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Geospatial approach for study of informal settlements: Challenges of slums and squatter settlements in India

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Abstract

The Informal Settlements contribute to about 7.53 per cent of the urban gross domestic product (GDP), assuming that the urban GDP is about 60.00 per cent of the total GDP of the country, India. The Slums and Squatter Settlements usually develop informally without following guidelines of the urban planning and comprises to form the informal settlements. India's urbanization significant feature is the growth of large towns and metropolitan cities. Cities are symbol of hope for the rural population as these signifies to the higher standard of living and offer a number of economic opportunities to the people because these are usually not available in rural areas. This result into the large scale migration of people from rural to urban areas. The Informal Settlements are considered as an unorganised sector of the economy. There are found a large number of persons involved in different kind of economic activities in this sector. Besides this, the urban population projection point out that by 2030 the India's urban population will be about 575 million persons which is constituting over 40 per cent of the total population. In lieu of this, most of the cities experience a steady decline in the quality of physical environment. So, the reaction to increasing urbanization and the growth and development of cities needs to be viewed positively. Though there is no denial of the fact that the urbanisation should be more balanced and more approachable to national development goals, at large. The Slums have been earmarked in all the statutory towns irrespective of their population size. So, there are three types of slums which have been defined in the census, namely, the notified slums, the recognized slums and the identified slums. There is found wide gaps in terms of slum reported towns and their population size among the states of the country, India. In this context, there are number of challenges of the slums and squatter settlements, for instance, there is found a lots of stress on the physical infrastructure, inadequate delivery of basic services, air and water pollution, uncollected wastes, etc. So, such challenges are to be efficiently tackled under the various development plans and policies for the sustainable urban life style in the country, India. And, also it is a fact that the phenomenal increasing pace of urbanization is inevitable and needs to be considered as positive for the all-round national development.

Keywords: Urbanisation, Informal Settlements, Globalisation, Sustainable Development, Urban Plans and Policies.

1. Introduction

In the recent past, there is experienced a significant increase in the pace of urbanisation in the country, India. The urbanization commence with an increase in the percentage of population living in urban areas. In other words, the urbanization takes place when urban population increases more rapidly than population, as a whole. Besides this, it is noteworthy to mentioned that the most probable reasons for upcoming slums and squatter settlements are as firstly, the process of increasing pace of urbanisation; secondly, the economic development due to industrialisation; thirdly, the higher productivity in the secondary as well as in the tertiary sectors against primary sector of the economy. By virtue of this, the cities and towns resulted into the economic growth and more jobs opportunities to the peoples. Fourthly, the cities act as fascination for the rural population. Because, the cities provides the higher standard of living and offer large prospects to the rural peoples. In lieu of this, a large scale migration takes place from rural to urban areas. And, fifthly, the negative consequences of urban pull results in upcoming of slums and squatter settlements. Such kinds of settlements are characterized by housing shortage and critical inadequacies in public utilities, overcrowding, unhygienic conditions, etc. (CoI, 2011)^[7-8].

The 2011 Census is the 15th Census of India since 1872. For the first time since independence, the absolute increase in population is more in urban areas than in rural areas.

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The rural and urban population distribution proportion accounted for about 68.84 per cent and 31.16 per cent, respectively in 2011. So, the level of urbanization increased from 27.81 per cent in 2001 Census to 31.16 per cent in 2011 Census. Whereas, the proportion of rural population declined from 72.19 per cent to 68.84 per cent over the periods from 2001 to 2011 Censuses, respectively. The slowing down of overall growth rate of population is due to the sharp decline in growth rate in rural areas, while the growth rate in urban areas remains almost the same. There has been a spurt in growth of population in urban areas in the country, which could be due to the migration, the natural increase and the inclusion of new areas under the urban in form of towns and cities.

The informal settlements are an integral part of an unorganised sector of the economy in which a large number of persons are involved in different kind of economic activities. The informal settlements contribute to about 7.53 per cent to the urban gross domestic product (GDP), assuming that the urban GDP is about 60.00 per cent of the total GDP of the country, India. There are multiplier effects of urban informal settlements on the economy which are higher than both the other urban households and the rural households. Besides this, in several studies, it is propounded that the employment growth has largely been due to the informal sector, in the country. So, the contribution of the informal settlements cannot be overlooked in the economy of the country, India.

