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Measuring Inequality in Distribution of Sanitation Amenities in Urban West Bengal

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Abstract

Economic development of a region depends upon health and productivity of the people which is ensured by hygienic lifestyle. This study seeks to understand the inequality in the distribution of two very important amenities viz., latrine and drainage. For this purpose secondary data is collected from 911 urban areas of West Bengal from the Household Amenities' tables of Census of India, 2011. Inequality in the distribution of the two types of amenities was calculated using Theil's Entropy Index. Theil's T-statistic is modified to fit the study. Findings of the study demonstrate that high incidences of regional inequality exist within the jurisdictional areas, within the districts and across the districts in West Bengal. The efficiency of the Urban Local Bodies is important in ensuring equitable distribution of resources.

Keywords: Economic Development, Amenities, Regional Inequality, Urban Local Bodies, Equitable Distribution

JEL Classification: R100, R110, R500

Paper Classification: Research Paper

Introduction

According to UN Water (*"Sanitation"*, 2013), around 1.5 million children die every year as a result of diseases caused by unclean water and poor sanitation. Almost 2.5 billion people around the world lack access to improved sanitation and almost 15% of the global population practice open defecation. A few years back, World Health Organization (2012) performed a cost-benefit analysis of sanitation facilities and found that every dollar spent on improving sanitation generates an average economic benefit of \$7 to \$9. Every year, more than 200 million tons of human sewage goes uncollected and untreated, fouling the environment with virus particles, bacteria, parasite cysts and parasite eggs (*"Why improved sanitation is important for children"*, 2008). The population remaining unprotected from it suffers by getting affected by chronic diseases like diarrhoea, cholera and other bacterial and viral diseases. A region where people live vulnerably to poor environmental conditions yields lower productivity and all around underdevelopment.

Whether the talk is about the welfare of the people or of regional development, sanitation intervention always plays a vital role. Hygiene and sanitation interventions are also regarded as

the most cost effective programs that yield maximum economic benefits. Healthy people generate higher productivity and create wealth for the economy. Therefore, to ensure economic prosperity, health and hygiene of the people of the economy must be taken care of through effective sanitation initiatives.

A Brief Review of Past Studies

Poorly drained storm water and improper outlet of the household wastewater provide sites for disease vectors that increases health and environmental risks (WHO¹,n.d). The disease outbreaks such as cholera, resulting from poor sanitation, cause productivity losses and premature deaths, and also divert expenditures from essential items enlisted in the national budget, along with some trade and tourism losses (Kolsky, 1998). The report of the Water and Sanitation Program indicates that the universal implementation of improved sanitation and hygiene interventions would significantly lead to possible annual economic gains worth US\$ 6.3 billion, contrary to that, in 2006, India incurred a loss of US\$ 53.8 billion, or 6.4 percent of its GDP due to inadequate sanitation (WSP-ESI²).

Inequalities related to safe drinking water and sanitation exist in every country and these inequalities cause human rights deprivation (Water Aid)³. Post-2015 Development Agenda of the United Nations took Human Rights to water and sanitation into consideration and emphasized on non-discriminate and equal access to safe water and good sanitation (Albuquerque, 2012). Discrimination has many forms such as those based on gender, age, minority status across countries and also across regions within a country, and each type of discriminations gives rise in inequality (Water Aid, n.d)³. Regional inequality often is studied across rural-urban divide. Within a country spatial inequalities are experienced by communities in remote rural areas and slum dwellers in urban areas (Water Aid, n.d.)⁴.

UN Habitat has mentioned in its Report⁶ that in cities where poverty and wealth are concentrated in specified areas, income inequality fails to capture important dimensions (UN Habitat, 2010)⁷. In the changing face of globalization, today, slum prevalence or 'ghettoization', may or may not influence income inequality, but would definitely pull back economic well-being

¹This chapter is an excerpt from the World Health Organization (WHO) Report "Healthy Villages: A guide for communities and community health workers", prepared by Guy Howard, Water, Engineering and Development Centre, Loughborough University, Loughborough, England, with Claus Bogh, Bilharziasis Laboratory, Charlottenlund, Denmark and five others (see report) in 2002, with an aim to support the 'Healthy Villages' project of WHO for improving the health of local communities. See reference "Drainage (n.d)".

²The Economics of Sanitation Initiative (ESI) launched in 2007 with Water and Sanitation Program (WSP) study from East Asia. The WSP is a trust fund administered by the World Bank which aimed at improving access to water and sanitation for poor people. See reference "Economics of Sanitation Initiative (n.d). Water and Sanitation Programme."

³Water Aid is a global federation (a non-Profit Organization, a Trust) based in London, UK, that was set up in 1981 in response to the UN International Drinking Water & Sanitation decade (1981–1990). WaterAid's Post-2015 toolkit is designed to focus on people's access to safe water, sanitation and hygiene (WASH) by 2030. The report "WASH and Inequality" is based on the same agenda. See reference "Wash and Inequalities. Water Aid (n.d). Post – 2015 Toolkit (www.wateraid.org)."

⁴See footnote (above).

⁵See footnote (above).

⁶UN-HABITAT, Global Urban Observatory, 2009. This Report was referred while developing the article "State of the World's Cities 2010/2011: Bridging the Urban Divide (2010)" and interpreted by UN Habitat (see reference).

