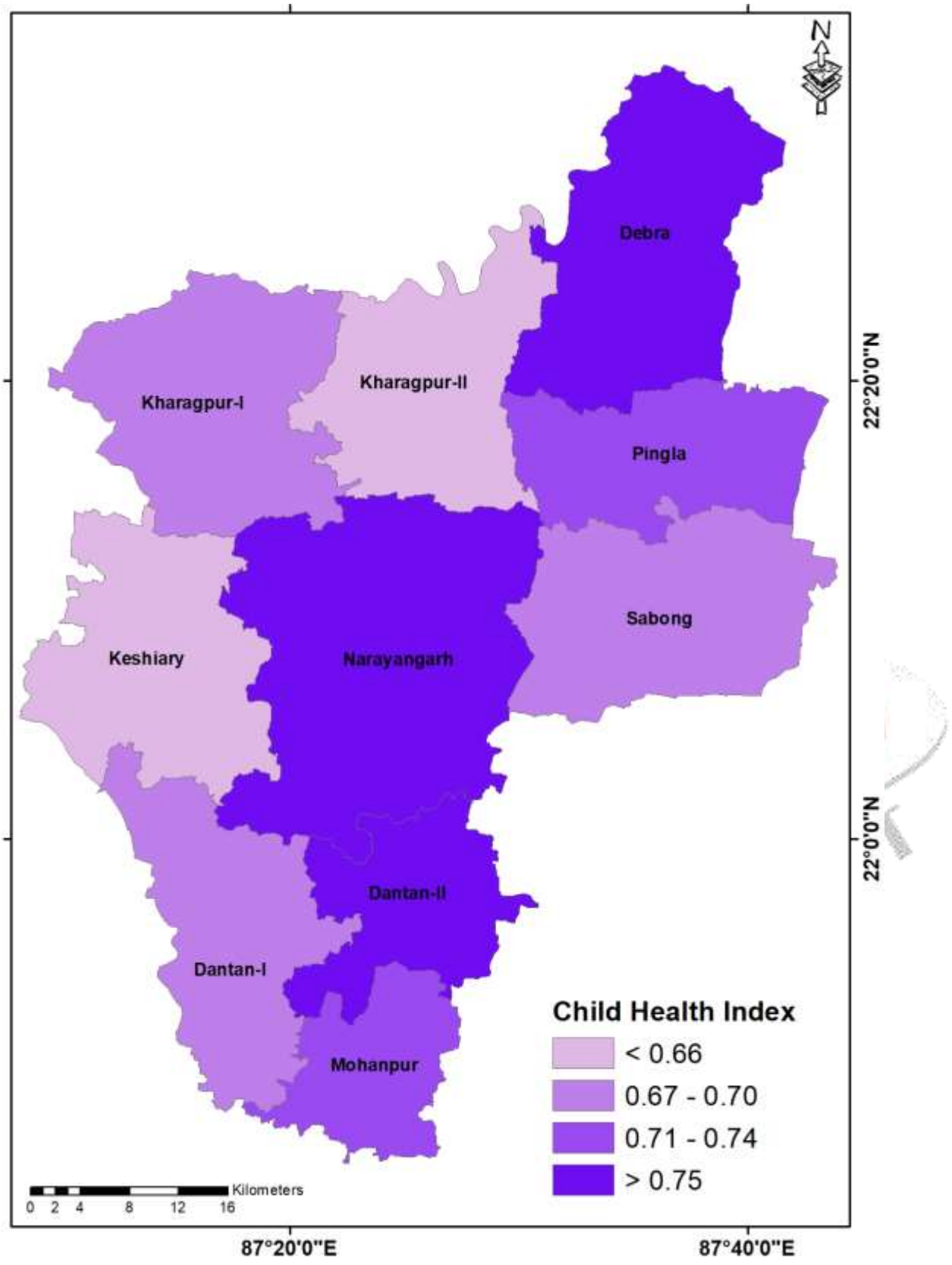

Figure- 3, Spatial variation of Child Malnutripiol index in Kharagpur Sub-Division

