

Level of urbanisation in Varanasi and its adjoining districts of state of Uttar Pradesh in India

Binoy Pratap Singh

Department of Geography, Banaras Hindu University, Varanasi – 221005, India.

E-mail: bpsinghisking09@gmail.com

Abstract

From a demographic point of view, urbanisation is the proportion of urban population to the total population of the region. Past century has seen acceleration in the pace of urbanisation, particularly in developing countries. During 1950-2010, urban population of the developed countries has increased nearly two times from 427.27 million to 924.7 million, while during the same time interval it has increased approximately eight times from 309.52 million to 2569.9 million in developing countries.

Being an agriculturally dominant country, the level of urbanisation in India is comparatively lower (27.78%) than other developing countries. Even this figure is lower than ours one of the neighbour Pakistan (35%). The state of Uttar Pradesh, the largest state of India (according to population), has a share of 16.17% of total population and only 3.36% of urban population of the country. Study area too, it's not an exception. Only, 15.9% population of the study area is residing in urban areas. Taking four variables, the paper attempts to measure the level of urbanisation at tahsil (sub-district) level by using Z-score. Finding of the study revealed that level of urbanisation is higher in northern region in comparison to southern region in the study area.

Key words: Urbanisation, Z-Score (Standardised Score).

1. Introduction

The last decade of the twentieth century marks a major watershed in the evolution of human settlement, for it encompasses the period during which the location of the world's people became more urban than rural (Clark 1996). Bose (1978) argued that Urbanisation in the demographic sense is an increase in the proportion of the urban population (U) to the total population (T) over a period of time. According to Chand and Puri (1983) urbanisation refers the proportionate increase of the urban population in relation to the total population in a given country. The process of urbanisation is said to be taking place when the proportion of urban population is increasing or if the rate of growth of urban population is faster than the rate of growth of total population of the region (Reddy 1970).

Urbanisation is considered to be an important process of socio-economic and cultural development for any geographic region. There are so many methods to measure the level of urbanisation. Most common of them is the percentage of urban population to the total population. However, there are other alternative measures of urbanisation. The rural population of an area, divided by the number of recognised urban places can be regarded as convenient measure of level of urbanisation of that area. The two criteria for measuring level of urbanisation of any area have been used by R. Ramachandran (1989). Rajbala (1986) has used another method to measure the level of urbanisation of any area. She calculated density of towns per thousand square kilometers. Another alternative measure of urbanisation is the area of the rural hinterland that served by an urban centre. The concept is taken keeping this view in the mind that urban centres work as the foci of their rural hinterland. The larger the size of the rural hinterland, the lower the level of urbanisation would be and vice-versa.

