Measuring Spatiality in Infrastructure and Development of High School Education in Hooghly District of West Bengal, India

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Abstract

An increasing access and enrolment do not necessarily ensure school effectiveness or educational progress. They are, of course, other parameters of development of education, rather than being measures of standards of quality education. The present paper opts to scrutinize whether infrastructural development in schools at all ensures good educational development or not. To accomplish this, Education Infrastructural Index has been prepared through Access, Facility and Teacher Index whereas a combination of Enrollment Index and Literacy Index gave rise Educational Development Index. The study reveals that accessibility factor begets a division within rural spaces in the form of backward rural, rural and prosperous rural that manifests through the availability of the teachers and facilities. In the urban areas, wherein accessibility is not a matter of concern, facilities and teachers matter in making difference between the less developed and developed urban areas. The higher Educational Development Index at the non-rural areas indicates town- centric nature of the development of our educational system. Superimposition of the infrastructural and developmental parameters revealed that good infrastructure does not always ensure good educational achievement. In the light of these backdrops, the key purpose of this article is to measuring spatiality in infrastructure and development of high school education in Hooghly District of West Bengal, India.

Keywords: Education, Education Infrastructural Index, Teacher Index, Enrolment Index, Literacy Index, Education Development Index, Quality Education, West Bengal, India

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Introduction

This study aims to examine the intricate relationships between spatiality, dichotomy with regard to infrastructure and development of high school education in Hooghly district of West Bengal. If "access" was a defining educational opportunity theme for higher education beginning in the mid1960s, "retention" has become a defining theme for the 1990s and beyond. "In our national perception, education is essentially for all. This is fundamental to our all-round development, material and spiritual" says India's National policy on Education (1986). In addition, *Sarva Shiksha Abhiyan* (SSA) mandated by the 86th Amendment to the Constitution of India and Right to Education Act (RTE) enacted on August, 2009 have started journey towards making free and compulsory education to children between age group of 6 to 14 years as a 'fundamental right'. Nevertheless, the magnitudes of under-representation of students remain high. However, rates of successful completion of primary schooling still lag behind the desired level as most children fail to complete the grades for which they are enrolled.

Peoples' access to education depends crucially on the educational infrastructure in place. Effective and fruitful functioning of schools relies on the provision of physical and human facilities. Accessibility is a major determinant of schooling that shows variations over space. And also the favourable literacy, enrolment level, pupil-teacher ratio, student-classroom ratio, teacher-school ratio, pupil-school ratio, co-curricular activities, training and educational quality of teachers, plenty of subject teachers etc. are mandatory to make learning environment healthy within the school environment (Bhatta, 2010). This paper attempts to look at the extent of availability of these facilities. This is intended to unfold the dichotomy of the infrastructural and achievement arena in rural and non-rural areas.

The transformation of the globe from a 'Growth Based Economy' to 'Knowledge Based' one and ever-increasing emphasis on Human Development has brought education into the forefront of developmental debate (Sujatha and Rani, 2011). It is believed that an increasing access and enrolment do not necessarily ensure school effectiveness or educational progress. They are, of course, parameters of development of education, rather than being measures of standards of quality education (Sujatha and Rani, 2011). The article begins with a review of literature and the conceptual framework. Following this, it discusses the objectives and methods of this article. Then it goes on to discuss the results.

Review of Literature

This section attempts to review the related literature on spatiality, dichotomy and problems of high school education to have a view of broad spectrum of these studies.

Spatiality of School Education

Spatiality is one of the dimensions that influence the whole process of schooling. The concentration or deconcentration of schools, the convergence or non-convergence of schools, the aspects of accessibility and schooling momentum, spatial planning of school location and lacunae are some of the spatial aspects upon which the school education heavily depends on.

Mitra, Dangwal and Thadani (2008) explored the relationship between the physical remoteness and quality of primary education in rural North India. The study found a significant negative correlation between the quality of education and the distance of a school from the nearest urban centre. Mukherjee (2009) estimated the effect of better roads on students' enrolment in schools of rural India. The instrumental variable estimates reveal that an improved access to school by new all-season roads increased school enrolment by 22% in 2009. The study conducted by Raza et al. (1984) portrays the interregional variation in the population by schools of within the perceived walkable distance. With an aim to analyse their spatial pattern the study reveals that the areas with inhospitable physical conditions are characterised by poor accessibility to schools.

The very objective of education for all cannot be achieved unless spatial dimension of problem is taken into consideration. This was echoed in Makhija's work (1977) which made an appeal to undertake locational surveys of education on micro-level to realize the areal problems and locational validity. Considering education as a point located phenomena, the study showed uneven distribution of educational institutions which are closely interlinked with accessibility and connectivity. Ray (1982) tried to diagnose the spatial dimension of school education, the significance of block-level disparity regarding qualitative and quantitative aspects of school education and mapping of the exact locations of schools.

Keeping in mind the perception of educational planning Anitha (1997) sought to identify the linkages and qualitative aspects of school education at the state, the district and sub-district levels. The researcher found that action plans in education are drawn without any evaluation of the merits and demerits of the previous plans. Educational planning embraces top-down approach. It is not decentralised. Qualitative aspects are lacking. The idea of schools has been transformed into day care centres of children especially in rural areas.

Tilak (1991) tried to look into the problems and prospects of educational planning in the rural areas of India. A top-down empirical approach has been adapted to highlight the inter-regional disparities of planning at micro level. The study is almost a pioneering effort in India to consider school cluster as an area of investigation.

Dichotomy of School Education

School education responds differentially in different geo-environmental settings. Differences are there between the urban and non-urban areas in a broader spatial context between the various types of managements of education and within the urban and rural areas, education spaces embrace dynamicity.

Mc Cracken and Barclnes (1991) made an attempt to expose the relationships between students' background, occupational aspirations and location of schools in urban as well as rural areas of Ohio, USA. The researcher found rural schools to be a mechanism for community cohesion and continuity while urban schools were interpreted as vehicles for bringing about societal change. Dichotomy exists with regard to school size, enrolment, curricular and extra-curricular offerings, teaching aids, per-pupil expenditure, school staff, ethnic and cultural background, course contents, socio-economic status of students, etc. between the urban and non urban areas.

Khattri et al. (1997) attempted to scrutinise the processes along with structures in poor rural school that place students at risk of failure. A combination of families' socio-economic background and school distance from home disables students in accessing education (James et al. 1999). The study pointed out that the rurality and socio-economic background combine to produce greater educational disadvantages in rural areas. Less parental involvement to schooling, socio-economic conditions, less supportive communities, substantial school to home distance, huge cost of living away from home, discouraging accessibility, cost of higher education – all these barriers paralyze the rural schooling. Britto (1987) in the same way depicted the qualitative and quantitative disparities of schooling in different socio-economic settings. The study uncovered glaring disparities predominating with regard to the physical facilities, administrative structures, financial provisions, school environments, students' perception of school life and home, the level of educational aspiration and home atmosphere, etc. between these schools. Ganguly (1989) placed similar opinion by setting positive relationship with parenting process and parenting style with scholastic achievement of the students of both rural and urban areas. This relationship also stayed when teacher-classroom behaviour, teaching effectiveness are concerned. The same tuning came out from Sujatha and Rani, G. (2011) in the context of rural-urban dichotomy of school-education on various aspects, such as quality and availability of infrastructure, academic facilities in

secondary schools, extent of transition, dropout and repetition, performance of students in public examinations, the nature and extent of private tuitions, planning and management of curriculum including textbooks, etc.

Spatial analysis of school education is a significant indicator of the relative development of a region. The present study is an attempt to explore the nature of school concentration in rural and non-rural areas; the nature of relationship between accessibility and schooling on diverse spaces; spatiality in infrastructural development and education development in different spaces.