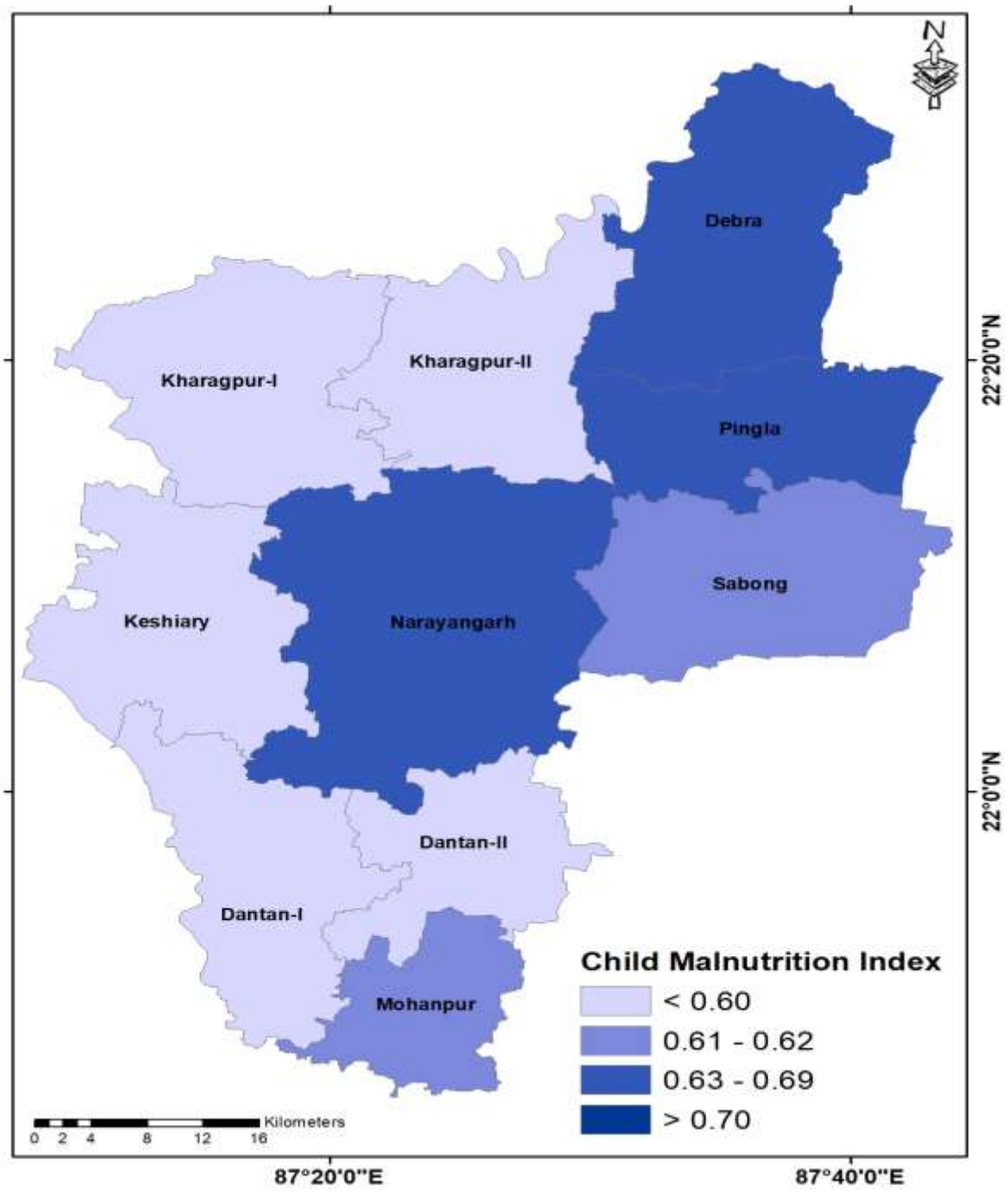

Table-3,Block wise Working status in Kharagpur Sub-Division form 1991-2011

Block	1991				2001				2011			
	Cultivator	Agricultural Labour	HH Worker	Other Worker	Cultivator	Agricultural Labour	HH Worker	Other Worker	Cultivator	Agricultural Labour	HH Worker	Other Worker
Debra	36.97	43.35	2.1	5.33	27.41	42.59	2.9	27.09	29.14	37	3.64	30.23
Pingla	49.68	29.01	7.19	6.15	45.1	30.08	4.26	20.56	33.12	38.3	3.26	25.32
Keshiari	43.57	46.38	1.81	3.95	24.39	51.39	4.34	14.87	29.36	46.99	3.16	20.5
Dantan I	55.27	26.62	4.17	4.56	38.09	39.18	3.43	19.3	35.55	34.6	2.35	27.49
Dantan II	54.48	30.18	2.27	5.12	39.14	35.95	3.53	21.38	38.75	35.61	1.73	23.9
Narayangarh	47.51	33.5	4.66	5.33	29.84	43.47	8.09	18.61	33.54	41.36	3.27	21.83
Mohanpur	60.3	22.68	3.57	5.71	47.91	30.99	3.24	17.86	45.52	38.3	1.44	14.75
Sabang	51.03	19.59	18.4	5.23	37	25.02	25.21	12.77	40.49	33.25	8.45	17.81
Kharagpur I	12.19	17.08	1.87	20.51	7.03	16.39	1.69	74.89	13.79	33.12	1.39	51.7
Kharagpur II	32.47	48.13	2.17	6	25.11	49.03	2.34	23.52	25.05	42.31	2.97	29.66

Source: Census of India, 1991,2001,2011

Table-3 shows that a larger portion of the population engaged in agricultural activities in 1991.Only 12.19% of all workers in Kharagpur-l block fell into the category of cultivators, compared to approximately 60.30% of all workers in Mohanpur block. The distribution of the working population in the blocks of the Kharagpur sub-division varied in 2001. In Pingla, farmers made up 45.10%of the total labour force, whereas in Kharagpur-l,they made up 38.07%.In Keshiary and Kharagpur-l ,the proportion of workers employed as agricultural laborers was 51.39% and 16.39% respectively. In Sabang and Kharagpur-l