The Slums and squatter settlements informally develop without following guidelines of the urban planning which together comprises to form the informal settlements. Such settlements are typically having no formal street grids, numbered or named streets etc. information. Even though these settlements are lacking some or all basic public amenities such as sewage network, electricity, safe drinking water, rain water drainage, garbage collection and removal, easy public transport accessibility, health care control services etc. These settlements are usually found developing on the periphery of cities, public parks, near railroad tracks, river banks, lagoons or city trash dump sites (UN-Habitat, 2003) ^[30]. So, the informal settlements are mostly found in developing countries; but also in some parts of developed countries of the world.

The Slum is an urban phenomena. According to the 2011 Census, the slum is treated as well as marked "Under Section-3 of the Slum Area Improvement and Clearance Act, 1956 (CoI, 2011) ^[7-8]. The Slums and squatter settlements have been defined as mainly those residential areas where dwellings are in any respect unfit for human habitation. Because of several reasons as the dilapidation, overcrowding, unreliable design buildings, narrow linkage of streets, lack of ventilation, no light or electricity, sanitation facilities and so on. All these factors are unfavourable to security, well-being and ethics to the people.

Besides this, as per the UN-Habitat, the unauthorised settlements which comes-up in urban area and is marked as "a slum is characterized by lack of durable housing, insufficient living area, lack of access to clean water, inadequate sanitation and insecure tenure" (UN-Habitat, 2003) ^[30]. Whereas, the "squatter settlements as opposed to

slums, despite their unattractive building materials, may also be places of hope, scenes of a counter culture, with an encouraging potential for change and a strong upward impetus" (Gerster, 1978) ^[9]. Besides this, the "squatter cities are Green. These are having maximum density for instance, a million people per square mile or so as found in the Mumbai City along with the minimum energy and material use by these peoples. Most of the population get around by foot, bicycle, rickshaw, or the universal shared taxi" in order to minimise their economic expenses in their daily life (Brand, 2010) ^[6].

So, it is noteworthy to mention that for first time in the country, Census of India 2001, enumerated the slum areas and earmarked across the country, particularly, in cities and towns having population of 50,000 or above in 1991 Census. Subsequently, the slum data was discarded for towns with 20,000 to 49,999 population in 2001 and statutory towns having population less than 50,000 in 1991. Whereas, the towns reported more than 50,000 population in 2001 were not considered for statutory slum as it was dealt in the earlier censuses. Besides this, in 2011 Census, there was a deliberation which took into account for consideration that the slums have been earmarked in all statutory towns irrespective of their population size based on the same definition as in 2001. According to the 2011 Census, there were the three types of slums which classified as namely, the notified, the recognized and the identified slums for which information is available at the States level for the entire country, India.