Conceptual Framework

School education in India of present day is far and wide different from ancient period. It has experienced wider discourse over time. After the 1990s, secondary and higher education in India is experiencing structural changes due to the process of globalisation (Agarwal, 2006) and economic reforms. It is argued that the emergence of threat from SATION syndrome—globalisation. liberalisation, modernisation, standardisation—all have pushed the traditional schools in urban areas towards marginalisation (Das, 2009). This is because these 'sations' have widened the rural-urban dichotomy in the realm of education in general and infrastructural, socio-cultural environment of schools in particular. The present growth of civilisation featured by globalisation and modernisation brings about significant changes in quantitative and qualitative dimensions of high school education of rural and non-rural areas. The mushrooming of English medium schools and sophistication of modern education are found to be ringing the death-knell of traditional educational environment. Educational ethics are being engulfed by the prosperity of techno-economic education. The traditional education system is gradually taking a backseat. The slow and steady rise of alternative education system in the form of non-formal education and E-learning are magnifying the dichotomies like Private Vs Public education, English VS Non-English

medium schooling in urban areas. Traditional schools in urban areas are sailing like boats without rudders (Ghosh and Guchhait, 2014.

Forces of globalisation, over the past twenty five years or so, have been instrumental in radical reshaping of the entire socio-economic topography of India. The gap between the wealthy and the poor has widened. With the growing prosperity of urban centres under the influence of new liberal economy, there has been a massive movement of people from the rural to urban areas (Baranov, 2006; Sassen, 1988). The immigrations are settling disproportionately in urban centres and putting stress on urban schooling as a result. Urban school systems have to renegotiate the tension between the "two"—the immigrants' diverse academic needs and their multifaceted cultural traits. It is important to note that most of the immigrant families in urban areas represent displaced agrarian families (Baronov, 2006, p.13). Thus, many students' families operate within the cultural norm of a rural household. Very often the parents possess little or no formal education. Against this backlog, the first generation urban students mostly gather in the public schools with meagre resources. On the other hand, the better off urban effluents, in most cases, prefer private concern and so called well reputed regional schools. What is true in educational landscape in urban India is that mushrooming of English medium and sophistication of modern education has been detrimental for the traditional school environment. All traditional secondary schools are crunching, suffering from steady dwindling down of enrolment. Their very existence is at stake now. Bulk of the higher secondary schools are also featured by shrinking of their catchment areas, whereas few of them are over flooded with, giving rise to the problems of shrinking and swelling of enrolment.

Spatiality indicates spatial relation and design. In social spaces, of which education spaces form an integral part, spatiality has wider connotations. In one side it considers the transport link or connectivity and accessibility. In the spatial context urban school education is

significantly different from the rural counterpart. The world today is characterized by various types of inequalities that may be identified not only in terms of the developed and underdeveloped regions but also by the development of the core or the urban areas and the rural one-the periphery (Meillassoux,1972). Differences in resource potentials ushers in dominance dependence relationships between the core and the periphery, sowing the roots of disparities between the two spaces. On the other hand, dichotomy has been analysed to glare the level of disparities with regard to the education realm among the regions. Education responds differentially on different spaces. There persists difference with regard to physical resource, human resource, financial resource inputs, organisational and management styles in schools of urban and non- urban spaces. Differences are there as to the school attributes like teacher pupil ratio, teacher classroom ratio and student per school, student per classroom etc.; home attributes like the educational attainment, aspirations, motivation level of parents, occupational pattern and standard of living, household size, family economy, family momentum for schooling etc. among the regions. Moreover, connectivity status and concentration and or deconcentration of high schools also show different dimensions and problems on dichotomous space.

 The quality of school education depends on large number of factors including the structural resources available to that school. School infrastructure, such as the site, buildings, furniture and equipments contribute to a learning environment. It is understood that both urban and rural areas enjoy some advantages and disadvantages regarding education. The advantage of rural education are like – easy proximity of playground, open space, garden, soothing touch of nature, direct experience in regard to object study and nature study, simplicity of normal life etc. The disadvantage of rural education are like - transport problem particularly in the monsoon month, rural illiteracy, experts, qualified teachers, poor electricity, access to drinking water, toilets.

The urban environment embraces some advantages with regard to school education like easy transport, teaching aids, infrastructural facilities, co-curricular activities, special services available, conscious parents etc. The urban environment poses some difficulties regarding school education, such as, lack of space, unavailability of playground, garden, soothing touch of nature, disparity between rich and poor students, congestion of schools etc.

This research work aims at identifying the glaring spatiality between educational facilities in urban and rural areas in terms of quality and quantity in the school education system. This is intended to unfold the dichotomy of the infrastructural and achievement arena in rural as well as non-rural areas that can be achieved through the detailed scrutinisation of the following questions:

- Is there any regional variation of secondary and higher secondary educational institutions?
- Is there any difference in access index in rural and non-rural areas?
- Do the physical and ancillary facilities imply marked difference in rural or urban space?
- Do teacher-school ratio and pupil-teacher ratio show marked variation over space?
- Do increasing access and enrolment necessarily ensure school effectiveness or educational progress?
- Does good educational infrastructure ensure good achievement and vice-versa.

Objectives

Against the backdrop of the above questions, the study aims to investigate the following:

- To scrutinise the spatial variation of Education Infrastructure Index;
- To depict Education Development Index and its regional dichotomy; and

- To explore whether good infrastructure necessarily ensure educational development.

Study Area

The district Hooghly is located between 22°39′32″ North to 23°07′20″ North, 87°30′20″ East to 88° 30′15″ East longitude. To the north it is bordered by the districts of Bankura and Barddhaman, on the south by the district of Howrah, on the east by the Hooghly River demarcating the district of Nadia towards north and North Twenty Four Parganas district east and the west and south-west by the district of Medinipur (Figure 1). This district has a total area of 3149 sq. km. and it ranks 13th among all the districts of West Bengal (Census, 2011).

Hooghly has led the way in the state of West Bengal in the matter of education. The district has a strong foundation of education with 3096 primary schools, 365 secondary schools, 192 higher secondary schools, 24 numbers of general degree colleges, 277 sishu siksha kendra (SSK) and 27 madhyamik siksha kendra (MSK), 2 engineering colleges and 2 polytechnics and one industrial training institute (Census, 2011). Moreover, hundreds of private educational institutes including I.C.S.E/ C.B.S.E./Anglo-Indian & Missionaries control recognised high schools, Sanskrit tolls (76 recognised), Madrasah (22 high, 09 senior Madrasah) and many private general and engineering colleges are operating in the district to generate skilled labour force of the district. Apart from conventional teaching, there are several vocational training centres in the district including polytechnics, mining training institute, junior training schools, and industrial training institutes. Consequent upon early educational establishment, the performance of the district is much better than the state average in terms of educational achievement.

Materials and Methods

To achieve the objectives, Secondary data from Upper District Information for Secondary Education (U-DISE), All India Education survey (AIES), District Inspector of schools (D.I. Office) of Hooghly District, NSS 64th round data, District Human Development Report (DHDR), Hooghly District; District Projects Office (D.P.O. Office), Hooghly District have been gathered and more specifically field level data collected from sample schools have been analysed for close scrutiny in order to find out the regional disparities in terms of the infrastructural provisions in various pockets of Hooghly district. As All India Education Survey (AIES) and District Information for Secondary Education (DISE) data throw light on macro level situations; these data are supplemented with micro level data collected from sample schools.

To study the spatial variations in accessibility, an accessibility index has been composed based on the distance of different types of institutions from the villages. The highest (negative) weightage has been given to non-availability of secondary schools, and progressively lesser importance to higher grades (Census 2001, 2011). The following skill is followed (Table 1).

The negative scores thus collected for villages are averaged across the Blocks to yield a block average that might be considered as an indicator of non-availability of institutions. It may be noted that score close to '0' indicates non-availability to a greater extent indicating deprivation than scores close to '1' indicating opportunity.