2. The study area

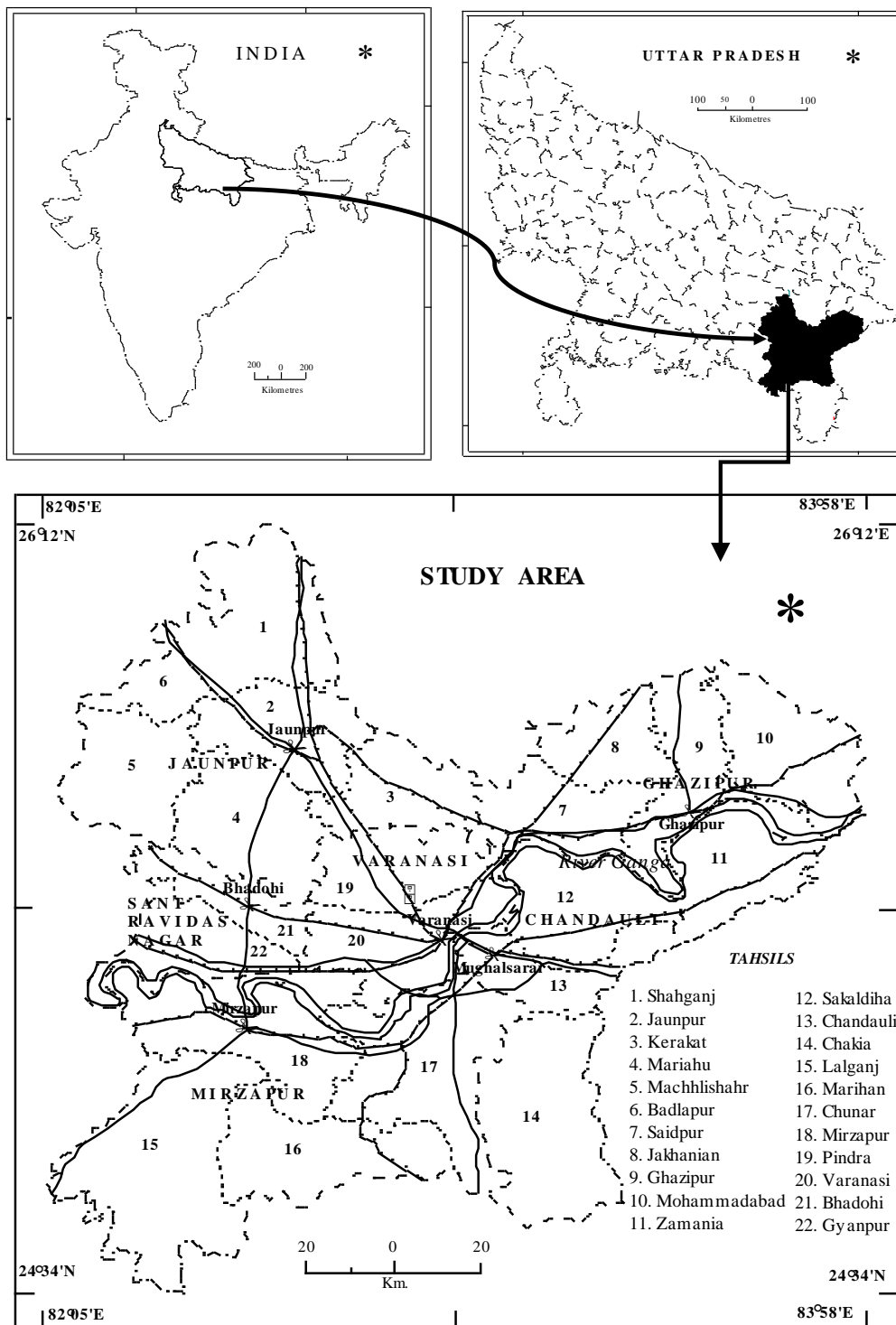


Figure 1. Location map of the study area

The Study area i.e. Varanasi and its surrounding districts (Chandauli, Ghazipur, Jaunpur, Sant Ravidas Nagar and Mirzapur), having common boundary with Varanasi and lying between 24°34' N to 26°12' N and 82°05' E to 83°58' E, in the south-eastern fringe of Uttar Pradesh state of India (Fig. 1); covers an area of about 17,027 km² with 15,200,930 persons (Census of India, 2001). Study area inhabits 22.27% of total population and 30.89% of urban population of eastern Uttar Pradesh. It is predominantly an agricultural region with about 84.1% of its population living in rural areas. Agriculture is the single largest sector of its economy employing about 58.95% of its labour force. Study area has uneven relief features, unequal distribution of population and natural resources responsible for variation in level of urbanisation. Out of 22 *tahsils* (sub-districts) of six districts under investigation, four *tahsils* viz. Badlapur (Jaunpur district), Sakaldiha (Chandauli district), Lalganj and Marihan (Mirzapur district) have no urban population.

3. Data source and methodology

Present study is based on secondary sources of data, obtained from Directorate of Census Operations, Uttar Pradesh, Lucknow. Location map of the study area is based on maps of Survey of India, New Delhi and National Atlas and Thematic Mapping Organisation (NATMO), Kolkata and is prepared on Map Info 6.5 version software. Analysis of data has been done on MS-Excel 2007.

