Assessing the Quality of Urbanisation across Size Classes of Urban Areas in India

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Abstract

India witnessed a 'turnaround' in the level of urbanisation which increased from 27.7 percent in 2001 to 31.1 percent in 2011. This measure, however, gives an incomplete picture as it fails to capture the complex socio-economic dynamics of the process of urbanisation. We construct an Urbanisation Index (UI) at the city/town level for the Census years of 2001 and 2011 that reflects the Quality of Urbanisation (QOU). Spearman's Rank correlation between absolute population size and the constructed UI is positive but low enough to show that there is a significant difference when urbanisation is measured on the basis of multi-dimensional aspects. We find that irrespective of size class, majority of urban areas offer moderate level of QOU. Moreover, QOU has improved as reflected by the increased average value of UI during 2001-11. Much of this improvement has been witnessed by size classes on either spectrums (that is, cities and small towns), while the QOU of medium sized towns has deteriorated over time. Future urban development programmes of the country should ensure equitable distribution of resources to reduce the variations in QOU within small towns, encourage the growth of medium and small towns, invest significantly in social infrastructure, and achieve greater inclusivity.

Keywords: Quality of Urbanisation, Urbanisation Index, Size class comparison, Population Census

JEL Codes: R110, H410, C000, O200

1. Introduction

The world started becoming predominantly urban towards the end of the twentieth century, particularly with Africa and Asia witnessing a sharp spike in the percentage of population residing in their urban areas (Clark, 1996). Further, the World Urbanisation Prospects Report of 2018 estimates Asia to comprise 52 percent of the entire increase (2.8 billion) in urban population during 2018-50, with India accounting for the highest contribution. The rapid urbanisation of developing countries is rather different than experienced by the developed world. Kundu (1983) argues that while in the Western countries industrialisation and urbanisation continued uninterruptedly, industrialisation in India was restricted to few regions and some metropolises. This has led to an uneven distribution of urban population which is heavily skewed towards cities, and it has been worsening over time (Kundu, 1983; 2011b; Mishra et al., 1999). At the same time, urban areas contribute about 63 percent to the country's Gross Domestic Product, and the McKinsey Report of 2010 estimates that this will increase further to 75 percent in 2030. However, urban areas of India face severe infrastructural deficiencies such that there is neither sufficient quantity nor quality of physical and social infrastructure to cater to the increasing population (Tripathy, 2017; Kundu, 2011a). Since urban areas serve as 'hubs for development'[1], such infrastructural constraints hinder economic growth, and severely affect the lives of urban residents who depend on services like water, education, hospitals, roads, etc. (Pradhan, 2007; Tripathi, 2017; Nandi and Gamkhar, 2013).

The Population Census of India calculates the level of urbanisation by measuring the percentage of population residing in urban areas of the region. This conventional measure of urbanisation may be suited to give a broad idea of or a glance at the degree of urbanisation, but it is an incomplete picture when urbanisation is considered as an indicator of development. Growth of urban areas may be brought about by an increase in their population, but urbanisation does not necessarily indicate economic development if it is coupled with a rise in deprivation of a section of the population[2]. Urbanisation, being a dynamic process of structural changes, encompasses changes in the economic base, social relations, culture, lifestyles, land cover, and infrastructure among others, and these changes vary across size classes of urban areas (Montgomery et al., 2013; Gupta, 2013). Accordingly, it is crucial to introduce a measure of urbanisation which takes into account this complex socio-economic process. The present study

[1] The UN-Habitat states that urban areas offer enhanced opportunities of education, employment, political participation and provision of infrastructural services (UN Habitat, 2018).

[2] The process of urbanisation in India has failed to ameliorate the poor living conditions of marginalised communities (Scheduled Castes and Scheduled Tribes) in urban areas (Sahoo, 2016; Bhagat, 2013).

constructs such a measure which attempts to capture not only the quantity but also the quality aspect of urbanisation in the Indian context. Applying weighted aggregation method, we design an Urbanisation Index (UI) at the city/town level that takes into account the dimensions of demographic composition along with housing and social infrastructure provisions in the urban areas of the country. The UI values are used to assess the Quality of Urbanisation (QOU) for the Census years of 2001 and 2011, and we find that quality has improved during the decade. Our most significant result is that small towns perform unexpectedly well with respect to their QOU, albeit with high variation within them.

A Brief Background of Urbanisation in India

India started off the twentieth century with Calcutta as the only city, with Bombay joining the ranks only in 1921. Over time, the country started becoming more urban such that the level of urbanisation, measured as the percentage of urban population to the total population of the country, increased from 17.29 percent in 1961 to 31.16 percent in 2011 (Bhagat, 2011b). In fact, the last Census of 2011 witnessed a 'turnaround' in urbanisation – there was a meagre increase in the average exponential growth rate (AEGR) that has been declining till before 2011[3], and a sharp spike in the number of urban settlements declared as census towns[4] (Kundu and Sarangi, 2005; Bhagat, 2011a). The table below shows the growth rate of the number of urban areas across these size classes during 1991-01 and 2001-11.

Table 1. Growth rates of cities/towns and growth rate of population across size classes during 1991-01 and 2001-11

Size Class[5]	Growth rate of urban areas		Population growth rates	
	1991-01	2001-11	1991-01	2001-11
I.I	53.06	18.67	31.69	22.59
I	37.13	10.99	34.16	20.75

[3] In the 1970s, the AEGR was 3.8 percent, in 1980s, 3.1 percent, while in the 1990s it decreased further to 2.74 percent. It increased to 2.76 percent in 2001-11.

[4] The number of census towns increased from 1362 in 2001 to 3894 in 2011.

[5] An 'urban area' is defined as one that is declared so by the respective State or Union Territory government. These are the Statutory Towns (ST). Areas which have minimum population size of 5000, a population density of at least 400 persons per square kilometres, and has at least 75 percent of the male workforce engaged in non-agricultural activities, are also declared as urban areas. They are referred to as the Census Towns (CT).