Table 1: Classification of Villages

Classification of Village	Within Village	Within 1 km	Beyond 1 km
For villages having Junior High and Secondary Schools	0	(-) 3	(-) 5

Source: Census of India, 2001, 2011
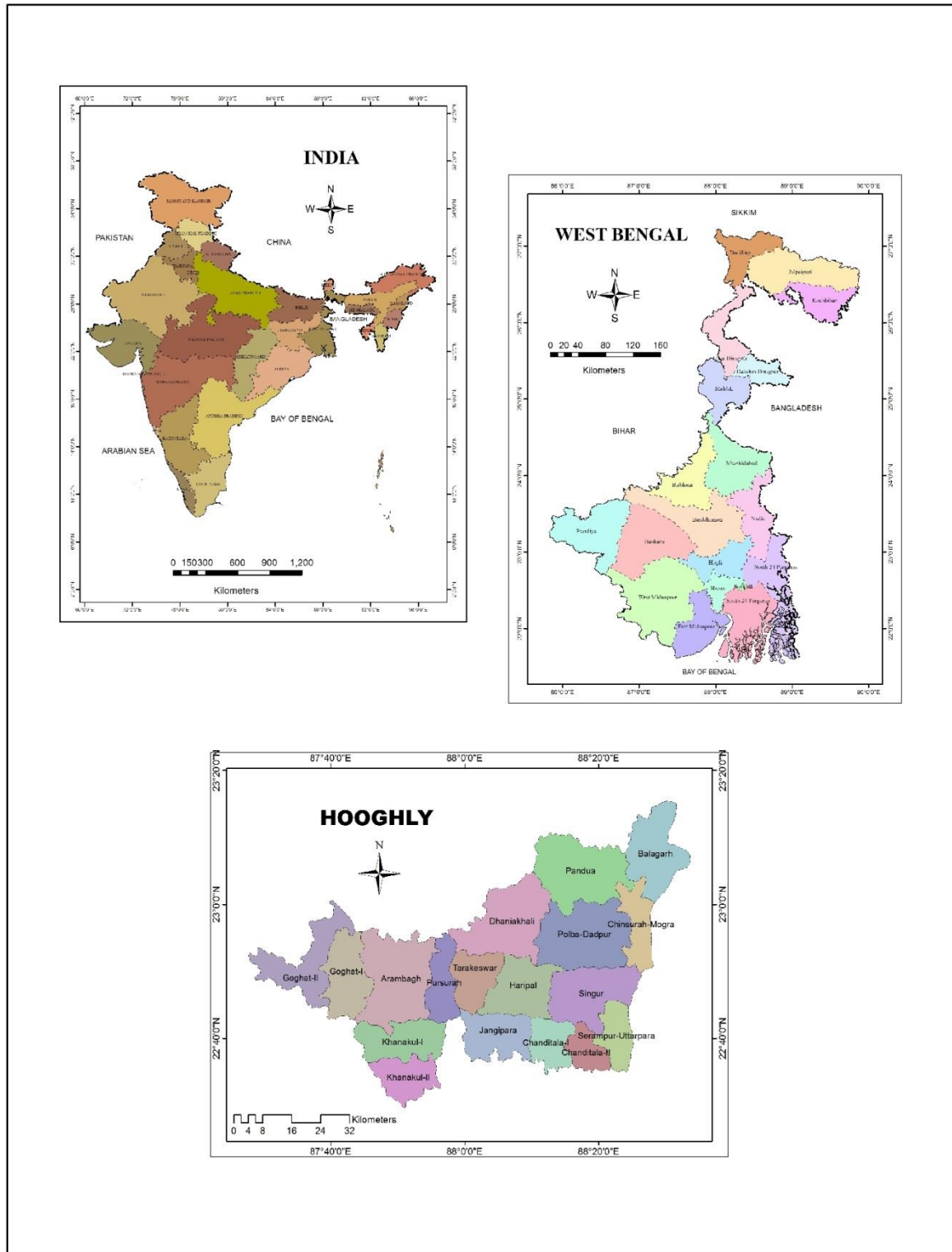
Figure1: Hooghly District, West Bengal
The district of Hooghly is located in the south-central part of West Bengal.

Source: Authors

To obtain facility score geometric means of the six facilities scores, viz. *pucca* (permanent) building, boundary wall, drinking water, sanitation facilities, library and playground have been computed and then converted to Facilities Index using the United Nations Development Programme (UNDP) goalpost method. Geometric mean of pupil-teacher

ratio and teachers-school ratio have been computed to give Teacher Availability Score and then again converted to Teacher Availability Index using the UNDP goalpost method. Educational Infrastructure Index (EII) is computed as simple average of Accessibility Index, School Facilities Index, and Teacher Availability Index and was ranked.

Enrolment scores for Middle (Junior High) and High (secondary) stages have been obtained by dividing number of students enrolled in Middle Stages and high stages by child population in 9-12 and 12-15 years of age groups respectively. Enrolment scores thus obtained have been converted to Enrolment Index using the UNDP goalpost method (maximum being 100). Literacy Score is then used, which is a combined score of gender gap adjusted literacy and spread between Gender Specific Literacy Rates, converted to Literacy Index using the UNDP method. Educational Development Index (EDI) has been prepared from the literacy index and enrolment index. EDI is computed as simple average of literacy Index and enrolment Index (Table 1).

Results and Discussion

It is a fact that availability of infrastructural facilities in school has considerable impact on school environment. RTE Act 2009 has recommended that each school should be equipped with 'All weather building consisting of at least one classroom for every teacher and an office-cum-store-cum-Head teacher's room; barrier free access; separate toilets for boys and girls; safe and adequate drinking water facility to all children; a kitchen where mid-day meal is cooked in the school; playground; arrangements for securing the school building by boundary wall or fencing'.

The following section depicts the availability of educational institutions and their spatial disparities. Access Index of the rural and urban spaces is also explored in this part along with

spatial dichotomies with regard to infrastructural inputs to the secondary school education. The main concern of this section is to develop education Infrastructure Index and provide a reasoned account of their spatial variations.

Education Infrastructure Index (EII) and its Spatiality

Spatial Variation of Access, Facility and Teacher Index

While urban centres contain educational institutions within their periphery, rural areas often do not, and substantial number of rural children drops out from the learning process because of the distance to schools and colleges. It is observed that in the context of middle schools of Hooghly district, about 42.55 % of villages have school within the periphery of the village, about 35 % have within 1 km range, and 22 % have it beyond 1 km.

In terms of *Access Index* (Figure 2), the best performing blocks are Serampore-Uttarpara and Chanditala-II while Jangipara, Khanakul-I, Goghat-II, Dhaniakhali, Polba-Dadpur, Haripal are very poor in this regard. Access index are found to be satisfactory in the municipalities. The blocks of Singur, Chanditala-I and II, Chinsurah-Mogra in proximity to the urban areas embrace good linkage system as they possess good accessibility owing to the spill over impact of the developed urban track of the district. The Pursurah block lying in between two less developed urban areas of Arambagh (M) and Tarakeswar (M) receives the benefits of spatial linkages between the two less developed urban tracks leading to the enhancement of its accessibility scores. On the other, the connectivity of Khanakul-II, the southernmost block of Hooghly, also goes up as it becomes a link between the two well-developed Districts of West Bengal. So it is the location of a place that may enhance or paralyse the accessibility pattern in question.
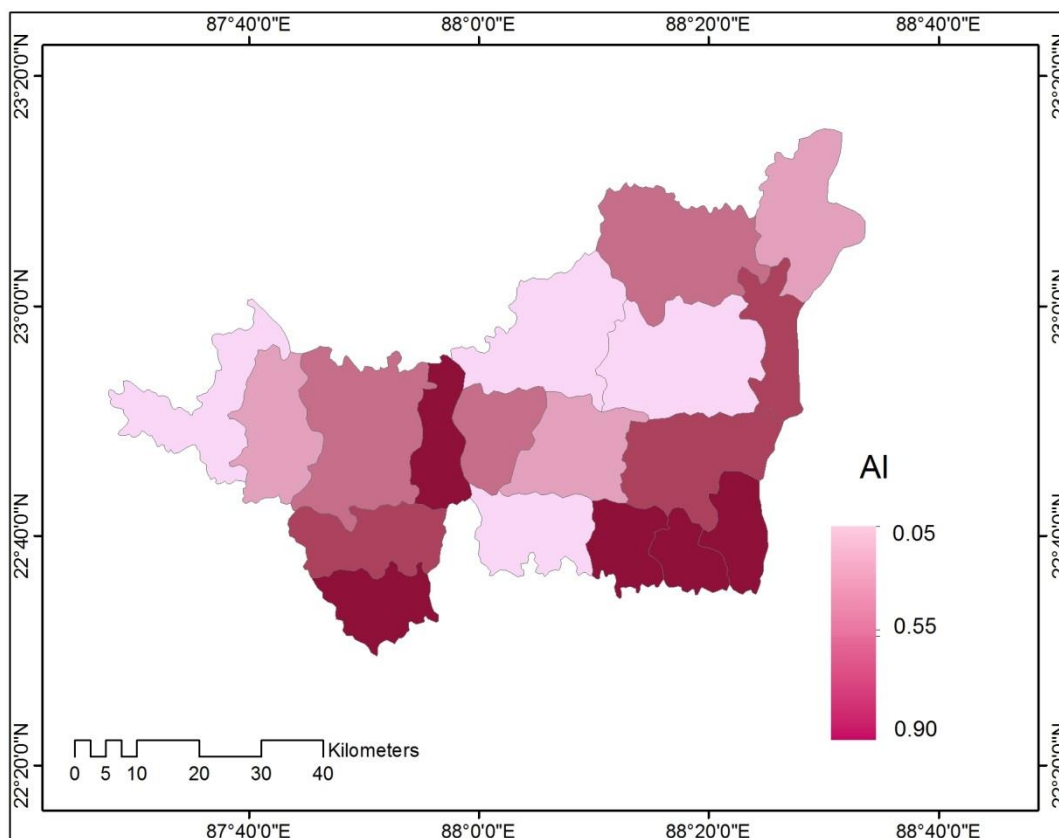
Figure 2: The Spatiality of Accessibility of Hooghly District in terms of Access Index, by Blocks (0.05 to 0.90).
The maroon colour code reveals the intensity of accessibility, the higher the intensity of colour, the greater the index is and vice-versa.
Source: Authors