⁷See reference "State of the World's Cities 2010/2011: Bridging the Urban Divide (2010)". UN Habitat (www.unhabitat.org)."

of the people of the locality (UN Habitat, 2010)⁸. For people who are already marginalized because of where they live, or because of their social status, inaccessibility of good sanitation, apart from safe water, is a significant problem and has become a regular struggle (Water Aid, n.d.)⁹.

According to Bartlett, Mitlin & Satterthwaite (n.d.), Local Government is most often officially recognised for addressing inequality through service delivery and provisioning for basic civic amenities. They cited few case studies where local governments and local authorities actively participated in urban service delivery mechanism. In Rosario, Argentina, past and present Mayors reduced inequalities in the city through providing much improved health care and other services, despite the fact that they did not belong to the party in power nationally. Another case cited by them was more of a participatory approach. In Brazil, Federation of Resident's Association of Porto Alegre forced the municipal government to adopt innovative practices. The Global South networks and federations of urban poor instigated for more inclusive policies. The dynamics between the different tiers of the government contribute to institutional variation in provisioning for public goods, and therefore, the inter-governmental relationship, devolution of power and revenue distribution presents a potentially important role in persistence of spatial and regional inequality (Silvera & Rivera, n.d.).

In South Africa, service delivery in municipal areas varied widely across jurisdictional areas; such that the service delivery inequality was low for richer urban and poorer rural areas, and was high in the recently urbanised areas (Sartorius & Sartorius, 2015). Statistical Yearbook for Asia and the Pacific (2013) revealed the fact that access to improved sanitation is less than 40 percent in African countries, less than 60 percent in Asia-Pacific while it is 100 percent in North American countries and more than 90 percent in European countries. It also highlighted the fact that open defecation remains the major problem in reaching the Millennium Development Goal targets. However, good sanitation practices have increased over the period from 1990 to 2011 for all the regions of the world. The report of Joint Monitoring Program (2014) by World Health Organization and The United Nations Children's Fund stated that sanitation practices have, indeed, improved for both rural and urban areas, however, till 2012 more than 750 million people live without access to improved sanitation.

The Theil index owes its concept to the entropy measure which was developed in the field of information theory (Theil, 1979; Dunford, n.d.; Ullah, 1996; Thompson, n.d.) to measure the amount of information contained in a random event. The entropy measure was first introduced by Shannon in 1948 and later by Wiener in 1949 (Ullah, 1996). This measure is based on *the distance between two probability distributions* initially introduced by Mahalanobish (1936) and is categorized as distance measure; widely used in social science today.

The Theil's index has been extensively used for measuring inequality in social and regional sciences. A huge volume of literature has been developed since the theory of economics and information was published in 1967. Most of the works have used the index to measure economic inequality by analyzing the income distribution of a region, state, and country (Dunford, n.d.; Thompson, n.d.; Akita & Pirmansah, 2011; Sicular, Yue, Gustafsson & Li, 2006; Tanimura & Shima, 2011; Wan, 2004; Hui, 2006; Yang, 1999; Swierzewski, 2012; Tesei, 2015 or the world Theil, 1979; World Bank, n.d.¹⁰. Significant uses of this index have been found in health economics Wagstaff,

⁸See above footnote.

⁹See footnote 22.

¹⁰This literature uses some issues of World Bank's "Inequality in Focus" magazine for conceptualizing various aspects of 'inequality'. The "Inequality in Focus" is a series of magazines which addresses the public policy debate on equity, inequality of opportunity, and socioeconomic mobility. The first issue of Vol. 1, No. 1, was published in April, 2012. All the issues are available at www.worldbank.org/poverty.

Paci & Doorslaer, 1991; Coulter & Pittman, 1983; Williams & Doessel, 2006. There are two aspects – an intra-region analysis done by T-statistic and inter/across-region analysis carried out by L-statistic and T-statistic together Rohde, 2007; Haughton & Khandker, 2009. Both the statistics are mathematically derived from the index itself. Most importantly, this index of inequality follows all the basic axioms (six) of inequality measurement (Bourguignon, 1979). These axioms guide researchers to build various alternative inequality measures to *ad hoc* methods, to methods involving prior specification of a social welfare function Cowell & Kuga, 1981; Cowell, 2003.

Theil's index being strong in following the axioms, its wide usage is found in the regional economics, which requires a stable tool in understanding the complicated regional development. Many dual economies are characterized by rural-urban divide in terms of average income and domestic product, and so economists have used T and L statistics to measure the economic inequality Sicular et al., 2006; Wan, 2004; Koo, Kim & Kim, 2014 used the concept to understand the local government's performance efficiency in welfare services in Korea. Sartorius & Sartorius (2015) interestingly analyzed the service delivery inequality in South African Municipal areas with the help of Theil's index.

Research Gap and Contribution of the Study

The past literatures on regional inequalities can be summarized to have dealt with the following four areas:

- Regional inequality studied in terms of income;
- Existence of inequalities between rural and urban areas, or case studies of regional small economies;
- Access to sanitation amenities in much broader scale, which is important for launching and monitoring a global sanitation improvement program, but implementation of any program or policy may require intricate knowledge about composition, variation and dynamics of the smaller regions which all together forms the bigger ones; and
- Case studies regarding the successes and failures of local governments in delivering service.

The contribution of this study may be assessed by explaining the objective of the study. The objective states that the regional inequality is studied in two ways – status-wise urban areas and district-wise urban areas. The study may throw light upon the efficiency of the local governments and urban bias that exists in favour of the bigger cities. The study may also be able to cover the political bias in provisioning for the basic civic amenities through urban services by the urban local bodies. Very importantly, the findings of this research will be able to capture how the regional variation exists within a small economy of a state with only nineteen districts. And lastly, the analysis of the results and the findings will be helpful for the policy-makers of the state of West Bengal for understanding the extent of regional disparity in healthy sanitation usage.