A set of four indicators has been chosen to measure the level of urbanisation in the study area:

- urban-population ratio (in terms of percentage)
- rural population served by urban centres (in terms of population)
- rural area served by urban centre (in sq. Km.)
- density of towns/100 sq. km.

Since the units of measurement for each criteria is different, in order to make them comparable the values of each of the criteria have been transformed into a standard form using the Z value (standardised score):

$$Z = \frac{X - \mu}{\sigma}$$

Where, Z = Standard Score
X = the actual value to be standardised
 μ = mean of the criterion being measured
 σ = Standard Deviation

The Z-Scores on all the four criteria are then added together to give a composite index (C.I.) which has been depicted with the help of map (Fig. 2).

$$C.I. = \sum Z_{ij} / N$$

Where, C.I. = Composite index of urbanisation
 Z_{ij} = Z score of an indicator j in *tahsil* i
N = Number of indicators.

4. Findings and Discussions

4.1 Level of Urbanisation

The four measures of level of urbanisation suggested above individually reveals different aspects of urbanisation. This is discussed in following subsections. Further, an attempt is made to combine all the four criteria into a composite index of urbanisation in the final section.

4.1.1 Urban Population Ratio (UPR)

Urban population ratio (% of urban population in the total population) is the most popular and commonly used method for measuring level of urbanisation. The percentage could vary from zero to hundred. If the percentage is zero, it means there is no urbanisation and if the percentage is hundred, then it means the le-

level of urbanisation has reached to its upper limit from where no further extension is possible. Higher the percentage, higher would be the level of urbanisation and vice-versa. Thus, the level of urbanisation is directly proportional to urban population ratio. People living in urban centres accounted for 27.78% of the

total population of the country, while at state level, this figure is too low and it is around 21%. The urban population ratio of the study area is only 15.9%.

There are significant variations in the level of urbanisation among the 18 *tahsils* of the study area. Varanasi is the single *tahsil* where more than half of its population is urban. This is the most urbanised *tahsil* in the study area. Mirzapur, Chandauli, Bhadohi, Jaunpur and Ghazipur also have a high level of urbanisation with over 15.9% (study area average) of their population in towns. Urbanisation is at lower level in the *tahsils* Saidpur, Chakia, Mariahu, Jakhania, Kerakat and Pindra with less than 5% of its population is urban. The least urbanised *tahsil* is Pindra with only 1.31% population in towns (Table: 1). In general terms, area belong to north of river *Ganga* is relatively highly urbanised than area belong to south of the river.

The least urbanised *tahsils* have the following characteristics:

- they (Chunar and Chakia) belong to hilly or plateau regions
- they (Lalganj, Chakia and Marihan) are generally inaccessible with respect to cities like Mirzapur and Varanasi.
- Chakia belong to socially violent area
- *tahsils* north to river *Ganga* (Shahganj, Mariahu, Kerakat, Machhlishahr, Pindra, Jakhania, Saidpur, Mohammadabad, Zamania) have lower level of urbanisation because they belong to agriculturally dominant area where is lack of industries. More than 60% of their working population is engaged in agriculture and its allied activities.

4.1.2 Rural population served by urban centres

A general statement in this regard could be larger the number of towns, the more urbanised an area is likely to be. However, the number of towns has to be related to either the population or the area of the study region. The first aspect is being discussed in this section. To avoid mentioning towns in terms of fractions, I have used the concept of population served by each town. The reason behind choosing rural population that served by urban centres has twofold: (a) If one include the urban component along with the rural, a highly urbanised area with a metropolitan city, as well as a less urbanised area with a small town, may both have a large population served by the respective centres. On the other hand, the rural population served by a town would reflect the level of urbanisation. (b) In the context of socio-economic development, serving the surrounding rural areas is one of the main functions of a town. The larger the rural population served by each town, the lower the level of urbanisation would be and vice-versa. Thus, the level of urbanisation is inversely proportional to the population served by an urban centre.