Infrastructure available to schools refers to both the provision of physical and ancillary facilities. The physical environment of a school is a major determining factor in the attainment of its objectives (Asiabaka, 2008). With regards to Hooghly district, about 97% high and higher secondary schools run in permanent (pucca) buildings. In all municipalities except for Arambagh almost 100% schools have pucca buildings, whereas in the block level at Dhaniakhali, Balagarh, Chinsurah-Magra, Polba-Dadpur, Goghat II blocks more than 10 % schools are running in non- pucca buildings. Only 47% high schools in Hooghly possess a well-defined pucca boundary wall. The performance of western rural blocks in this regard including Goghat-I, Goghat-II, Khanakul-I, Khanakul-II and Arambagh are found to be very disappointing.

The provision of drinking water, sanitation, library, playground facilities make up the ancillary services of a school. In this study 98.5 % schools, on an average, have drinking water facilities within school premises. The blocks of Dhaniakhali (98.41%), Jangipara (97.43%), Khanakul-I (86.87%) and Khanakul-II (86.2%) embrace lower than the average. About 7% schools at Chinsurah-Magra block and 6% at Haripal block do not possess the drinking water facilities at all. Halder (2016) found that there is gap between actual and optimal conditions of infrastructure in any school (Halder, 2016, p.4)

Toilet facilities are available in all secondary and higher secondary schools of the district barring one or two blocks (such as Pursurah). Dichotomies do exist between its availabilities of separate toilet for girls and it is also

questionable whether it is at all in usable condition or not.

Based on an extensive survey carried out in eight states of India, of which West Bengal is one, Mehrotra (2006) found that the problem of pucca buildings and one-classroom schools is also largely confined to the government schools. The author further mentioned that the larger share of government schools were found without drinking water facilities and toilets whereas many private-unaided schools in urban areas had separate toilets for girls than the government schools.

As regards to library facilities, about 32 % high schools in the district have libraries. Most of the blocks in Hooghly are associated with the problem of lacking reference books and skilled librarian with Tarakeswar, Balagarh, Pursurah, Goghat-I are more vulnerable in rural areas, so as Arambagh (M) and Dankuni (M) in urban areas. The results are discouraging also in the eastern urban tract of the district, for example, only 12 % schools at Dankuni (M), 27.59 % in CMC, 33.33 % in Bhadreswar (M), 35 % in Baidyabati (M), 37.5 % in Serampore (M) have

libraries at their institutions. In the western parts of the district, the libraries are there only in 7 % high school in Tarakeswar, 10 % in Arambagh (M), 15 % in Pursurah, 19.23 % in Goghat I and 33.33 % in Tarakeswar (M). This implies that substantial portion of High Schools in every pockets of the district is running sans any library facility at their lap.

Playground facilities are other areas of concern in the district wherein only 46 % high schools in this district have the facilities of playground. In the rural areas, 47 % high schools, on an average, have play ground with Pandua block topping the list (63.64% high schools) whereas Chinsurah- Magra and Tarakeswar, both with 33.33 % rank first from the bottom. In the urban areas, the gap between high and low values stuns, while in Konnagar (M), 30 % schools do not have playground and only 12.5 % schools in Dankuni (M) possess it. Serampore (M), Chapdani (M), Baidyabati (M), CMC, Arambagh (M) are also the vulnerable pockets. The following box plot (Figure 3) has shaped the individual score of various aspects of High School.
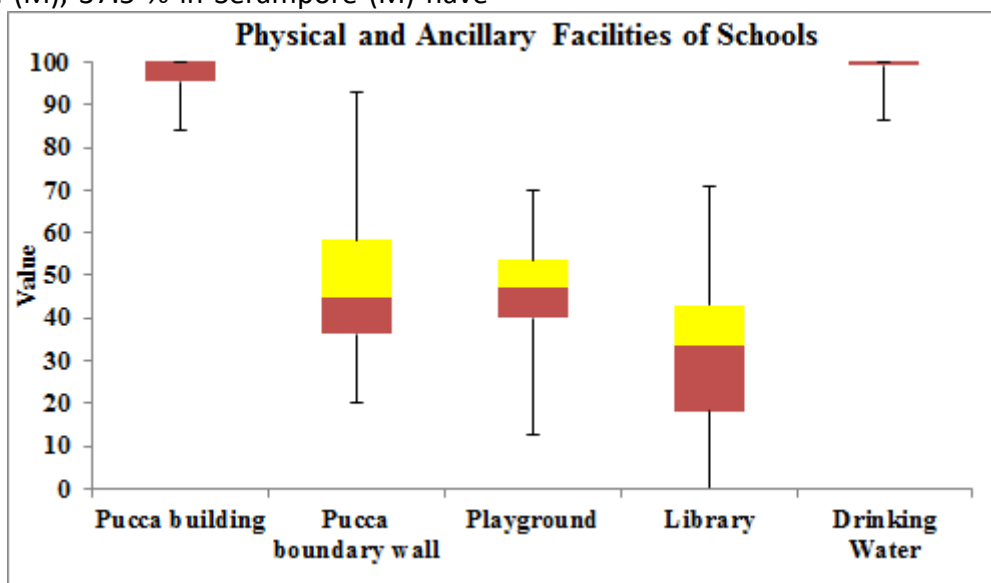

Figure 3: Physical and Ancillary facilities of Schools of Hooghly District.
The physical facilities include *pucca* (permanent) building and *pucca* boundary wall whereas playground, library and drinking water make up the ancillary facilities. The red colour shade shows the lower quartile zone while the yellow shade shows the upper quartile zone of the dataset. The highest and lowest values of facilities have also been highlighted by cap at upper and lower end of each box.
Source: Authors