Objective of the Study

This study aims at understanding the regional inequality in distribution of good sanitation amenities, in two ways – firstly, within the statutory and non-statutory areas, and secondly, within the districts. The inequality is studied to throw light upon the regional bias in sanitation practices within the pool of urban areas.

Research Methodology

Type of Study

To get a clear 'snapshot' of the existence of inequality in availability and access to sanitation utilities, this research conducts a cross-sectional study on West Bengal. To meet the objective of this study, an intricate quantitative analysis of the cross-section sample was used.

Sample

In order to study the regional inequalities in distribution of urban services, *vis-a-vis*, distribution of household amenities, the state of West Bengal was selected. All the urban areas of the state were considered. Broadly, the urban areas are classified into Statutory and Non-statutory areas. The Municipal Corporations, the Municipalities, the Cantonment Boards, the Notified areas and the Industrial Townships belong to the group of Statutory Areas, while the Census towns belong to the Non-statutory Areas. It was found that in 2011 there were 131 Statutory areas (6 Municipal Corporations, 120 Municipalities, 4 Cantonment Boards and Notified Areas and 1 Industrial Township) and 780 Non-statutory areas in Bengal in 2011 (Census of India, 2011).

For the purpose of study, the result will be presented in two possible ways – district-wise and status-wise (whether statutory or non-statutory).

Method of Data Collection

Secondary data was observed exclusively from the Census of India website (office of The Registrar General & Census Commissioner, India) for the year 2011. Two types of data were considered: namely, the Town Directory and the Household Amenities' tables of West Bengal for the year 2011. The amenities table gave information regarding the type of houses and its construction, drinking water availability and access, types of bathrooms, the drainage outlet connected to the bathroom, types of latrines, cooking fuels used, household assets and banking behaviour. Here, the sample comprises of the tables containing information about household's waste water outlet connected to the drainage types and availability of different types of latrine facilities for West Bengal.

Variables

The study uses two types of amenities: (i) households' waste water outlet connected to the type of drainage system, and (ii) the type of latrine used by the households. Now for drainage, the waste water may be connected to an open drainage or a closed drainage or there may not be any drainage system present at all. The latrines may or may not be present within the premises. When it is not present within the premises, then people can either use public toilet or use open air. A latrine present within the premises may be a flush/pour type, pit type, open drain or service latrines. Even in case of flush/pour type it may be either connected to piped sewerage system or septic tank or other such systems. The purpose of the research is to understand the uniformity in distribution of 'proper/hygienic sanitation amenities', termed as 'good' (in this paper), used by the households of the state. In the above two cases, the *good* sanitation would include:

- The waste water outlet connected to a closed drainage system, and
- A flush/pour latrine connected to piped sewerage or septic tank and the latrine must be present within premises.

Hypothesis

Both the geographical boundary and the total number of sampling units (urban areas) are small. Therefore it is expected to have more or less, an even distribution of urban resources.

Null Hypothesis. H_0 : Urban amenities are evenly distributed across the districts and the different types of jurisdictional areas.

Alternative Hypothesis. H_1 : Inequality in distribution of urban amenities across the districts and the different types of jurisdictional areas.

Research Model and Statistical Tools

The equality (or inequality) in distribution or access to *good* sanitation facilities may be understood by using Theil's Entropy index. The index is generally used for measuring inequalities in income distribution, which was extended to measure poverty-inequality, or regional and welfare inequalities. This paper optimistically attempts to look whether the measure could be used for measuring the distribution in usage pattern of civic amenities by individual households over a given space. A modified form of T-statistic may be given as follows:

$$T = \frac{1}{n} \sum_{r=1}^n \left(\frac{s_r}{\bar{s}} \ln \frac{s_r}{\bar{s}} \right)$$

The 'n' is the total population set comprising all the ULBs and 's' represents the proportion of household using *good* latrine or drainage, calculated for the region 'r' $r \in [1, n]$. \bar{s} represents the mean value of the statistical population and s_r is the value obtained for a particular area. At first, the product of the ratio of actual value to mean value of each area and natural logarithmic value of the same ratio is taken. Then the sum of product is divided by the total number of observations (n) to arrive at the index value. The statistic thus obtained, ranges between [0,]. As the value approaches 0 (zero), equality in distribution is established and vice versa. The natural logarithm of the ratio can be both positive and negative, and hence the dispersion can move either ways, but the maximum value for r^{th} area will be the natural logarithmic value of its ratio.

Overview of Usage Pattern of Drainage and Latrine in West Bengal

Drainage

A preliminary study conducted on the drainage system with some selected towns and cities of West Bengal is shown in Table 1 below. The data was collected from the town directory published by Census of India for the survey year 2011. Four types of situations are described in columns of Table 1: (i) only open drainage system is present, (ii) only closed drainage system is present, (iii) both the systems are present and (iv) there are no drainage systems. Urban areas are classified according to their status; namely, the Municipal Corporation Area, the Municipal Areas, Other areas (comprising Cantonment Boards, Notified Areas and Industrial Township Areas) and the Census Town areas.