2. Research Objectives

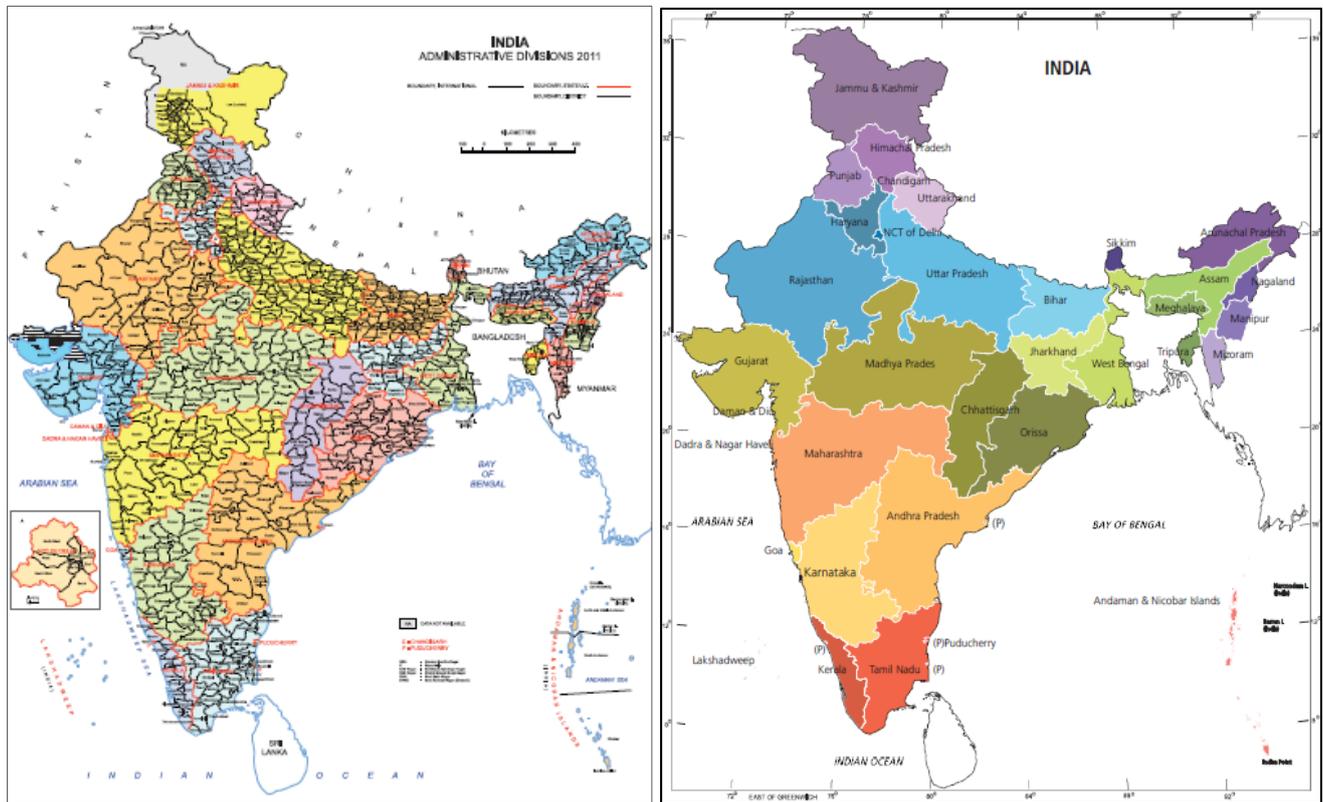
The present study takes into account the detailed scenario of informal settlements with special reference to the slums and squatter settlements in context to their geographical distribution in different parts of the country, India. In addition to this, the present study also seeks to scrutinise various concerns dealing with development of the slums and squatter settlements in context to the various plans and policies from the developmental perspectives for the country, India. So, the main objectives of the present study are mentioned as follows:

- 1) to study geospatial process of urbanisation over periods;
- 2) to analyse geospatial trends and patterns of slums and squatter settlements;
- 3) to identify major challenges of the slums and squatter settlements; and
- 4) to suggest suitable development strategies for informal settlements.

In view of this, the present research attempts to analyse and identify major challenges coming in the way of sustainable development of the informal settlements particularly to the slums and squatter settlements in the country, India.

3. Study Area

India is situated in the north of equator between the geographical extent of 08°04' and 37°06' north latitudes and 68°07' and 97°25' east longitudes. The States level as well as the districts level latest available administrative divisions based on the Census of India, 2011 are presented in the Figures 1 and 2.



Source: CoI (2011) ^[7-8] *Census of India 2011, Primary Census Abstract*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

Fig 1 & 2: States and Districts Levels Administrative Divisions of India, 2011.

4. Database and Methodology

The present study is based on secondary data available from the different sources. The Census of India publications as the Primary Census Abstract 2001 and 2011, obtained from the Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi. In addition to this, the Primary Census Abstract for Slum 2011, was also obtained from the Office of the Registrar General & Census Commissioner, India, New Delhi. So, the present research is based on the compilation, computation and interpretation of the available digital data in form of the tables and maps. The statistical techniques as the ratios have been computed for the States, districts, towns and cities and so on levels of digital information for the country, India. The GIS spatial analysis technique, the geovisualisation of spatial data have been performed for the presentation of the geospatial distribution patterns of the slums and squatter settlements. So, the chorochromatic and choropleth maps have been generated for the different periods.