The blocks doing well in Facility Index (Figure 4) at rural areas consist of Chanditala-II, Singur, Haripal, Panduah, Khanakul-II etc. while at urban areas Hooghly-Chinsurah, Bansberia, Uttarpara-Kotrung, Baidyabati are the leading ones. Tarakeswar, Balagarh, Polba-Dadpur are the most laggard blocks in rural areas in this district, so as Dankuni, Arambagh and Bhadreswar Municilipaties. Mostly the backwardness in terms of the facility score is attributed to the spatial variation of libraries and playground facilities, such as, the very low existence of library facilities at Tarakeswar Block and Arambagh Municipality pulls down the facility index of the two regions. Similarly very low playground concentration is responsible for lowering facility score of Dankuni Municipality.
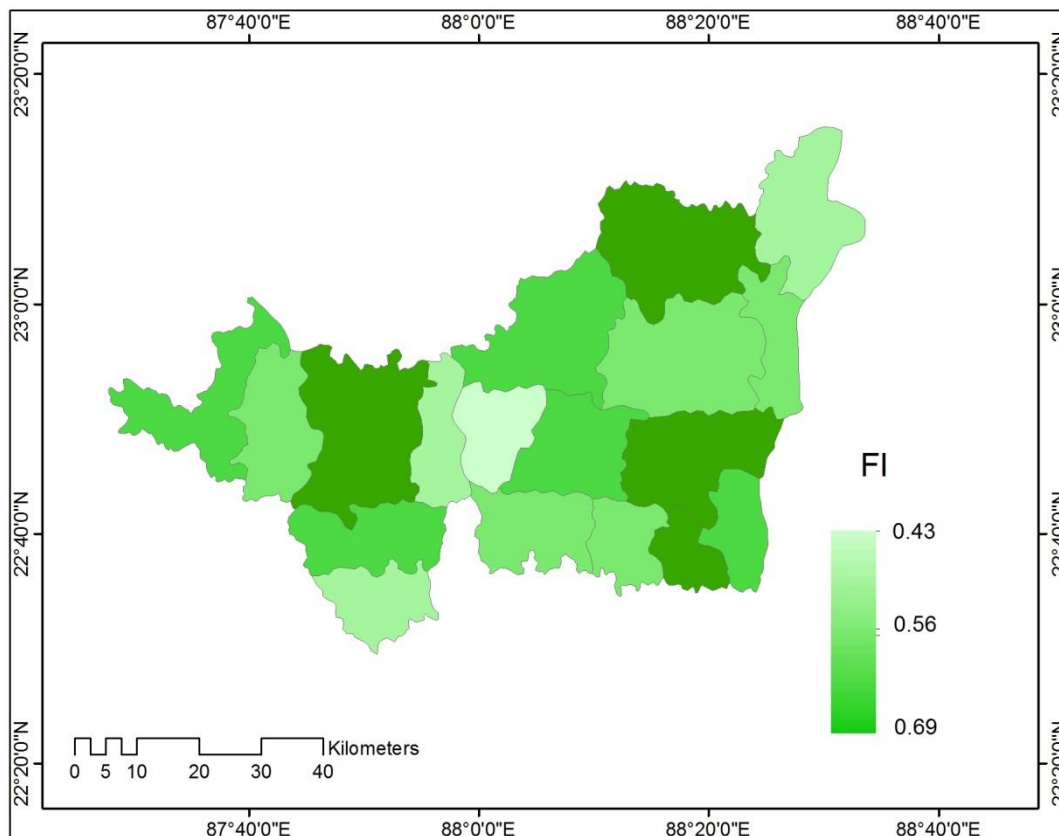
Figure 4: The Spatiality of Facilities in Different blocks of Hooghly district in terms of Facilities Index (0.43 to 0.69).
The green colour code reveals the availability of facilities in schools, the higher the intensity of colour, the greater the index is and vice-versa.
**Source: Authors**

Teacher index is the combination of Pupil-Teacher Ratio and Teacher- School Ratio. The Pupil-Teacher Ratio (PTR) is the number of pupil per teacher and Teacher-School Ratio (TSR) refers to the number of teacher available per school. The lower the ratio, the better for developing the educational standard of a particular area since lesser number of students will get attention by a teacher (Kamle and Adhikari, 2013). The case is completely reverse regarding Teacher-School ratio. The increasing nature of TSR enhances the teaching-learning quality of classroom. The classroom conditions are particularly acute in a number of developing countries where large class sizes often swell up and go beyond 100 pupils (Ron, 2003). High PTR due to overcrowded classrooms adversely affect the quality of education in poor resource schools. Ehrenberg et. al. (2001) noted that PTR is a global measure

of human resources brought to bear, both directly or indirectly, on children's learning. In the present study the box plot (Figure 5) of PTR and TSR depicts dismal picture of high school education of Hooghly district. The teacher pupil ratio is the lowest at Serampore-Uttarpara Block, followed by Tarakeswar block. Apart from these two, no blocks of the study area possess ideal pupil- teacher ratio of one teacher per 40 students. The blocks of the western part have shown a very high pupil-teacher ratio, thereby revealing poor educational conditions in them. There is an urgent need for improving the physical and academic infrastructure- incentives, TLM (teaching learning material), availability of teachers and their presence in the school and classroom (Lewin, 2007).