Urban areas are further divided into size classes according to their absolute population size. Size class 1 includes all those urban areas which have absolute population sizes exceeding 1 lakh. These are referred to as the cities. Urban areas except cities are termed as towns. Size class 2 refers to urban areas which have their population ranging between 50,000 and less than 1 lakh while size class 3 refers to those with population size lying between 20,000 and less than 50,000. Urban areas having absolute population in the range of 10,000 and less than 20,000 are the size class 4 towns, ones having population between 5,000 and less than 10,000 are size class 5 towns, and finally, ones with population less than 5,000 belong to size class 6.

II	18.2	21.97	28.82	15.9
III	17.48	37.2	27.87	18.27
IV	6.88	42.18	25.77	17.49
V	5.48	109.69	37.71	16.98
VI	-27.24	129.06	31.08	20.87
Total	**10.54**	**53.14**	**31**	**20.2**

Source: Computed using census data of 1991, 2001, and 2011

Note: In this study, size I.I refers to urban areas with absolute population size of greater than five lakhs. Size I are urban areas with population lying within one lakh and five lakhs. Both are referred to as cities; we use the term large cities for the former. Size classes II and III have population within fifty thousand and one lakh, and twenty thousand and fifty thousand, respectively. They are termed as the medium-sized towns. While size class IV has a population size lying between ten thousand and twenty thousand, population size of size class V ranges from five thousand to ten thousand, and that of size class VI are urban areas with population less than five thousand. Most of the size class VI towns are census towns. Size classes IV, V, and VI are referred to as small towns.

There is a notable increase in the growth rate of areas declared as 'urban' in 1991-01 (10.54 percent) as compared to 2001-11 (53 percent). In 1991-01, the magnitude of growth rates is observed to decline as one moves down the size class hierarchy, which has some probable explanations. A number of towns in 1991 might have graduated to cities in 2001 (Kundu, 2011b), while negative growth rate of size class VI towns reflects the declassification of a significant number of census towns owed to a slowdown in growth of non-farm employment (Kundu and Sarangi, 2005). This pattern is reversed in the next decade where small towns of size classes V and VI recorded the highest increase in their numbers while cities witnessed the lowest increase in their numbers. This has been highlighted by other scholars as well (Chakraborty, 2017; Mitra and Kumar, 2015). Table 1 also shows population growth rates across size classes using the continuous approach[6]. The steep fall in urban population growth rates over time may be due to a decline in natural increase along with a negligible increase in migration (IIHS, 2011; Bhagat and Mohanty, 2009). Moreover, there is no marked difference in growth rates across size classes, thereby disproving claims of cities growing the faster than medium and small towns (Mohan, 1996). However, while cities grew by benefiting off the liberalisation policies in post-1991 period, the growth of small towns was due to higher natural increase, migration of the rural poor who have little choice but move to small towns, and the

[6] Bhagat (2004) identifies two ways of calculating population growth rates. The instantaneous approach considers all urban areas in each year, while the continuous approach considers only those urban areas which are common to both the years to calculate the growth rate of population.

good connectivity enjoyed by those that are situated along the outskirts of metropolitan cities (Jain, 2017; Bhagat, 2004).

Population growth rate figures, however, fail to capture the multi-dimensional aspect of the process of urbanisation and provide a holistic overview of the same. Kundu (1983) contends that population and density criteria have become 'less binding'[7]. Additionally, the recent urban growth in the country (driven by a marked increase in the number of small towns) is argued to be attributed to significant infrastructure improvements in transportation and commute (Bhattarcharjee, 2016; Abhishek et al., 2017; Bhagat, 2012). This makes it imperative to undertake a comprehensive evaluation of the state of basic amenities, physical and social infrastructural services, and other social and economic aspects of urban areas. This will not only give us an idea regarding QOU of cities and towns in the country, but also enable policymakers to undertake requisite measures in order to address existing shortfalls. To this end, scholars have attempted to assess the quality of life of select cities in the country (Das, 2007; Saitluanga, 2014; Panda et al., 2016). Mitra and Nagar (2017) is the only study, to our knowledge, that has formulated QOU at a macro-level covering all the urban areas in India. They construct a vulnerability index that reflects the deprivation of households in basic amenities and possession of assets at the city/town level for 2011. However, their study neither covers the aspect of infrastructure nor does it undertake a comparative analysis over time. This study endeavours to fill this gap, and addresses questions like, are large cities inclusive and well equipped with social infrastructure like schools, colleges and hospitals to support its increasing population[8], and do medium and small towns fare much worse with respect to QOU as compared to cities?[9]

This paper is divided into six sections including the introduction. The following section provides the analytical framework of our index. Section 3 elaborates on the data sources and the methodology applied to construct the index, while section 4 presents the findings. Section 5 analyses the results obtained, and section 6 concludes.

[7] This holds specifically for small towns, majority of which fail to meet the requisite criteria since they suffer from a weak economic base and consequently, get declassified.
[8] Abhishek et al (2017) notes that local governments in cities are struggling to meet the increasing demand for good quality and sufficient quantity of basic amenities and other necessary infrastructures.
[9] Bhagat (2012) argues that medium and small towns face relatively grater shortage of civic amenities as compared to cities.

2. Analytical Framework

The past two decades witnessed many organisations attempting to analyse sustainability of cities or evaluating urban management, or measuring cities' 'prosperity index'. In 2001, the Asian Development Bank (ADB) came up with the Cities Data Book (CDB) which analysed select cities of the Asian region. They introduced an index measuring several urban indicators with the goal of proper management of cities. In 2012, the UN-Habitat introduced the City Prosperity Index (CPI) after conducting surveys in fifty-four developing countries all over the world. The index captures six dimensions of 'prosperity' as defined by them, namely, productivity, infrastructure development, quality of life, equity and social inclusion, environmental sustainability and governance and legislation. Additionally, several measures of sustainable urbanisation have been suggested – Global Urban Indicators Database, City Development Index, and Global Cities Indicators Program.