In 2001, an urban centre of India served on an average 143,866 rural people, while at state level (Uttar Pradesh) this figure is slightly high (187,015) than national average. In the study area on an average, 272,001 rural people served by an urban centre. There are significant variations in the level of urbanisation at *tahsil* level in the study area. Among the *tahsils*, Varanasi had the lowest population threshold of 1.08 lakh, closely followed by Chandauli (1.09 lakh). Pindra had the highest population threshold of nearly 8 lakh (Table: 1). Varanasi, Mirzapur, Chandauli, Bhadohi; which have a high proportion of urban population, had in fact a lower score in terms of the rural population dependent on towns. The *tahsils* of Shahganj, Machhlishahr, Ghazipur, Zamania and Mirzapur have population threshold closely corresponding to study area average.

From the foregoing analysis, Varanasi, Chandauli, Bhadohi, Gyanpur and Chunar emerged as the most urbanised *tahsils*, along with Mirzapur, Zamania, Ghazipur, Machhlishahr and Shahganj. Pindra and Kerakat along with Saidpur stand out as least urbanised *tahsils* in the study area.

4.1.3 Rural area served by urban centre

The second aspect i.e. the number of towns served the rural hinterland is being discussed in this section. In India towns serve as an innovation centre and a focal point of socio-economic change. The size of the rural

hinterland is an indication of development. Towns with larger hinterland, the town's services would be thinly spread over a large area while towns with smaller hinterland, services of towns would be widely spread over a small area. Thus, the level of urbanisation is inversely proportional to the area served by an urban centre.

In 2001, an urban centre served on an average 338.79 km² in the study area. There are significant variations in the level of urbanisation (measured as rural area served by urban centres) among the 18 *tahsils* of the study area. Kerakat *tahsil* (584.14 km²) has largest rural hinterland while Varanasi has smallest (93.63 km²). In other word we can say that Kerakat *tahsil* is the least urbanised while Varanasi is the most urbanised as per this criterion. Kerakat, Chakia, Saidpur and Jakhania are belonging to least urbanised *tahsil*. The *tahsils* of Zamania, Shahganj, Ghazipur and Jaunpur have rural hinterland closely corresponding to study area average (Table: 1).

From the foregoing analysis, Varanasi, Chandauli, Bhadohi and Gyanpur emerged as most urbanised *tahsils*, and Kerakat along with Chakia, Saidpur and Jakhania stand out as least urbanised *tahsils* in the study area.

4.1.4 Density of towns/100 sq. km

The number of towns could be related to any area. The simplest approach is to measure the density of towns per unit area. This method has been used by Rajbala (1986) to measure the level of urbanisation at macro level by calculating density of towns per thousand square kilometers. I have calculated density of towns in per hundred sq. km because area of so many *tahsils* are under 1000 sq. km. Greater the density of towns, higher the level of urbanisation would be and vice versa. Thus, the level of urbanisation in any area is directly proportional to density of towns.

In 2001, average density of towns in the study area was 0.36 towns/100 km². Density of towns also varies from one *tahsil* to other *tahsil*. The highest density of towns is occurred in Varanasi *tahsil* while the lowest density is occurred in Kerakat (Table: 1). This means that Varanasi is most urbanised *tahsil* while Kerakat is least urbanised *tahsil*. The density of towns in the *tahsils* of Varanasi, Chandauli, Gyanpur and Bhadohi are above from study area's average. Thus these *tahsils* are more urbanised in comparison to others. The level of urbanisation is low in the *tahsils* of Jakhania, Chakia, Saidpur and Kerakat.