The PTR (Pupil-Teacher ratio) is substantially higher in rural areas than its urban counterparts both in secondary and higher secondary levels. This increase is mainly due to increase enrolment in rural areas without corresponding increase of the number of teachers. Geometric mean of Teachers-Student Ratio and Teachers per School is computed to give us Aggregate Teacher Availability Score. This is converted to Teacher Availability Index using the UNDP goalpost method. No block is found to be satisfactory in this regard (Figure 6). However, Dhaniakhali, Polba-Dadpur Pursurah, Khanakul-I show higher values whereas, Serampore-Uttarpara, Goghat-I, Chanditala-I, Chanditala-II, Haripal, Tarakeswar and Khanakul-II behind. The urban areas also show very disappointing figure.
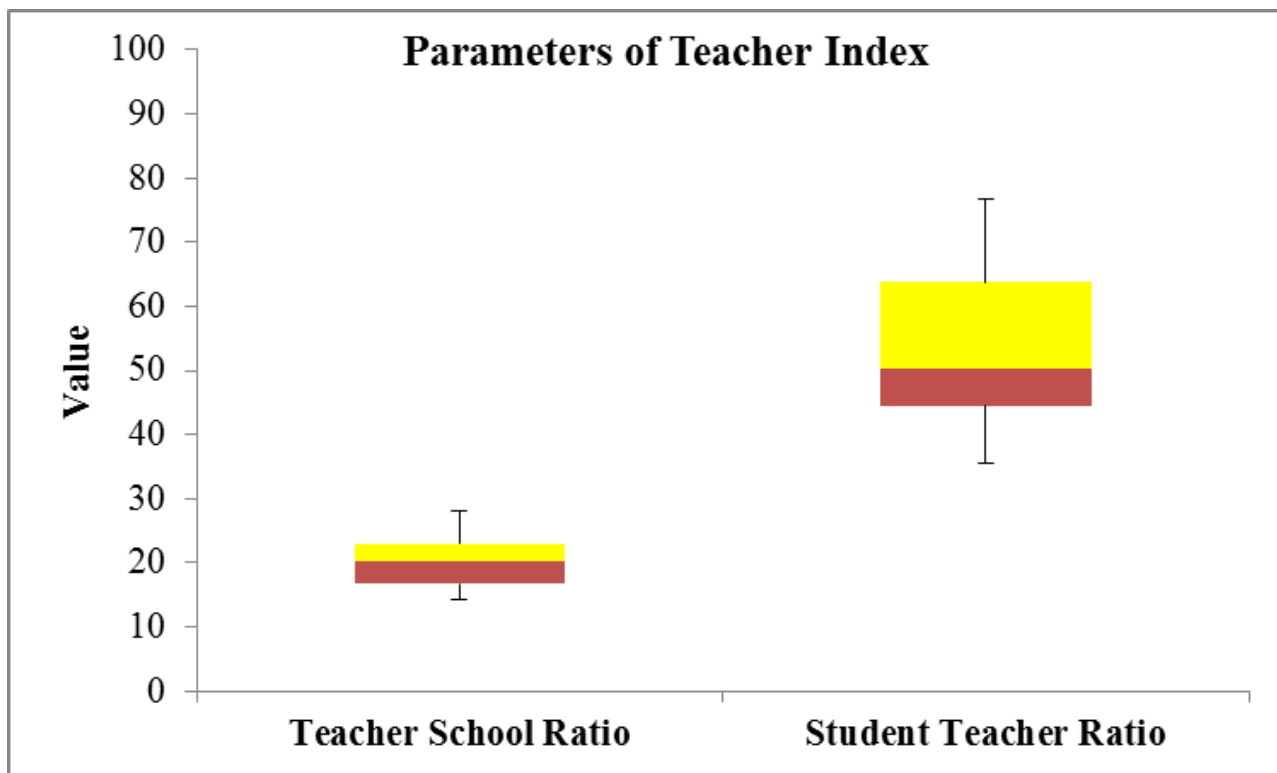
Figure 5: Teacher School Ratio and Student Teacher Ratio, the Two Parameters of Teacher Index of Schools of Hooghly District.
The red colour shade shows the lower quartile zone while the yellow shade shows the upper quartile zone of the dataset. The highest and lowest values of ratio have also been highlighted by cap at upper and lower end of each box.
Source: Authors
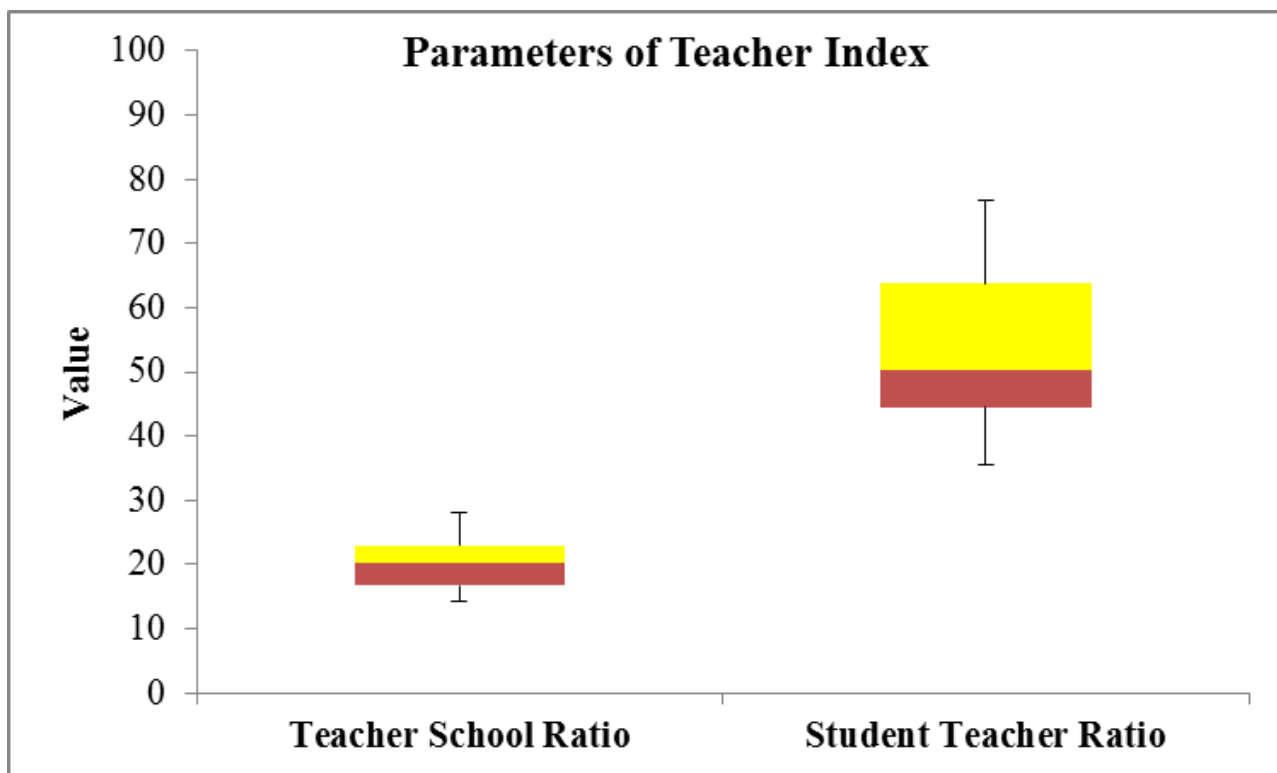
Figure 6: The Spatiality of Teacher Index in Different Schools of Hooghly District, by Blocks (0.27 to 0.42).
The brown colour code reveals the availability of teachers in schools, the higher the intensity of colour, the greater the index is and vice-versa.
Source: Authors

Education Infrastructure Index

Based on these three indexes discussed above, viz. the Accessibility Index, the Facility Index and the Teacher Availability Index (Table 2), Educational Infrastructure Index (EII) has been computed as doing simple average of the three indices and was ranked. In terms of EII (Figure 7), four blocks of Chanditala-II Serampore-Uttarpara, Singur and Chinsurah-Magra fall in the upper rank. Except for these four blocks, the remaining blocks register very low to moderate values, with Jangipara as the most laggard ones immediately followed by Dhaniakhali, Balagarh, Polba Dadpur and Goghat-II. The performances of the urban areas are better in this regard. The lowest score of the urban areas starts almost from where the highest score of the rural areas terminates. It varies between 0.48 at Dankuni Municipality to 0.62 at Hooghly Chinsurah Municipality. All other urban areas score between 0.50-0.60.

The reasons between the dichotomy in the urban and non-urban areas with regard to EII reveals some facts. The lower accessibility in the rural areas is an important determinant. In the case of Dhaniakhali or Jangipara, it has been observed that despite possessing a moderately good facility at schools, overall education Infrastructural Score is low, whereas good accessibility pulls the Education Infrastructure Index score up in the Chinsurah-Magra though facilities are moderate there. In the urban areas, wherein accessibility isn't a matter of concern, facilities and teachers matter a lot in making difference between the less developed and the developed urban areas.

Table 2: Education Infrastructure Index: Rural-Urban Differences

Block / Municipalities / Corporation	Access Index	Facility Index	Teacher Index	Education Infrastructure Index (EII)
Dhaniakhali	0.07	0.63	0.05099	0.25033
Pandua	0.46	0.66	0.04899	0.389663
Balagarh	0.35	0.52	0.042426	0.304142
Chinsurah-Mogra	0.64	0.57	0.026458	0.412153
Polba-Dadpur	0.19	0.55	0.0509902	0.263663
Tarakeswar	0.42	0.43	0.0244949	0.291498
Haripal	0.26	0.64	0.0244949	0.308165
Singur	0.68	0.68	0.0374166	0.465806
Jangipara	0.05	0.56	0.0331662	0.214389
Chanditala-I	0.74	0.59	0.0282843	0.452761
Chanditala-II	0.89	0.69	0.0282843	0.536095
Serampur-Uttarpara	0.9	0.64	0.0264575	0.522153
Goghat-I	0.37	0.56	0.0360555	0.322019
Goghat-II	0.14	0.62	0.04	0.266667
Arambagh	0.45	0.68	0.0458258	0.391942
Khanakul-I	0.6	0.61	0.0412311	0.417077
Khanakul-II	0.75	0.51	0.034641	0.431547
Pursurah	0.82	0.53	0.03	0.46
Hooghly-Chinsurah(M)	1	0.83	0.0316228	0.623874
Bansberia(M)	1	0.72	0.0282843	0.582761
Tarakeswar(M)	1	0.66		0.553333
Bhadreswar(M)	1	0.59	0.0173205	0.535774
Champdani(M)	1	0.69	0.0141421	0.568047
Chandannagar(M.C.)	1	0.65	0.03	0.56
Uttarpara-Kotrung(M)	1	0.73	0.0316228	0.587208
Konnagar(M)	1	0.7	0.02	0.573333
Serampur(M)	1	0.59	0.0282843	0.539428
Baidyabati(M)	1	0.69	0.0223607	0.570787
Rishra(M)	1	0.71	0.0244949	0.578165
Dankuni(M)	1	0.42		0.473333
Arambagh(M)	1	0.49	0.0141421	0.501381