Table 1: Area-status wise number and percentage of different types of Drainage System in Some Selected Urban Areas of West Bengal

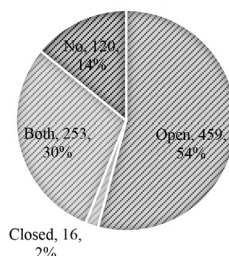
Area Status	Parameters	Open Drainage	Closed Drainage	Both (open + closed)	No Drainage	Total
Municipal Corporation Areas	Number	-	-	6	-	6
	(%)	-	-	(100)	-	(100)
Municipal Areas	Number	60	1	50	1	112
	(%)	(53.6)	(0.9)	(44.6)	(0.9)	(100)
Other Areas (NA, CB, ITS)	Number	4	1	-	-	5
	(%)	(80)	(20)	-	-	(100)
Census Town Areas	Number	395	14	197	119	725
	(%)	(54.5)	(1.9)	(27.2)	(16.4)	(100)
Overall	Number	459	16	253	120	848
	(%)	(54.1)	(1.9)	(29.8)	(14.2)	(100)

Data Source: Town Directory (2011) of West Bengal, Census of India, 2011.

The table plots status-wise UAs against the different types of drainage system: given in number and percentage (row-wise).

It is known that Municipal Corporation areas hold large populations with some people living in good houses, some in bad ones and some in squatter settlements. Owing to this diversity in the pattern of settlement, both the open and closed type of drainage systems are found in big cities. In the sample of 112 Municipal areas, 60 of them have 'open drainage' system and Bidhannagar is the only municipality which has entirely closed system. Among the Notified Areas, only Nabadiganta ITS have closed drainage system. In the towns, which generally come under rural jurisdictions, around 2% of the areas (14 out of 725) have fully closed drainage system. However, the table shows 120 towns, which comprise approximately 16.4 percent of the sample, do not have any kind of drainage system. An overall situation is described in the Figure 1: a pie chart showing percentage distribution of drainage system in Bengal. A closed drainage system is regarded as hygienic and desirable for each and every community. In the sample, which considers 93% of the UAs of West Bengal, shows only 2% of them having a desirable drainage system.

Drainage System



Data Source: Town Directory (2011) of West Bengal, Census of India, 2011.
Refer Table 1.

Figure 1. Distribution of Drainage System in selected cities/ towns of West Bengal given by number and percentage

Latrine

Table 2 below represents an overall situation of latrine usage/ non-usage in the state; results are given according to the status of the area. Similar to Table 1 (drainage), four types of areas were considered viz. the Municipal Corporation Area, the Municipal Areas, Other areas and Census Town areas. The distribution of good sanitary latrine is better in the Corporation areas. The sixth row from the top represents the hygienic latrine usage by the households of the respective group of urban areas. The usage of these types of latrines is very low in the Census Town areas, where around one-fourth of the population practices open defecation. The Census Towns fall under rural jurisdiction but are considered to be urban due to the fact that they fulfil certain criteria as set by the Directorate of Census (India) for urban areas. Whereas, the situation is better in the Municipal Corporation areas, followed by the Municipal areas, where about 56 percent of the population uses hygienic latrines. Hence, the latrine amenity is highly unequally distributed within the urban areas of the state. This will be understood well in the following sections of this article.

Table 2: Area-wise Distribution of Latrine (by types) in Urban Households of West Bengal, 2011

Parameters	Area - Status			
	Municipal Corporation	Municipalities	Other Areas	Census Town
Total Number of UAs ^{*1}	6	120	5	782
Percentage of UAs having Latrine within the premises	88.9	82.4	95.2	70.8
SD ^{*2} of the 'proportion' value	0.08	0.15	0.03	0.21
Percentage of UAs Not-having Latrine within the premises	11.1	17.6	4.8	29.2
SD of the 'proportion' value	0.08	0.15	0.03	0.21
Percentage of UAs having A Proper / Hygienic Latrine within the premises	76.6	56.0	66.6	27.8
SD of the 'proportion' value	0.08	0.21	0.36	0.19
Percentage of UAs with households using open defecation	7.7	13.7	2.4	26.3
SD of the 'proportion' value	0.08	0.16	0.03	0.21

Note: *1 Urban Areas; *2 Standard Deviation.

Data Source: Household Amenities Table, Census of India, 2011.

A proper latrine signifies proper hygienic conditions and 100% coverage is desirable, although impossible. It was noted that 76.6 percent of the total number of houses in the Corporation areas have proper latrines. The standard deviation (henceforth 'SD') calculated for the value of the proportion of households using proper latrine to the total number of households is also found to be low, which indicates that the percentage values observed for the six Corporation areas are close to each other. In that group, 88.5% of households in the Kolkata Municipal Corporation and 84.5% in the Howrah Municipal Corporation have proper latrines, and lowest count is found for Durgapur Municipal Corporation with only 66.2% households.

Open defecation is another major problem in both the urban and rural areas in the developing countries. More than one-fourth of the people in the towns openly defecate; creating an unhygienic environment. In the Municipal Corporation areas, 7.7% population uses the

environment instead of a latrine to defecate, and a bit higher incidences are found in the Municipal areas (13.7%).