A 'well-managed' urbanisation is one which maintains a balance between the push and the pull factors (World Urbanisation Prospects, 2018; Preston, 1979). Availability of and accessibility to basic services like water, sanitation, drainage, waste disposal, etc., social infrastructure including health and medical services and schooling, physical infrastructure like well-built roads, better connectivity, etc., and existence of a large and diverse better pool of workers and clustering of firms act as the 'pull' factors which encourage individuals to move to urban areas. On the other hand, factors like increasing crimes, pollution, and congestion are the 'push' factors at work as well which tend to discourage people from concentrating in urban areas. Thus, the process of urbanisation is measured more effectively if all of these factors are taken into consideration.

The present study was, however, unable to incorporate all the factors suggested by different organisations. Data limitations allowed only some dimensions to be considered for the index. They are as follows:

Social infrastructure: Availability of and accessibility to social infrastructural facilities, directly and indirectly, have a crucial effect on the quality of life of any area (Fourie, 2006). These facilities promote education, health, and recreation, and enable people to move out of poverty and improve upon their deprived situations (UN-Habitat, 2016). Thus, if the benefits outweigh the costs of providing such new infrastructure, then it is likely that these services will increase the attractiveness of an urban area, particularly of large cities since they have stronger agglomeration forces (Grimes et al., 2014). Even in the Indian context, Pradhan (2007) finds

that infrastructure has a strong positive impact on urbanisation. However, urban areas do face lack of sufficient quantity and decent quality of infrastructure (Tripathy, 2017).

Housing infrastructure: These include services which are essential for daily living and sustenance. Durable materials like concrete and machine-made tiles ensure protection to inmates from bad weather conditions; energy sourced from electricity is more reliable than that from kerosene thereby enabling activities of work and education; a flush toilet or a piped sewer system is more hygienic; and covered drains or waste water outlets and clean drinking water also reduce health risks. Hence, all of these facilities contribute to the well-being of urban residents (UN-Habitat, 2016). In fact, access to basic amenities like drinking water, bathrooms within premises and electricity are often called 'the major determinants of quality of urbanisation' (Handbook of Urban Statistics 2019; Bhagat 2011a).

Demography: The UN-Habitat (2012) encourages the creation of an inclusive society, defined as one that overrides differences of gender, class, race, generation and geography, and ensures equal opportunities and capability of all members of the society. They suggest that inclusiveness can be achieved to a considerable extent through gender equality, protection of rights of minority groups and ensuring representation of all members in various spheres of life. In the Indian context, it is observed that urban areas do not fare well with regard to representation of the socially backward castes of Scheduled Caste (SC) and Scheduled Tribe (ST). This section of the society has been victims of discriminatory practices, which continue in urban areas (Vithyathil and Singh, 2012; Deshpande and Newman, 2007). Although the percentage of SCs and STs in urban areas has increased over time, their economic and living conditions continue to be much worse than the average urban households such that they reside in the poorest of all neighbourhoods in cities (Bhagat, 2013; Sahoo, 2016). Concurrently, while overall sex ratio in 2001 was 933 females per 1000 males, the same in urban areas was a mere 900 females per 1000 males. The situation remained equally grim in 2011- the urban sex ratio stood at 926 per 1000 males compared to 943 in the country. Thus, urban areas of the country perform quite poorly with respect to inclusiveness of the society.

Other Socio-Economic Aspects: This dimension includes three other variables which are pertinent in assessing QOL of urban areas, but could not be incorporated in the preceding dimensions. The first variable is literacy rate which is a crucial indicator of development in any society (Handbook of Urban Statistics, 2019). Thus, ensuring high literacy rate is the basic requirement and one of the first steps to 'foster productivity, economic growth and quality of

life' (UN-Habitat, 2012). Employment to population ratio is the second variable, and an important indicator of growth and social development of an economy (UN-Habitat, 2012). Higher employment to population ratio implies larger number of individuals engaged in economic activities, which results in not only a lower dependency ratio but also a higher per capita GDP. The third variable in this dimension is the complement of this ratio- the unemployment rate. The state of unemployment not only creates financial difficulties for individuals, but also affects their mental health and social relationships thereby making them more vulnerable (Darity and Goldsmith, 1996). Thus, ceteris paribus, urban areas with lower unemployment rates offer better QOU.

Therefore, four dimensions have been used to construct the UI: social infrastructure, housing infrastructure, demography and other socio-economic aspects. Each city/town in the sample has a value measuring each of these dimensions and consequently, each has a value reflecting its QOU.

3. Data Sources and Methodology

3.1 Data Source and Sample Size

Data obtained from Population Censuses of 2001 and 2011 are merged at the city/town level to enumerate the UI for each urban area. Three datasets are availed - Town Directory datasets; Primary Census Abstracts to obtain information on employment; and, the Housing list and Housing datasets to avail information regarding household's access to basic amenities.

A cross-sectional analysis for each year has been attempted. The dataset for 2001 contains detailed information on 3360 cities and towns and the same for 2011 has a list of 7576 cities and towns. Since different sample sizes of each year impedes a comparison of QOU over time, datasets of 2001 and 2011 are merged to obtain the sample of all those cities and towns which were notified as 'urban' in both Census years. This sample has a total of 3160 cities and towns.

3.2 Definition of variables comprising the index

A number of variables pertinent to the four dimensions have been taken into account.

Variables used for constructing the dimension of ***social infrastructure*** are defined as follows:

- *Schools*: This variable measures the availability of primary, middle, secondary and senior secondary schools per 100 of the city/town population aged 6-18 years.

- *Colleges*: This variable reflects the availability of higher educational institutions in the city/town. It is measured as the total number of arts, science, commerce, arts and science, arts and commerce, arts, science and commerce, medical, engineering, polytechnic, law and other colleges that are available per 1000 of the city/town population aged 19- 25 years.

The above two variables have used age-specific town population, which is unavailable in Census. Their values have been arrived at by using the following formula:

Town population aged 6 to 18 years = (District urban population aged 6 to 18 years/ Total district urban population) * Town population

Town population aged 19 to 25 years = (District urban population aged 19 to 25 years/ Total district urban population) * Town population

This gives a more precise figure of availability of schooling and college facilities than using just the total town population for this purpose.