Calculated by Authors
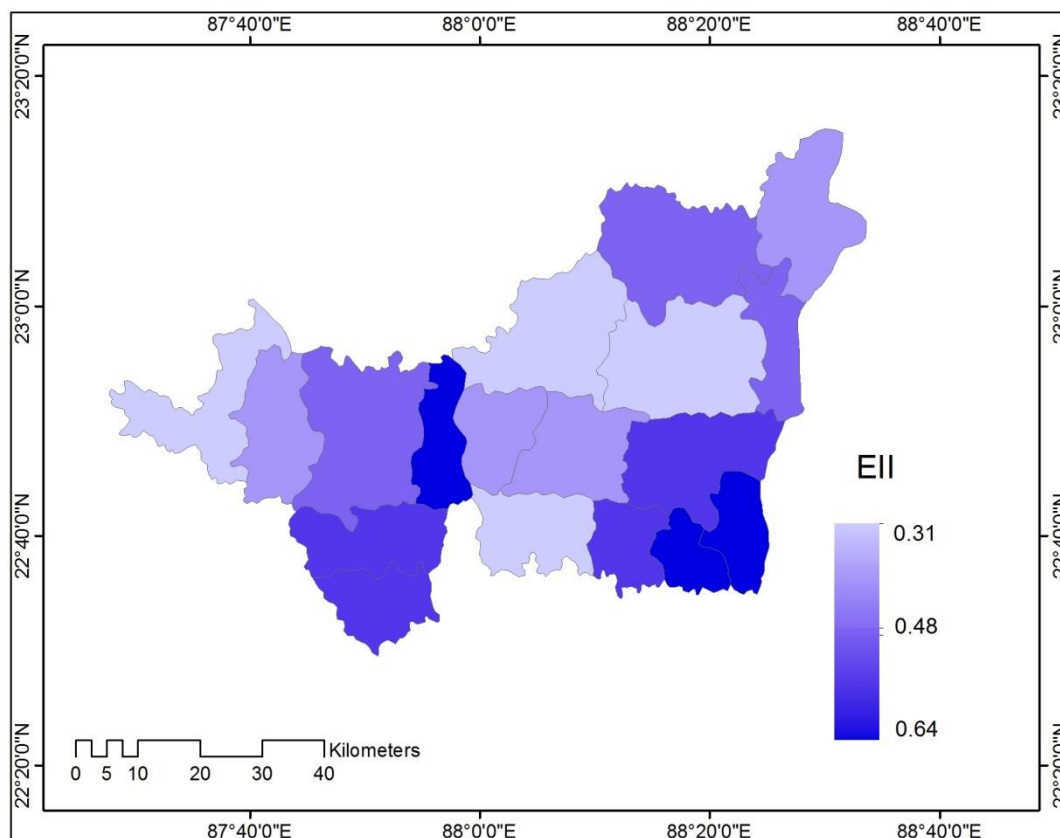
Figure 7: The spatiality of Education Infrastructure Index in Different Schools of Hooghly district, by Blocks (0.31 to 0.64).
The blue colour code highlights the education infrastructure in schools, the higher the intensity of colour, the greater the index is and vice-versa.
Source: Authors

Education Development Index (EDI) and Regional Variations

Spatial Variation of Literacy Index, Enrolment Index and Disparity Index

Although literacy rate is a crude indicator of educational attainment, it is vitally important as alphabetisation provides the basal stratum for the subsequent development of a multi-level educational pyramid (Raza, 1990).Increase in dropout rate, decrease in attainment rate, lack of infrastructure facilities, indifferent attitude of teachers towards students, high pupil-teacher ratio, ineffective curriculum and vague understanding of the benefits of education among the parents of children are some of the major ills plaguing secondary educational scenario in India.

In India as a whole there has been a significant development in the literacy level from 5.3% in 1901 to 65.4% in 2001 and 74 % in 2011. The situation of Hooghly District is better than both the country and state average. During 2001-2011 rural literacy in Hooghly has increased by 8.22% points. During the same period urban literacy has also increased by 4.75% points.

In so far as the total **literacy rate** of Hooghly district is concerned, more than 80% people are found to be literate in most of the Municipalities. Except for Serampore-Uttarpara block, all other areas fall into developed urban tracts. In most rural blocks the literacy rate varies from 60%–80%.

As regards to **female literacy**, a clear dichotomy has been diagnosed between the eastern and western half of the district. More

than 65% female population can read and write in the blocks of the eastern margin, the highest value being 78.9% in Serampore-Uttarpara block. The blocks of the extreme west, Goghat-I & Goghat-II register low female literacy rate with the lowest value to the tune of 57.8% in Goghat-II block. The remaining blocks embrace moderate female literacy rate between 60 to 65 %.

With the introduction of Millennium Development Goals and many other initiations of Government of India for promoting gender equality in education has gradually reduced gender gap in education. In the Hooghly district, the gender gap in literacy rate has declined from 15.38% in 2001 to 10.98% in 2011. Gender gap in literacy is substantial in western part of the district where the figure exceeds 20 with maximum value being 22 in Goghat-II. The blocks bordering the eastern margin of the district like Serampore-Uttarpara, Singur, Chanditala-I, Chanditala-II have less gender gap in literacy of less than 15. It depicts a biased distribution, least in very well developed urban tract; lesser in less developed urban track; moderate in prosperous rural and rural areas and higher in backward rural areas of the district. It has been a matter of concern that literacy level skews in favour of males, stabilising the subordinate position of women in every pocket of the district.

Enrolment ratios for middle (junior high) and high (secondary) stages are obtained by dividing number of students enrolled in the middle and high Stages by child population in 9-12 and 12-15 years of age groups respectively. Enrolment scores thus obtained are converted to Enrolment Index using the UNDP goalpost method. A closer view on the enrolment scenario reveals that urban areas command over the rural areas.
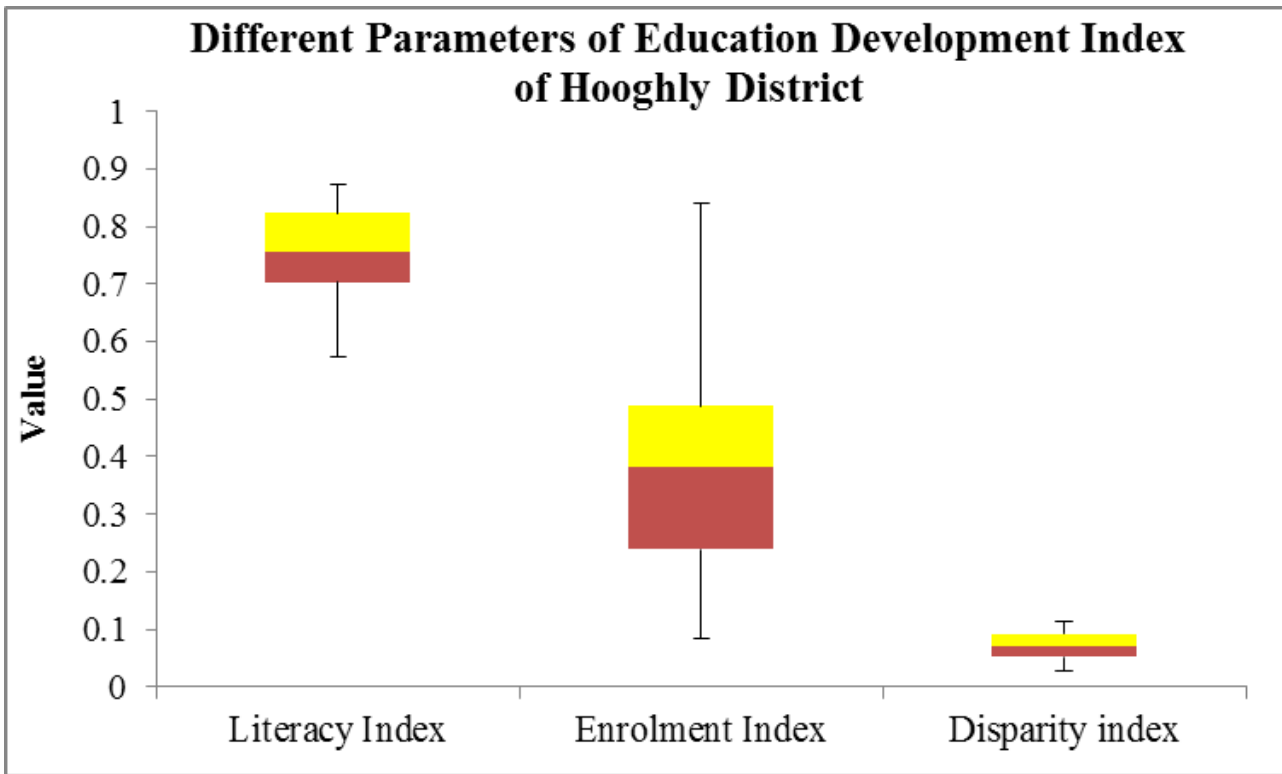
Educational Development Index (EDI)

Educational Development Index (EDI) has been computed as simple average of Literacy Index, Enrolment Index and Disparity Index. In Hooghly district, possessing high medium value of literacy index, moderately low median value of enrolment index and low median value of disparity index establish a more or less good position of the district in terms of EDI as shown in the Figure 8.