Analysis of Results

Calculations based on the Theil Entropy Element are presented in Table 3. The value of the T elements are shown in two columns representing the two selected amenities – the latrine (first column) and the drainage (second column), which are given against the type of urban areas shown row-wise. The result shows that overall usage of *good* latrine in the urban households is much better than the usage of *good* drainage system in West Bengal. It may have two implications – (i) individuals generally consider ‘latrine’ as more preferred amenity over ‘drainage’, and (ii) the Urban Local Bodies fail to provide a well-connected network of drains for carrying household waste water in the cities and towns of West Bengal. Use of a latrine may depend upon the individual’s economic condition (given by wealth or current disposable income), awareness and knowledge about hygiene, demonstration effect of the locality where he lives and availability of hygienic sanitation facilities in the area, like the piped sewerage system. On the other hand, the drainage network of a city is constructed by the Government with the help of the local bodies. The network should collect wastes from all the households of a city and reach the (stormwater) pumping stations for further processing. A closed drainage system runs underground and keeps the region clean, avoiding environmental pollution. Provisioning for a hygienic sanitation system and creating awareness among the individuals about that system, are the two important tasks of the Urban Local Bodies. Local Self Government; the third tier of the Federal Government is such a body which works close to the people. The devolution of power to a Local Self Government is intended to bestow the responsibility of providing urban services to its people. It was also opined by Oates (1999) that the Local Self Governments can bring about Pareto optimal solutions because it possess knowledge about local preferences and also the cost conditions that a central agency (or Government) is not likely to have.

Whether a bundle of sanitation amenities is of use to a household or not depends upon a simple two-fold analysis. The bundle must be accessible to the household, which is only possible if those amenities are available to the area (space) where the household is located. Now, being available it must be affordable, which can be further made possible in two ways – either the household must be able to privately purchase it or some agency must provide it. Here, the provisioning may be made through full 100 percent or less than 100 percent subsidization. In case of latrine, the first fold does not apply, rather much depends upon the affordability of the respective household. However, if the construction of a latrine is partially subsidized then the affordability would increase. In case of drainage, the first step is stronger, as the households must have the closed drainage networks available in that area to access it or connect the house’s waste water outlet to it.

The construction of a closed drainage network depends upon political will and power of the ruling Governments. At the first instance, the Local Self Governments must be willing to construct the closed network of a specified area. Say, if the area is a residential hub with properly built concrete houses, then the local Governments will always be willing to cater better amenities to the area. This is not only for gaining the support of the people of the area but also to make the area more attractive for living to indulge a lateral sprawling. The second factor is power: having the ‘will’ to develop an area, the Local Self Government must have the power to take decision. The power may exist as there is financial independence to take a decision to construct an alignment of underground drains, or the body is able to make its upper Government viz. the state Government hear its plea.

The T-statistic shows that inequality in distribution of *good* sanitation amenities are more even (closer to zero) in the metropolitan areas. The Municipal Corporations are more efficient in providing urban services to its people. Apart from the efficiency of the local Government, education and awareness about hygiene are also important. Understanding the need and awareness of a healthy hygienic environment creates demand for having a salubrious living condition. In the metropolitan areas, people have both accessibility to and demand for hygienic sanitation, and therefore, it is due to some other economic and social factors that an individual does not choose *good* sanitation utility.

The entropy element observed for municipality areas showed that in case of 'latrine' the usage pattern is not much dispersed (0.0813), while in case of 'drainage' the dispersion is high (0.2868). The underlying implication is that the operational abilities of the municipal bodies are not uniform throughout the space. Some municipalities work more efficiently than others. There are a hundred and twenty municipalities in the state, each of them has different socio-economic set-up and is placed under separate political apparatus. As a result, their *modus operandi* is expected to be different from one another. However, since they all cater urban services, which is expected to be uniform throughout a country-space, it is always desirable to have uniform outcomes. The Census Towns also face similar conditions, where dispersion is even higher (see Table3).

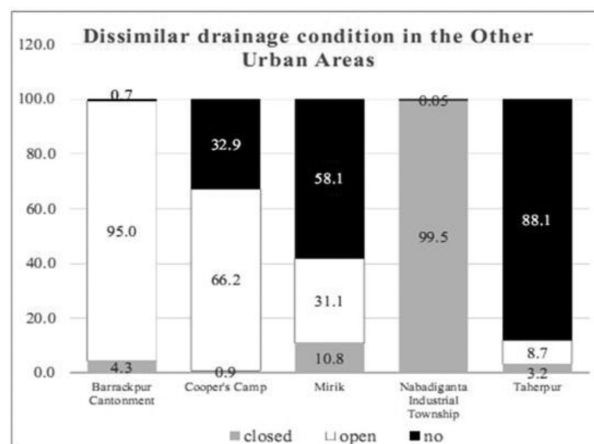
Table 3: Inequality in Usage Pattern of Sanitation Facilities in Urban Areas of West Bengal, given by the Civic status of the Area.

	AREA-TYPE	THEIL ENTROPY ELEMENT	
		Good Latrine	Good Drainage
1	Municipal Corporations	0.0044	0.2491
2	Municipalities	0.0813	0.2868
3	Notified Areas and ITS	0.1670	0.9914
4	Census Towns	0.2374	0.3880