- *Hospitals*: This variable is given by the total number of hospitals (both allopathy and homeopathy) available per 1000 of the city/town population.
- *Other health facilities*[10]: Health facilities other than hospitals like nursing homes, clinics and dispensaries play a crucial role in meeting medical requirements of residents. The variable is measured by the total number of dispensaries, health centres, family welfare centres, T.B. hospitals or clinics and nursing homes and other medical facilities available per 1000 of the total city/town population.
- *Beds in hospitals and in other health facilities*[11]: The number of hospitals and other such medical facilities do not provide much information about the quality of services provided by them. Thus, we consider the number of beds that are available to patients in an attempt to capture quality of such facilities to some extent. The variable measures total number of beds available in hospitals, dispensaries, health centres, family welfare centres, T.B. hospitals or clinics, nursing homes and other medical facilities, per 1000 of the city/town population.

[10] 2011 has data on maternity homes, maternity and child welfare centres and mobile health clinics as well. They too have been added to find the total number of other health facilities of a town for this year.
[11] The same note holds for 2011 as in the case of calculating other health facilities per 1000.

Variables considered for the dimension of ***household infrastructure***[12] are measured as follows:

- *Light*: This variable gives the percentage of households having access to electricity or solar energy.
- *Drainage*: It is the percentage of households with a closed drainage system.
- *Latrine*: This is the percentage of households that have pit latrines or water closet latrines.
- *Material of roof*: This, and the following two variables give an idea regarding the durability of houses. The 'material of roof' variable is given by the percentage of households which have their roof made of machine made tiles or handmade tiles or burnt brink or stone or slate or metal or asbestos sheets or are concrete.
- *Material of wall*: It is measured as the percentage of households which have their walls made of wood or burnt brick or stone packed with or without mortar, metal or asbestos sheets or are concrete.
- *Material of floor*: The variable is measured by the percentage of households which have their floors made of burnt brick or stone or cement or mosaic or floor tiles.

Variables considered in the dimension of ***demography***[13] are defined as follows.

- *Population Density*: It is a ratio of the total city/town population to the total area of the city/town in square kilometres.
- *Sex ratio*: It is the number of females per 1000 males.
- *Percentage of Scheduled Castes in Total Population*: This gives the representation of people belonging to Scheduled Caste. It is the number of SC individuals in a city/towns expressed as a percentage of total population of the city/town.
- *Percentage of Schedule Tribe in Total Population*: Similar to the percentage of SC people, this is the number of individuals belonging to the Schedule Tribe in a city/town expressed as a percentage of total population of the city/town.

[12] There were discrepancies in the 2001 and 2011 data regarding the variable of drinking water, i.e. percentage of households having clean drinking water within their household premises. While the exact data was available for 2001, the same could not be attained for 2011, thereby resulting in two indicators measuring this variable in 2011. The entire variable of clean drinking water was dropped later, on two accounts - to ease the comparison of QOU over time; the broad results remained the same, with only the magnitudes changing.

[13] Inclusion of minority groups would have been measured better by taking into account variables which give information on slum households and condition of SC and ST households. But, data was unavailable at the requisite disaggregated city/town level in at least one of the Census years. Thus, we had to resort to variables which is restricted to their representation.

Lastly, the dimension of ***other socio-economic aspects*** has the following variables:

- *Literacy rate*: This variable reflects the overall literacy of a city/town, and is measured as the percentage of total number of literate males and females to the total city/town population.
- *Employment as percentage of population*[14]: This variable tells us the situation of employment in each city/town. It is expressed as the total number of persons employed as percentage of the total city/town population.
- *Unemployment rate*: It is measured as the total number of people who are not engaged in work but are a part of the labour force as a percentage of the total city/town population.

3.3 Normalisation of variables

To make the variables unit free and hence comparable, they have been scaled such that their values range between 0 and 100, using the following formula:

Normalised value of variable v =

$$\left(\frac{\text{Observed value of variable v} - \text{Minimum value of variable v}}{\text{Maximum value of variable v} - \text{Minimum value of variable v}}\right) *100$$

The formula above implies that higher the normalised value, better is the performance of an indicator. It is applied to all variables except the one measuring unemployment rate because higher values of this variable signify poorer performance of the urban area in this aspect.

Hence, the normalised value of the variable of unemployment rate is given by =

$$\left(\frac{\text{Maximum value of the variable - Observed value of the variable}}{\text{Maximum value of the variable} - \text{Minimum value of the variable}}\right) * 100$$

This normalisation formula ensures that higher values of the variable of unemployment rate imply better performance of the indicator.

Therefore, the normalisation technique applied ensures that lower values of each and every variable imply that the city/town scores poorly in the aspect while higher values signify better performance.

[14] Due to lack of sector-wise disaggregated data, we have taken the total number of employed people in each city/town, irrespective of the sectoral activity they are engaged in. Also, quality of employment could not be considered since there is no data available on the percentage of informal sector workers.

3.4 Assignment of weights for constructing the UI

In the present context, it is difficult to rationalise the assignment of unequal weights to variables and dimensions. We believe that probably no explanation is sufficient to justify attaching greater weight to one dimension than another, because all of the variables considered are equally crucial for the survival and sustenance of urban residents. Thus, in order to obtain the final values of UI, equal weights have been assigned to each dimensions as well as to each variable within the dimension. The following table gives a detailed disaggregation of weights.