The regions that have performed well in terms of EDI (Fig. 9) are the Municipal areas in general and also the areas of Singur, Serampore-Uttarpara, Chanditala-I, Chanditala-II, and Goghat-II. In the five C.D. Blocks, the EDI secure more than 0.80 with Singur topping with index value of 0.88. Serampore-Uttarpara and Chanditala-I are very next to Singur scoring with 0.87 points each owing to satisfactory trend both in literacy and enrolment.

However, for the case of Goghat-II, good scoring in enrolment stretches its score despite literacy rate is moderate. On the other hand, the regions that have performed poorly in terms of this index are Khanakul-I, Khanakul-II, Polba-Dadpur, Dhaniakhali, Pandua, Chinsurah-Magra, Balagarh, Haripal, Jangipara, and Pursurah. It is to mention here that the performance of the Khanakul-I, Khanakul-II and Polba-Dadpur are very dismal, with EDI less than 0.60. This is attributed to their very poor performances in both the Literacy Index and Enrolment Index. The Education Development Index (EDI) is above 0.80 for all urban areas except Tarakeswar Municipality where the EDI is to the tune of 0.72. In the urban areas the good performance of the Literacy level in particular makes the EDI score higher.
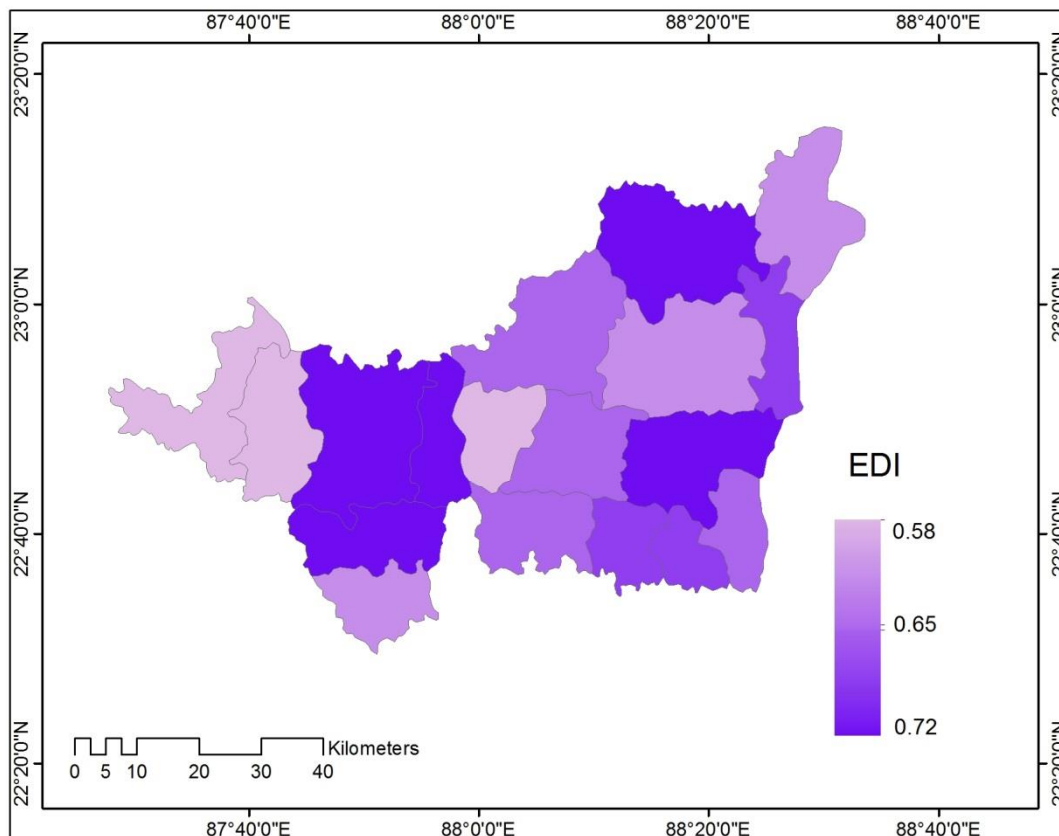
Figure 8: Education Development Index consisting of Literacy Index, Enrolment Index and Disparity Index.
The red colour shade shows the lower quartile zone while the yellow shade shows the upper quartile zone of the dataset. The highest and lowest values of ratio have also been highlighted by cap at upper and lower end of each box.
Source: Authors

Figure 9: The spatiality of Education Development Index in Different Schools of Hooghly District, by Blocks (0.58 to 0.72).
The blue colour code highlights the education infrastructure in schools, the higher the intensity of colour, the greater the index is and vice-versa.
Source: Authors

Conclusion

Various dimensions of infrastructure and development are gleaned out in relation to school education, some of which are of critical importance**.** Wide regional disparities are found in the availability of secondary and higher secondary school facilities**.** Urban centre contain educational institutions within their periphery, rural areas often do not, and substantial number of rural children drops out from the learning process because of the distance of schools and colleges. The blocks in proximity to the urban areas also embrace good linkage system. Singur, Chanditala-I and II, Chinsurah-Mogra-also possess good accessibility owing to the spillover impact of the developed urban track like CMC, Serampore (M), and HCM respectively.

Accessibility is also higher in the buffer areas of two developed tracks. Accessibility factor begets a division within rural spaces in the form of backward rural, rural and prosperous rural that manifests through the availability of the teachers and facilities. In the urban areas, wherein accessibility is not a matter of concern, facilities and teachers matter a lot in making difference between the less developed and developed urban areas.

Mostly the backwardness in terms of the facility score is attributed to the spatial variation of Libraries and Playground facilities. Very low playground concentration is responsible for lowering facility scores. The blocks of the western part have shown a very high teacher pupil ratio, thereby revealing a poor educational conditions prevailing in them.

The PTR is substantially higher in rural areas than its urban counterparts both in secondary and higher secondary levels. This increase is mainly due to increase enrolment in rural areas without corresponding increase of number of teachers.

Literacy rate register pure urban concentration. Gender gap in literacy is prominent in western part of the district. The block like Arambagh, Balagarh, Dhaniakhali, Polba-Dadpur, Jangipara are found to be very much vulnerable as these blocks perform badly in both total literacy and female literacy rate and suffering from enhanced proportion of gender gap.

It is found that for the Junior High school stages, the Net Enrolment Ratio (NER) is lower compared to the primary stages consistently. EDI is substantially higher in urban areas compared to rural areas, as indicated by the higher scores for the municipal areas compared to the blocks. In the urban areas the good performance of the literacy level in particular makes the EDI score higher. It needs mentioning that the higher EDI at the non- rural areas indicates town- centric nature of the development of our educational system. Average EDI for the district signifies that the achievement of the district in terms of various dimensions of educational capacity building has been moderate, though better than State or National average. The success seems better than the infrastructural support index, indicating the intensive use of available infrastructure for achieving educational success.

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