Data source: Census of India, 2011

There are four notified areas and one Industrial Township named 'Nabadiganta', in West Bengal, all of which are highly dissimilar to one another. In Nabadiganta, one out of 193 households has 'no drainage' while the rest have the closed drainage system. This is ought to be, as this township was carefully designed to meet the growing demand for residential spaces of the industrial hub of Sector V areas of Saltlake city (Bidhannagar). The situation is worst in the Taherpur, a Notified Area of the district of Nadia where 8305 out of 9428 households do not have any drainage system. The Ranaghat area of Nadia District has Cooper's Camp in the south. Both of these Notified Areas have historical significance. The second one was formed in 1950s, in the aftermath of partition when one million Hindus ran away from East Bengal to save themselves from the horrifying violence instigated by the Muslims. Unfortunately, even after 60 years, they are regarded as refugees, living uncomfortably in our land. Very recently, Cooper's Camp residents were given the status of Indians. The second camp at Taherpur provided shelter to Hindu refugees from East-Pakistan who fled the mass genocide of the Pakistani Military forces. These areas were neglected by the Indian government ever since they came into existence, and therefore, urban services were never delivered properly. This may be the reason why closed drainage system is very rarely found in the households of Cooper's Camp (50 out of 1783) and Taherpur (300 out of 8305) areas. Barrackpore Cantonment Area has a vintage structure, established in 1765 during the British rule in India. The British architectural plan still exists and the landscape remains unchanged for the last two hundred and fifty years. Mirik in Darjeeling

district is a tourist attraction and is not really meant for residential uses. However, two and a half thousand families live there and they belong to extremely heterogeneous income group.



Data source : Household Amenities tables, Census of India, 2011.

Figure 2. Percentage distribution of Drainage System in Other Areas (non-municipal statutory Areas) of West Bengal showing the extent of inequality that exists in the five selected areas.

The next part of this analysis deals with the regional variation dealt in respect to variation across the districts. In the subsequent sections, district-wise distribution of the two variables is shown separately in two tables. The results are presented in Tables 4 and 5 below.

Table 4: District-wise Theil Entropy Index for the distribution of 'Good Latrine' in West Bengal.

District	Municipality		Census Town	
	Theil's T	Rank	Theil's T	Rank
Darjeeling	0.003	1	2.191	8
Bankura	0.029	2	0.511	4
Purulia	0.043	3	6.319	11
Cooch Behar	0.094	4	0.479	3
Jalpaiguri	0.147	5	2.581	9
Uttar Dinajpur	0.156	6	0.194	2
Purba Midnapore	0.166	7	1.732	6
Birbhum	0.169	8	2.159	7
Bardhwan	0.181	9	7.714	12
Dakshin Dinajpur	0.242	10	0.118	1
Malda	0.243	11	3.787	10
Howrah	0.346	12	29.605	16
Murshidabad	0.491	13	31.210	17

(Continued...)

Hooghly	0.541	14	13.142	15
Nadia	0.645	15	11.965	13
North 24 Parganas	1.309	16	12.612	14
Paschim Midnapore	1.324	17	1.553	5
South 24 Parganas	2.567	18	34.378	18

Data source: Census of India, 2011

The Table 4 shows the T-statistic values of the districts and their corresponding ranks for the statutory and the non-statutory areas respectively. Darjeeling (rank-1) and Purulia (rank-3) revealed that inequality is lower in the Municipal areas but higher in the Census Town areas. In contrast, Dakshin Dinajpur and Paschim Midnapore have higher inequalities in Municipal areas and lower in Census towns. Another category of districts showed closer ranks obtained for the two different types of areas; they are Cooch Behar (ranks 4 and 3), Purba Midnapore (ranks 7 and 6), Birbhum (ranks 8 and 7), Malda (ranks 11 and 10), Hooghly (ranks 14 and 15) and South 24 Parganas (ranks 18 and 18). In this category, the first three districts, which gained ranks below ten in both the cases, can be regarded as above average, while the rest are below average. Thus, the inequality line demarcating the above and below average groups is 0.242 and 3.787 for Statutory and non-Statutory areas, respectively.

High differences in ranks can be attributed to high intra-regional inequality within a district. This is only possible when there exists significant rural-urban divide. A town area falls into rural jurisdiction, which has economic, administrative and political set up very different from that of any municipal area. Thus, it can be inferred that *an urban bias exists within urban areas towards bigger cities – the more favoured ones.*

The North Twenty-four Parganas is a large area with some parts possessing relatively high economic profile and some are much poorer. In the eastern part of the district, a cluster of industries are found along the Howrah, Hooghly and Kolkata border: the areas which are economically better-off in all respects, while in the western and southern side economic condition is relatively poorer. This diversity has resulted in the disparity in the usage pattern of latrines; proving once again the importance of the economic profile in choosing latrine utility. Howrah and Hooghly too have disparity in distribution of hygienic latrines due to its diverse economic profiles in different parts of the district.

Although, the 'good latrine' usage showed more or less average results, the 'good drainage' showed poorer results as presented in Table 5 below.

Table 5: District-wise Theil Entropy Index for the distribution of 'Good Drainage' in West Bengal

District	Municipality		Census Town	
	Theil's T	Rank	Theil's T	Rank
Bankura	0.021	1	1.273	3
Uttar Dinajpur	0.023	2	0.285	1
Purulia	0.092	3	7.959	8
Darjeeling	0.106	4	8.572	9
Howrah	0.349	5	65.098	18

(Continued...)