Table 2: Weight assigned to each dimension and to each variable within the dimensions of the Urbanisation Index

Dimension	Weight of the dimension in the index	Variables included in the dimension	Weight assigned to the variables within the dimension
Social Infrastructure	(1/4)	Number of hospitals available per 1000 population	(1/5)
		Number of other health facilities available per 1000 population	(1/5)
		Number of hospital beds available per 1000 population	(1/5)
		Number of schools available per 100 children in age group of 6-18 years	(1/5)
		Number of colleges available per 1000 students in age group of 19-25 years	(1/5)
Housing Infrastructure	(1/4)	Percentage of households with durable wall	(1/6)
		Percentage of households with durable floor	(1/6)
		Percentage of households with durable roof	(1/6)
		Percentage of households with reliable source of light	(1/6)
		Percentage of households with decent latrine facilities	(1/6)
		Percentage of households with access to closed drains	(1/6)
Demography	(1/4)	Density of population	(1/4)
		Percentage of Scheduled Caste population in the total city/town population	(1/4)

		Percentage of Scheduled Tribe population in the total city/town population	(1/4)
		Sex ratio	(1/4)
Other socio-economic aspects	(1/4)	Literacy rate	(1/3)
		Total employed to population ratio	(1/3)
		Unemployment rate	(1/3)

Source: Constructed by author

3.5 Aggregation of dimensions to arrive at final UI values

Each variable is multiplied by its assigned weight after which all the weighted variables are aggregated to arrive at the respective dimension, that is,

$$I_{ij} = \Sigma_m a_i X_i m_j$$

where, I_{ij} is the value of the ith dimension for the jth city/town, $X_i m_j$ is the normalised value of variable X contained in i^{th} dimension for j^{th} city/town and a_i is the weight assigned to each variable in the ith dimension.

Finally, the four dimensions obtained at the city/town level are aggregated using their corresponding weights to obtain the values of the Urbanisation Index (UI):

$$Urbanisation\ Index_j = \Sigma_i w_i I_{ij}$$

where, Urbanisation $Index_j$ (UI_j) is the final index measuring the QOU of the jth city/town, w_i is the weight attached to the ith dimension and I_{ij} is the value of ith dimension of jth city/town.

Following the above mentioned aggregation technique, we get a value of UI for each city/town for each census year - 2001 and 2011 – that reflects the QOU of a specific urban area. To analyse the kind of QOU witnessed by the cities/towns in each size class, index values have been scaled such that their values lie between 0 and 100. Using the normalised values, cities/towns across size classes have been divided into five categories of QOU. The categorisation is provided in table 3 below.

Table 3: Categorisation of Quality of Urbanisation according to UI values

Category of Urbanisation	Urbanisation Index (UI) values	Quality of Urbanisation
Category 1	UI < =20	Very poor
Category 2	20 < UI <= 40	Poor
Category 3	40 < UI <= 60	Moderate
Category 4	60 < UI <= 80	Good
Category 5	UI > 80	Very good

Source: Constructed by author

According to the constructed categorisation of UI values into different levels of QOU, we expect quality to decrease continually as we move down the size class hierarchy. The extant literature argues that there are significant differences across size classes with respect to the availability of and accessibility to basic amenities and other necessary infrastructural facilities (Rajagopalan et al., 2018; Kundu D., 2014). For example, medium and small towns in India have weak and volatile economic bases leading to higher poverty levels, suffering from serious lack of basic amenities, resources and grants-in-aid (Kundu D., 2014; Bhagat, 2012; Kundu, 1983). Thus, we expect majority of cities belonging to size class I.I to fall in categories 4 and 5, i.e. having 'good' and 'very good' QOU. Most of the medium-sized towns belonging to size classes II and III are expected to witness 'moderate' QOU, while small towns are supposed to be majorly clustered in the lowest categories of 'poor' and 'very poor' QOU. The results obtained are discussed in the next section.

4. Results

In order to check for the validity of our expected hypothesis, a Spearman's Rank Correlation test has been run on the ranking of absolute population figures of cities and towns (higher ranking implies larger urban area) and the ranking of their respective UI values (higher ranking in this respect reflects better QOU). Table 3 below gives the relevant correlation figures.

Table 3: Spearman's Rank Correlation in 2001 and 2011

Variables	Year	
	2001	2011
Housing Infrastructure (HI)	0.3629	0.2952
Social Infrastructure (SI)	-0.258	-0.1286
Demography (D)	-0.0336	-0.0933
Other Socio-economic aspects (SEA)	-0.0775	-0.0335
Urbanisation Index (UI)	0.159	0.1903

Source: Compilation of results by author

Note: All the rank correlation figures are significant at 1 percent level of significance.