4.2 Composite Index of Level of Urbanisation

The four criteria of urbanisation discussed above reveal widely different spatial patterns. *Tahsil* wise Z score shows that there are wide ranges of variation in each category. In first criterion it varies from -0.86 (Pindra) to 3.4 (Varanasi); in second criterion it varies from -1.31 (Varanasi) to 2.79 (Pindra); in third criterion it varies from -1.78 (Varanasi) to 1.49 (Kerakat) while in fourth criterion it varies from -0.81 (Kerakat) to 2.58 (Varanasi). Table: 2 show that one *tahsil* ranked in top order in one criterion do not necessarily rank also in top order for other criteria. For example, Varanasi which ranked first in first and fourth criteria, ranked last in second and third criterion. Pindra ranked first in second criterions, ranked last in first criterion. Similarly, Kerakat ranked first in third criterions, while it has last rank in fourth criterion.

Chandauli ranked in top order in first and fourth criteria, and situated in last order in second and third criteria. No one of the *tahsil* has the same rank in all of the four criteria, even in three criteria also. In general terms we can say that positive values of Z-Score indicate a high level of urbanisation while the negative values indicate a low level. In order to reach at an overall picture the Z-Scores on all the four criteria have been added together to give a composite index.

After getting the average of all the four criteria, I have grouped all the *tahsils* into four categories: very high, high, moderate and low; to reveal the level of urbanisation at *tahsil* level in the study area (Fig. 2). Varanasi, which has a highest composite index, has the highest level of urbanisation on the composite scale; is closely followed by Pindra, Kerakat and Saidpur; also have relatively high scores and have the high level of urbanisation. Jaunpur, Jakhania, Mirzapur and Chakia also have positive values on the composite index, ranging from zero to 0.1 and belong to moderate category of level of urbanisation. All the

above mentioned *tahsils*, except Chakia, belong to northern plain of the study area. Interestingly, there is a significant breakpoint between the *tahsils* having positive values. No *tahsil* belong to 0.1 to 0.25 composite indexes. Low levels of urbanisation are reflected in negative scores. Chunar ranked in last order in composite index of level of urbanisation. The *tahsils* with negative scores form a contiguous block covering most of eastern and western segment of the study area. The northern most *tahsil* of the study area also has very low level of urbanisation. The central part of the study area is most urbanised (Fig. 2)

5. Conclusion

A notable feature of the analysis of levels of urbanisation is the existence of a north-south urban divides which separates relatively more urbanised northern part of the study area with least urbanised southern part. The divide, however, follows almost the course of river Ganga. The area north to river, falls under plain area, has age long history of evolution of human settlements and comparatively more urbanised and the area south to river falls under hilly and uneven land and is less urbanised. Comparatively high level of urbanisation in southern part of the study area (Mirzapur etc.,) is partly due to long history of urbanisation there from around 18th century when this city emerged as a major trade centre of northern India. By and large urbanisation in the northern plain has affected by political fluctuations. Varanasi and Jaunpur both have a long urban tradition; nevertheless the degree of urbanisation at present day is higher at one place (Varanasi) than another (Jaunpur) while in the southern plateau region, urbanisation has been less affected by political upheavals.

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Binoy Pratap Singh: Born in Kolkata on April 8th 1982. Currently lives in Varanasi and pursuing Ph.D. from the Department of Geography, Banaras Hindu University and having three years of teaching experience. Did B.A.(2002) with I division from K.N.Govt.P.G.College, Gyanpur – 221 304, Uttar Pradesh, India and M.A. in Geography with I division in the year of 2004 from the same college. Knows fundamentals of statistics, SPSS, remote sensing, GIS and GPS. Read papers in four international and four national conferences/seminars.

List of Publications:

- Singh, Binoy Pratap & Singh, A.K. (2010): “Municipal Solid Waste Management in Varanasi City in Compliance with MSW(M&H) Rules, 2000”, *International Journal of Development Studies*, ISSN 0975-5799, Vol. **II**, Issue – IV, July – December 2010, pp. 43 – 59.
- Singh, Binoy Pratap (2010): “Municipal solid Waste Management in six Million plus Cities of Uttar Pradesh”, e-proceedings of 3rd *International Geographical Union (IGU) Commission Seminar – 2010*, Cotton College, Guwahati, 11th – 13th December, 2010.