Malda	0.445	6	6.976	7
Murshidabad	0.472	7	19.237	13
Jalpaiguri	0.532	8	12.279	12
Dakshin Dinajpur	0.537	9	1.020	2
Birbhum	0.667	10	6.769	6
Purba Midnapore	0.766	11	10.181	10
Cooch Behar	1.138	12	4.756	5
Hooghly	1.537	13	11.862	11
Bardhaman	1.712	14	21.232	15
Paschim Midnapore	2.075	15	3.443	4
Nadia	2.902	16	20.175	14
South 24 Parganas	3.614	17	56.465	17
North 24 Parganas	6.263	18	29.341	16

Data source: Census of India, 2011

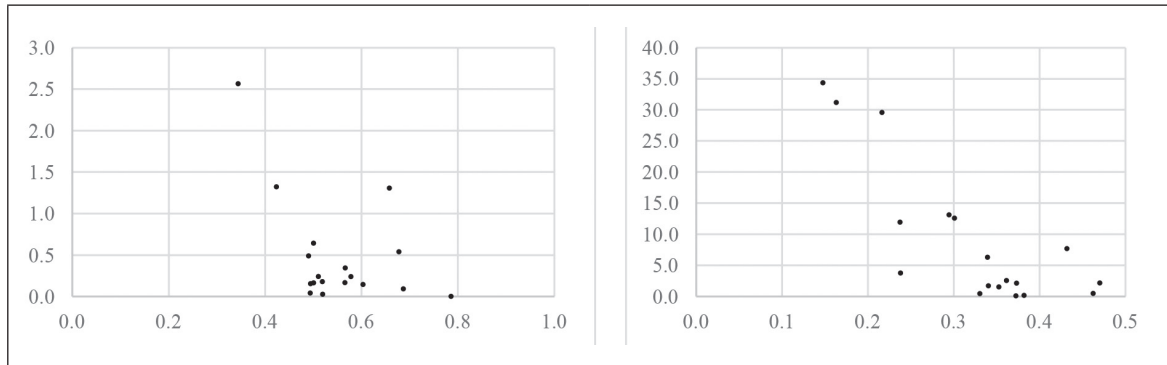
Higher incidences of inequality, within and between the districts, are found in the drainage usage. On average, the drainage networks are well-constructed in the statutory areas than its counterparts. It can be assessed that political motivation, to build a network of drainage uniformly throughout an urban area, is less in the towns than in the larger cities. Again, in contradiction to this, large cities have diverse population and settlement types, which cause inequality in distribution of urban resources. However, certain urban renewal schemes such as JNNURM or AMRUT operate in selected municipal areas to bring the entire area under one big umbrella. This makes the infrastructural development easier, i.e., it will enable an area to implement the scheme easily and monitor its progress and activities.

High deviation in ranks are observed in multiple cases; for example Howrah (ranks 5 and 18), Murshidabad (ranks 7 and 13), Dakshin Dinajpur (ranks 9 and 2) and Paschim Midnapore (ranks 15 and 4). This results reveals the fact that allocative and distributive efficiency of the urban local Government varies vastly across the municipal areas and the census town areas. Again, another very crucial factor observed in the table above is that the Theil values: beyond the 9th rank in town areas, the index value shoots up from 10.181 to above 65, which is very high indeed. Overall, the drainage system was found more even in Bankura and Uttar Dinajpur, while South and North Twenty-four Parganas were still the worst distributor of drainage amenities, as in the case of latrine amenities.

Considering both the cases above, Bankura was found to have more evenness in distribution of those sanitation amenities. However, a question may arise about the quality of amenities being distributed. It might so happen that the service being delivered is not adequate or poor. To check this issue, a scatter diagram is used to show the average level of service in the area and the index value. The following figure shows four scatter diagrams for cases discussed above.

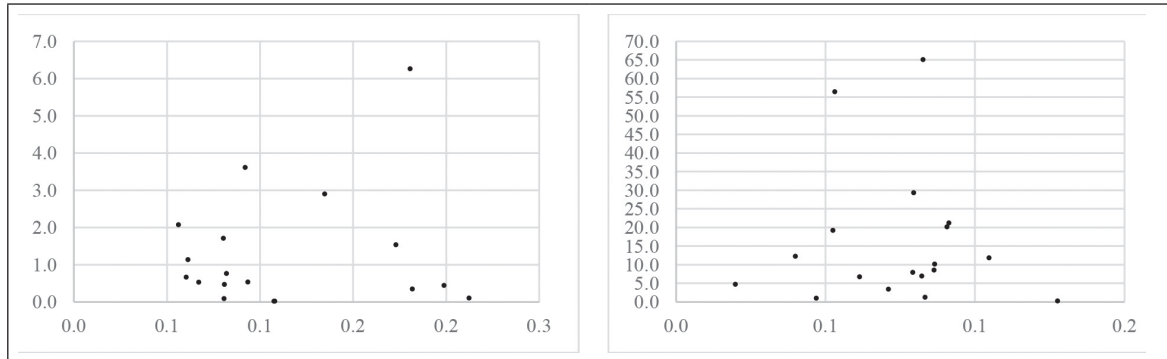
The diagram has four parts, given by four quadrants A, B, C and D: the horizontal axes measures average of the proportion of households having access to *good* sanitation condition and the vertical axes measures the Theil's index. The quadrants A and B delineates that there is a negative relationship between the two variables. However, from C and D such a relationship

could not be traced. Thus, we may say that as more people use good latrines, the distribution improves. This have more than one implication and the more prominent being that – as more people become aware of using a good hygienic system, the demand for it increases, which either forces the local urban bodies to provide it (where possible) or privately purchase it. In anyways, once people start believing in a healthier environment, they adopt it. Thus, awareness becomes one of the crucial aspects in taking up hygienic measures. It also implies that a local institution, such as the ULBs play a vital role in securing cleanliness to societies.



(A) Scatter Diagram showing relationship between the Average distribution of 'good latrine' and its corresponding T-statistic in the Municipal areas of West Bengal.