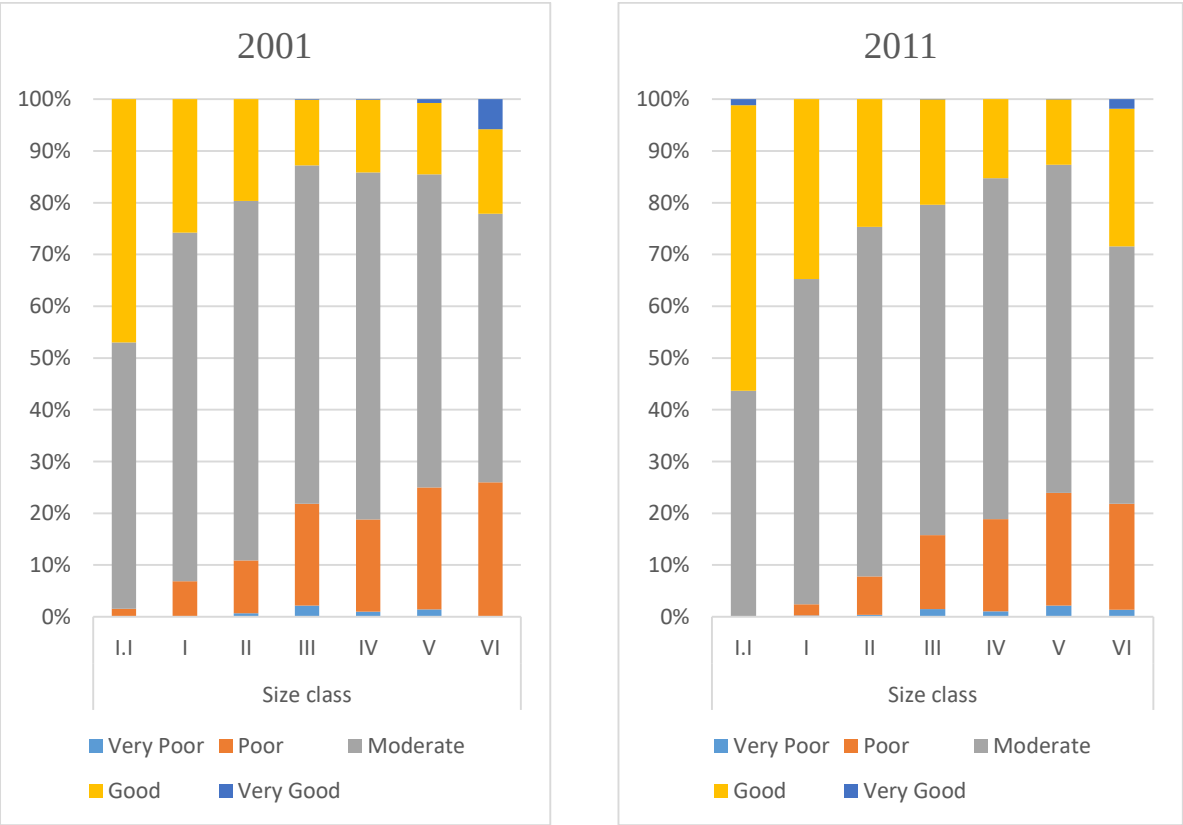
Except for the dimension of housing infrastructure, all other dimensions have negative, and mostly low, rank correlations. However, while larger urban areas have better housing facilities, they also suffer from insufficient provision of hospitals and/or schools relative to their population (-0.25 in 2001 and -0.12 in 2011). Overall, the rank correlation between absolute population size and the UI is positive (0.159 for 2001 and 0.1903 for 2011) but low enough to establish the fact that ranking of cities/towns on the basis of quality gives a significantly contrasting image. Hence, contrary to our hypothesis, cities and medium towns do not necessarily offer better QOU than smaller towns. Inclusion of multi-dimensional aspects of urbanisation shows that in some cases, small towns outshine other size classes resulting in higher ranks along the UI.

The following subsections analyse QOU for each cross-sectional year as well as over time, by comparing the percentage of cities/towns in the defined categories of QOU across size classes.

4.1 Cross-sectional Analysis

Figure 1 below provides a visual representation of the results obtained in our cross-sectional analysis.

Figure 1. Percentage distribution of cities/towns in each category of UI across Size Classes



Source: Author's compilation of results

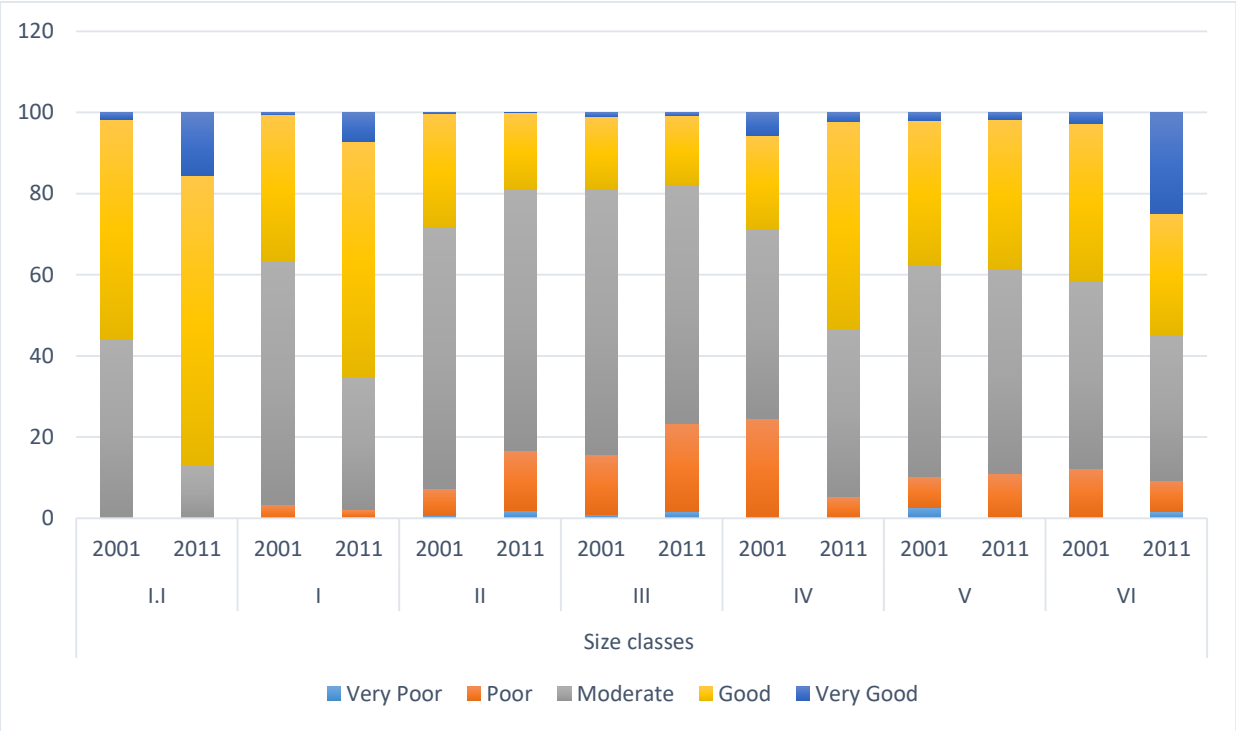
In 2001, urban areas are observed to have *moderate* level of QOU across all size classes, with the percentage of cities/towns offering *poor* QOU increasing as one goes down the size class hierarchy. While clustering of medium sized towns in category 3 is expected, the result is surprising for urban areas on either ends of the spectrum. Finding some cities performing poorly enough to fall under category 2 (1.52 percent of size class I.I cities and 6.88 percent of size class I cities), and none of them showing up in category 5 of UI was unanticipated. It is but size class VI which has 5.77 percent of its towns witnessing *very good* QOU, with negligible percentage of other size classes belonging to this category.