Table 1. Level of urbanisation under different criteria, 2001

Tahsil	Urban population ratio (%)	Rural population served by urban centre (in lakh)	Rural area served by urban centre (in sq. km.)	Density of towns/100 sq. km.
Shahganj	6.46	2.97	344.84	0.286
Machhlishahr	6.45	2.96	396.91	0.251
Jaunpur	18.2	3.79	339.74	0.283
Mariahu	3.59	3.54	373.73	0.266
Kerakat	2.14	5.71	584.14	0.171
Jakhanian	2.23	4.54	513.73	0.193
Saidpur	4.12	5.02	574.21	0.172
Ghazipur	16.31	2.94	321.14	0.301
Mohammadabad	6.12	3.56	424.66	0.233
Zamania	6.89	2.74	350.10	0.281
Chandauli	22.74	1.09	121.36	0.776
Chakia	3.87	3.4	574.57	0.173
Pindra	1.31	7.94	460.55	0.216
Varanasi	53.55	1.08	93.63	0.945
Bhadohi	18.45	1.53	143.48	0.663
Gyanpur	8.81	1.8	144.04	0.677
Mirzapur	23.01	2.51	362.89	0.264
Chunar	9.27	1.99	369.72	0.267
Study Area	15.9	1.44	338.79	0.36

Source: Computed by Researcher based on Census of India, 2001

Table 2. Ranking of Tahsils

Tahsil	Rankings				
	Z1 Score	Z2 Score	Z3 Score	Z4 Score	C.I.
Varanasi	1	18	18	1	1
Pindra	18	1	5	14	2
Kerakat	17	2	1	18	3
Saidpur	13	3	3	17	4
Jaunpur	5	5	13	7	5
Jakhanian	16	4	4	15	6
Mirzapur	2	13	10	11	7
Chakia	1	8	2	16	8
Chandauli	3	17	17	2	9
Ghazipur	6	11	14	5	10
Mohammadabad	12	6	6	13	11
Bhadohi	4	16	16	4	12
Mariahu	15	7	8	10	13
Machhlishahr	11	10	7	12	14
Shahganj	10	9	12	6	15
Zamania	9	12	11	8	16
Gyanpur	8	15	15	3	17
Chunar	7	14	9	9	18

Note: Z1 = Z-score for urban population ratio,
 Z2 = Z-score for rural population served by urban centre
 Z3 = Z-score for rural area served by urban centre
 Z4 = Z-score for density of towns per hundred square kilometre.
 C.I. = Composite Index for Level of Urbanisation.

Source: Computed by Researcher

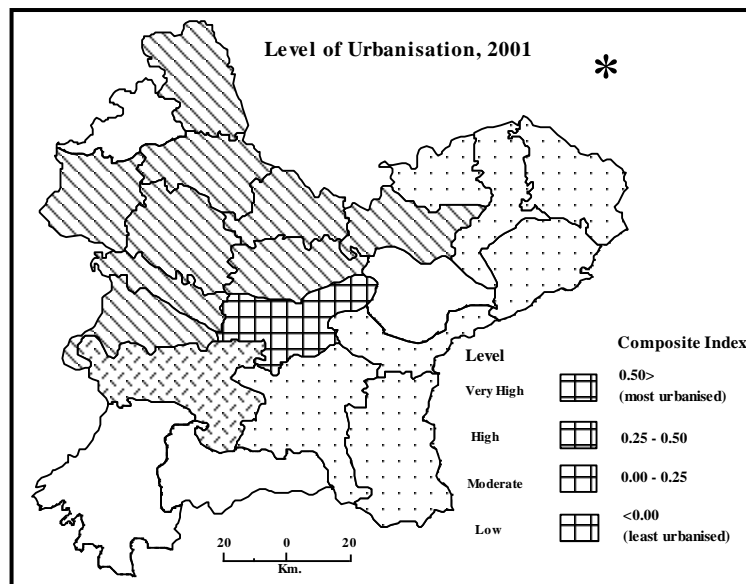


Figure 2. Level of Urbanisation, 2001

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