block, domestic industrial laborers made up 25.21 and 1.69% of all workers. Similarly in 2011,out of all workers, cultivators and agricultural laborers contributed the most, followed by other workers. Sabang contributed the most cultivators, or 27.45%,and Kharagpur-l made the least contributions, or 5.48%.

Results :

*The average adult literacy index in the study area is calculated as 0.69 and highest is observed in pingla (0.815) and average female literacy index is 21.764.

* In primary lable highest GPI is Calculated in Kharagpur-I (1.01)and lowest is Debra block, wheras in upper primary level highest GPI is observed in Debra and lowest in Mohanpur Block.

* CHI ad CMI highest in Narayangarh and lowest in Keshiary.

* The highest percentage of farmer 81.29 were in Sabang Block.

*Arround 61.27% of the labour force is employed in agricultural parsuits.

Conclusion:

As Human Development Index consists of three different aspects like education, health and income, but among these three, there are some variation of HDI in my Kharagpur sub-division, such as highest adult literacy index is observed in Pingla (0.815),followed by Sabang (Sabang (0.78)block. The maximum female literacy index is calculated for Dantan-l (23.6) and Dantan-ll (22.84)block. In my subdivision the highest Child Malnutrition Index (CMI) is calculated for Narayangarh, Pingla and Debra block and lowest CMI index is calculated for Keshiary, Dantan-l & ll and Kharagpur-l &ll block. The highest percentage of farmers or 81.29 percent were in Sabang block. Therefore, it is clear that all the blocks in my subdivision are not same position in terms of human development index.

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