A somewhat different picture is observed for 2011. Barring size class I.I cities majority of which offer *good* level of QOU, most of the remaining urban areas are still clustered in *moderate* levels of QOU. There is some decrease in the percentage of cities and towns experiencing *poor* QOU for most size classes. Size class VI has a significant percentage of its towns in the *moderate* category of QOU, along with the highest percentage of towns that offer *very good* level of QOU. Hence, there is no consistent decline in the QOU along the size class hierarchy. For both census years, we find that on an average, cities offer *moderate* QOU similar to other smaller sized urban areas, and that small towns are witnessed to perform unexpectedly well.

4.2 Comparison of QOU over time

Different sample sizes in the cross-sectional analysis thwarted a comparison of QOU over time. To this end, Town Directories, Primary Census Abstracts and Household Amenities datasets of 2001 and 2011 Census have been merged, yielding a total of 3160 cities and towns for each year. In order to compare QOU over time, all variables are normalised based on the common minimum and maximum values over the two years. A sample restricted to urban areas that were common in both 2001 and 2011, along with the normalisation technique applied, allows for a comparison of QOU over the decade.

Figure 2. Percentage distribution of cities/towns in each category of UI across size classes during 2001-11



Source: Author's composition of results

The average value of UI has increased from 29.04 in 2001 to 32.37 in 2011, implying an improvement in quality over time. Figure 2 above shows no perceptible changes with respect to clustering of cities/towns during the decade (except size classes I and IV). One noticeable finding is that there is a discernible shift in clustering of size class I cities from *moderate* to *good* category of QOU. Thus, the two highest size classes that were already doing well in 2001 witnessed significant improvement in their QOU in 2011. In the case of medium and small towns, the percentage figures in the category of *moderate* QOU has decreased over time. But following this decrease, while size classes II and III witnessed a rise in the percentage of their towns in *poor* category of QOU, small towns witnessed an improvement in the percentage of towns experiencing *good* and *very good* QOU. Therefore, a comparison of QOU over time reveals that while cities and small towns performed well, medium sized towns experienced a deterioration in their quality.

5. Discussion

The cross-sectional and time series analyses highlight two major results. First, cities offer a QOU that is either *moderate* or above. Second, the QOU of size class VI towns is better than anticipated. Although they are not clustered in the highest two categories of QOU, it was

unexpected to find 25 percent of them experiencing *very good* levels of QOU in 2011. Good performance of cities in both 2001 and 2011 can be attributed to a number of factors. One explanation might be the benefits of agglomeration which have not been outweighed by the costs of congestion yet. High population density, in fact, might be making it easier to provide requisite infrastructural services (Rajagopalan et al., 2018). Another plausible explanation is biased governmental policies, such that QOU of cities is furthered through preferential allocation and disbursement of funds, and through policies whose benefits are restricted to the larger municipalities or urban local bodies (Kundu D., 2014; Khan, 2017; Kundu, 2011a).

On the other hand, a probable explanation for the unexpected performance of size class VI is the emergence of census towns. Most of them came up in 2001, and were located in the outskirts of metropolitan cities. Good connectivity with the city might explain the high quality of life offered by these towns to the residents. However, this is not necessarily the case. While Roy and Pradhan (2018) find that 65 percent of census towns located at a definite distance from a large city/town are clustered together, Pradhan (2017) observes that a significant share of the population of the new census towns of 2011 do not lie anywhere close to large cities, and have thus grown without crucial dependence on any nearby city. In our comparison of QOU over time, 48.34 percent of the census towns belonging to size classes IV, V and VI were in good and very good categories of QOU in 2011. Of these, 23.9 percent were at a distance of greater than fifty kilometres from a nearby city. Hence, census towns generally offer decent QOU regardless of whether they are located in the outskirts of big cities. These results are similar to that of Mitra and Nagar (2017) who find that census towns situated either along the peripheries of large cities or in remote areas, performed well on their deprivation index, a result of spillover effects of the city's agglomeration forces. Apart from being located in the vicinity of large cities, high UI of census towns can be attributed to higher federal funding received by them, as they are effectively a part of Gram Panchayats (Mukhopadhyay, 2017).

Although small towns are observed to offer better QOU than expected, we do find about 24 percent of size classes IV, V, and VI towns experiencing *poor* levels of QOU in our cross-sectional analysis. This is akin to the finding of Jain and Korzhenevych (2018) who observed that small towns in the National Capital Region in India suffer from poor public provision of infrastructural services like health and education. The situation of both medium and some small towns can be explained by their inability to attract sufficient domestic and/or foreign private investments to finance their infrastructural and other developmental projects, because they are located away from the primary 'global centres of growth' in the country (Kundu, 2011b; Kundu

et al., 1999). Consequently, provision of basic amenities and necessary infrastructures in these towns is adversely affected, and the situation is further aggravated by declining public sector investments, particularly for the towns which are located in the backward regions of the country. This is reflected in high standard deviation figures of small towns (Table A1 in the Appendix). However, there is a marked reduction in the percentage of small towns belonging to poor and very poor categories of QOU over time. This finding departs from the relevant literature insofar as the literature points at the instability of small towns owed to the high dependence of their population on agriculture, weak manufacturing base, and lack of organised or formal sector employment opportunities (Kundu and Sarangi, 2005; Kundu et al., 1999).

Thus, while cities offer decent QOU in spite of increasing population growth rates, the relationship of size classes IV, V, VI with the quality they offer is not linear although they do cluster at the *moderate* level of QOU. Additionally, even though QOU has improved over time, the same for size classes II and III has deteriorated. Policy prescriptions to address these concerns are discussed in the following section.

6. Summary

According to the World Urbanisation Prospects Report of 2018, India's urban population is expected to double by 2050. These estimates along with the 'turnaround' experienced in the last Population Census might be an indication that India is on the path of increasing urbanisation in the near future. Thus, it is at a crucial juncture with respect to its urban policies.