(B) Scatter Diagram showing relationship between the Average distribution of 'good latrine' and its corresponding T-statistic in the Census Town areas of West Bengal.



(C) Scatter Diagram showing relationship between the Average distribution of 'good drainage' and its corresponding T-statistic in the Municipal areas of West Bengal.

(D) Scatter Diagram showing relationship between the Average distribution of 'good drainage' and its corresponding T-statistic in the Census Town areas of West Bengal.

Figure 3. Relationship between the average value of the proportion of households having access to good sanitation amenities and the corresponding Theil's T-statistic index measuring its distribution

So far, the result is analyzed in two ways – (i) with respect to the type of jurisdictional area (broadly and also within the districts), and (ii) between the districts. Both the results showed high incidences of inequality in the study area, West Bengal. Therefore, the 'null hypothesis' that states urban sanitation amenities are evenly distributed is rejected, and the alternative hypothesis is accepted.

Discussion

In the federal structure of the Government residual powers lie with the lowest tier of the government. The financial powers are also limited, which make the Local Governments to depend heavily on the State Government for any decision making at the local level. A State Government is formed by the ruling political party of that State which, eventually, takes decisions on behalf of the Local Bodies. At this point of time, it can be argued that, it is the bargaining power of these Local Bodies to fetch something for their area. For example, Kolkata Municipal Corporation is a large body with eminent bargaining power to seek a sanction for a drainage network construction work. Such a power is not always present with the Municipalities or Nagar Panchayats. Here, when the sanctions become biased then development follows suit.

The 'political will' arises or is created to influence or allure political support of the people. A city dweller will not compromise on health and environmental issues, and would, at the first go, demand hygienic sanitation amenities. This demand, to a great extent, is developed via strong 'demonstration effect'. An educated individual will compare the condition of his city with that of the greater ones like London, New York and/or Bangalore. When he cherishes his demanded bundle, his neighbours will learn about it and will also demand similar bundle, and gradually this group will grow. Now, growth of this group is faster in the larger cities than the smaller ones. An interplay of three very evident factors can be cited – information dissemination factor, smart learning and bargaining factor. When an individual gets a chance to socialize faster across diverse cultures and groups, he receives and transmits information at a faster rate, which can be regarded as smart learning and develops a bargaining power with the support of his group. As a result of this, resonance of information dissemination is high. The resultant outcome is the demand, which is formed socially. Any political party must respond to this demand to survive, however, since the force of this demand is never uniform throughout the state or district, or even within a district, the inequality arises. It must be remembered that the sanitation amenities are basic civic amenities of a household, and therefore, force of demand will be more powerful than any other good or service which is not that necessary for survival.

In the previous section, the Census Towns are found to have high incidences of inequality, which may be due to the factors mentioned above, i.e. low bargaining power, low political will and lower demand for latrine and drainage. However, another important reason can be cited for such backwardness of the towns. Bengal has witnessed rapid urbanization in the past decade: 530 new Census Towns have emerged from the rural background. These towns belong to Class IV and V status, indicating their backwardness, and in no case the urban set-up can be compared with that of any Municipal areas. Comparing them with old towns that existed before 2001 will be a bit harsh because the new ones are still apparently rural. Pooling all the towns together gave bad value of the T-statistic.

Limitations of the Study

The study is carried out in one of the twenty-nine Indian states. Therefore, the research can envision possible prescriptions from the analysis of data of West Bengal only. It fails to understand the variability in variation of inequality that may exist amidst socio-economic versatility of whole country of India. The research work has also limited the study to cross-sectional analysis, which cannot throw light upon the dynamics of time on the concept of inequality.

Scope for Future Research

India is a country of diverse culture and multiform economic apparatus. Therefore, extending the study to the states of Northern, Western and Southern India, will provide a larger vision of inequality, and enable the policy makers to prescribe a more general prescription to combat regional inequality in urban services. Moreover, panel data study can be adopted by pooling data from Census of India 2001 and 1991, which will give a dynamic dimension to the study.

Conclusion

This research discloses more incidences of inequality in usage pattern of 'good latrine' and 'good drainage' in West Bengal. Several socio-economic, economic and political reasons have been stated in the previous sections in support of the prevalence of such inequalities. Now, given this prevalent inequality, what can be done?

In Rosario, the strength and bargaining power of the Mayors brought forth development for the region. 'Political will' is a proven powerful tool to bring about development, even in the absence of copious resources. If no one is motivated enough to exhibit their 'willingness' to work towards social development, then participatory approach may do the needful. Progress of many cities around the world is bearing the example of 'social inclusion'. When the entire community takes part in developmental activities, then *political will* can be generated and hence the bargaining power can also be exercised.

Another great example witnessed recently, is of a participatory budgeting instituted by hundreds of Latin American local Governments. Participatory approach towards the construction of a municipal budget empowers people to reveal their demand for services. However, what will happen if the budget limit is too small? At this point, the private players may be invited, because many private companies, such as, HUDCO and JICA, have records in their bags of doing impressive job under centrally sponsored schemes like JNNURM. Thus, there should be two steps – firstly, a participatory budget to prioritize demand and necessities, and secondly, to invite private players to fill up the gap and increase efficiency of urban service delivery system. Thus, the problem of unequal urban services, which indulges the regional inequality to creep in the provisioning of households' sanitation amenities, can be resolved by a complete dual participation of the community and the local Government. In addition to this, if 'political will' is generated, then the development can be further paced up.

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