This paper contends that growth of urban areas and/or urban population is not the end goal – what is perhaps more important is the quality of urbanisation witnessed in cities/towns. In this regard, we construct an UI using a simple weighted aggregation technique, which reflects the QOU of each city/town in India. A major contribution of our study is the inclusion of social infrastructure variables in the index, and analysing the change in quality over time. The index is further divided into five categories of QOU – *very poor*, *poor*, *moderate*, *good*, and *very good*. Spearman's Rank Correlation of the rank of cities/towns according to absolute population size and their rank with respect to their UI turns out to be less than 0.20. This shows that the UI gives a different picture of urbanisation than mere increase in the number of urban areas and the population within.

Our results show some interesting patterns which departed from conventional expectations. The cross-sectional analysis shows that irrespective of size class, cities/towns witness only *moderate* QOU. Comparison of QOU over time highlights an improvement in average quality,

with urban areas belonging to either ends of the spectrum (that is, size classes I.I, I, IV, V and VI) witnessing much of this improvement. There has been a deterioration of QOU of medium sized towns (size classes II and III) during 2001-11. Cities recording the highest population growth rate in 2001-11 and being clustered in *good* category of QOU may be a result of biased governmental policies enabling further flows of investment. On the other hand, unanticipated performance of small towns (mostly census towns) is owed to their proximity to cities resulting in good connectivity and benefitting from agglomeration forces, and higher federal funding received since they fall under the purview of Gram Panchayats.

It is doubtful whether the urban development programmes that are currently in place will be sufficient to address the concerns regarding QOU as discussed and analysed in this study. The Smart Cities Mission (SCM) introduced by the incumbent government in 2015 aims at transforming select cities with 'smart' technology. The SCM and the Atal Mission for Rejuvenation and Urban Transformation, together, are expected to bring about significant infrastructural improvements and offer better quality of life to all urban residents. However, neither schemes have stressed on the need to improve upon social infrastructure. Table A1 in the appendix shows that the mean values of the dimensions of social infrastructure are much lower than the other two dimensions, and this holds for both 2001 and 2011. Moreover, figures reveal that social infrastructure provision is better in lower size classes, although there exists more variation within. Thus, there is an urgent need to allocate funds and other resources to achieve significant improvements in social infrastructure across all the urban areas of the country. High variation among small towns with regard to social infrastructural facilities can be ameliorated with unbiased disbursal of funds, and greater attention of policymakers towards encouraging the growth of these towns. This is expected to support the interdependent relationship that small towns have with the surrounding cities and the rural areas, wherein the former plays a crucial role in providing infrastructural services and non-farm employment opportunities to the rural areas. Additionally, low mean values are observed from Table A1 in the dimension of demography as well, with higher variation in lower size classes. Thus, there is also a need for urban development policies to be more inclusive, so that urban areas offer decent quality of life to all its residents, including the marginalised sections of the urban community.

Our study comes along with some limitations. First, we were unable to include migration in our study due to unavailability of data at the requisite disaggregated level. Migration is a crucial component of urbanisation in India, and studies that can incorporate it can provide a better

understanding of QOU which influences migration directly and indirectly. Second, physical infrastructure is also an important dimension of the UI. However, the presence of a large number of missing values of the pertinent variables of this dimension hindered its incorporation in the final UI. Field surveys may be conducted to avoid this situation. Finally, since urbanisation in India varies across regions, future attempts at examining QOU can undertake a regional analysis.

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Appendix

Table A1: Descriptive Statistics of each dimension across size classes for 2001 and 2011

Size class	2001				2011			
	Mean	Std.Dev.	Minimum	Maximum	Mean	Std.Dev.	Minimum	Maximum
Household Infrastructure								
I.I	76.17	8.51	44.37	90	85.22	6.75	70.9	96.69
I	68.87	7.58	46.23	94.14	78.55	7.86	32.37	98.51
II	65.94	9.35	25.75	99.3	75.52	8.92	37.72	95.49
III	60.49	10.83	17.36	93.25	70.24	11.62	26.2	97.79
IV	59.09	11.42	18.87	99.82	68.03	11.79	27.07	99.93
V	55.97	13.77	7.99	95.89	66.97	13.44	24.67	99.92
VI	55.97	15.99	18.32	99.52	70.53	15.52	39.45	99.98
Social Infrastructure								
I.I	1.3	0.97	0.27	5.46	1.18	0.62	0.28	2.82
I	1.4	0.93	0.05	7.58	1.55	0.85	0.07	6.77
II	1.7	1.15	0.05	10.24	1.93	1.01	0.09	7.04
III	2.11	1.49	0	13.37	2.62	1.74	0.04	21.24
IV	2.41	2.2	0.05	40.2	3.22	2.62	0.1	24.28
V	2.51	2.48	0.07	22.87	3.1	3.44	0.08	25.42
VI	4.92	6.84	0.24	34.2	7.12	6.84	0.15	28.4
Demography								
I.I	9.91	1.73	5.96	14.95	10.92	2.23	7.43	19.23
I	10.62	2.8	6.56	31.48	11.19	3.23	6.01	33.47
II	10.28	2.62	5.61	24.49	11.01	3.1	6.31	32.4
III	10.53	3.15	4.88	31.15	11.08	3.15	5.78	31.59
IV	11.02	3.46	1.72	29.77	11.77	3.8	4.16	30.31
V	11.29	3.98	3.67	29.69	11.99	4.3	5.17	31.37
VI	11.62	5.13	4.71	25.01	12.04	5.06	2.74	25.82
Other Socio-Economic Aspects								
I.I	43.17	7.31	11.16	54.01	47.43	7.43	30.5	63.89
I	41.76	6.36	21.87	61.64	45.57	8.7	17.98	64.07
II	41.51	6.63	22.92	63.19	43.69	7.93	19.95	64.02
III	41.2	7	21.91	64.13	42.76	7.56	19.16	64.69
IV	42.4	6.99	21.57	78.24	43.89	7.37	17.23	70.6
V	43.18	7.55	20.78	70.72	45.09	7.76	17.39	75.97
VI	44.03	9.28	27.43	74.41	47.18	10.97	27.35	83.91

Source: Author's compilation of results