The definition of urban area varies from country to country in the world. Besides this, the periodic reclassification of urban also vary within one country over time, making direct comparisons difficult for the different periods. The urban area can be defined by one or more criteria as followed during different censuses. In the Census of India 2011, the demarcation of urban area is based on the specified criteria which are as firstly, “all places with a municipality, corporation, cantonment board or notified town area committee, etc. (known as statutory town); secondly, all other places which satisfied the following criteria (known as census town) as: (a) a minimum population of 5,000; (b) at least 75 per cent of the male main working population engaged in non-agricultural pursuits; and (c) a density of population of at least 400 persons per sq. km” (CoI, 2011) ^{[7-}

8]. Besides this, the increase in proportion of urban population over time, calculated as the rate of growth of urban population minus that of the total population. It is a fact that the positive rate of urbanization result when the urban population grows at a faster rate than the total population. Whereas, there is found an increasing concentration of the number of people who live in towns and cities. The pace of urban population growth depends on the natural increase of the urban population and the population gained by urban areas through both the net rural-urban migration and the reclassification of rural settlements into towns and cities.

In lieu of this, the types of slums have been defined and categorised in the 2011 census for the country, India on the basis of the number of criteria as firstly, “all notified areas in a town or city notified as ‘slum’ by state, union territories administration or local government under any act including a ‘slum act’ may be considered as the notified slums; secondly, all areas recognised as ‘slum’ by state, union territories administration or local government, housing and slum boards, which may have not been formally notified as slum under any act may be considered as the recognized slums; and thirdly, a compact area of at least 300 persons or about 60 – 70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities. Such areas should be identified personally by the charge officer and also inspected by an officer nominated by Directorate of Census Operations. This fact must be duly recorded in the charge register. Such areas may be considered as the identified slums” (CoI, 2011) ^[7-8]. The Slums settlements demarcation and designation as described above are based on the criteria adopted and followed by the 2011 Census.

Whereas, the UN-Habitat defines “a slum is a contiguous settlement where the inhabitants are characterised as having inadequate housing and basic services. A slum is often not recognised and addressed by the authorities as an integral or equal part of the city”. Slum households as group of individuals living under the same roof that lack one or more of the conditions listed are as (a) insecure residential status; (b) inadequate access of safe water; (c) inadequate access to sanitation and other infrastructure; (d) poor structural quality of housing; (e) overcrowding by the peoples (UN-Habitat, 2003) [30]. However, the above mentioned criteria were taken into consideration for demarcation and designation of the slums settlements. All these criteria are described and defined in detail in the Primary Census Abstract for Slum, 2011 published by the office of the Registrar General & Census Commissioner, India, New Delhi. In this context, it is certainly a challenging task for the policy makers and planners for the development of slums and squatter settlements in the country, India.

5. Results and Discussions

5.1. Geospatial Trends of Urbanisation

On the basis of results obtained for the period 2011, there is found that out of the total population of 1,210.19 million, about 377.10 million live in urban areas which is accounting for 31.15 per cent of the total population. On the other hand, the proportion of population living in the urban areas of country was increased from 27.80 per cent in 2001 to about 31.15 per cent in 2011. The number of towns was increased from 5,161 in 2001 to 7,935 in 2011. Such kind of the increasing pace of urbanization resulted into increasing pressure on the level of services in the urban centers. So, by and large, the urbanization has also been accompanied with an increase in the urban poor population. Besides this, there are four components of urban population growth as the natural increase, the rural to urban migration, the reclassification, and the boundary changes of the existing urban centers. Based on the Census of India reports, it is found that the natural increase during 1991-2001 was about 59 per cent, on the one hand. And, the rural-urban migration is accounted for about 21 per cent during the same period, on the other hand. Moreover, the remaining urban growth is due to reclassification or boundary changes of the towns and cities in the country, India.

It is important to point out that the significant feature of urbanization is the growth of large towns and metropolitan cities. Such growth of urban centers are the challenges of urbanization in India. For instance, in 1901 only the Calcutta City had more than a million population. Later on, such cities number was increased over the periods and there were about 12 cities in 1981, which was almost doubled to about 23 cities in 1991. Moreover, their number was increased to about 35 cities in 2001 and to about 53 cities in 2011 as also evidenced by the Table 1 and 4. The metropolitan cities altogether accounted for the population of about 108 million in 2001. All these metropolitan cities altogether accounted for nearly 11 per cent of the country's total population and 38 per cent of the urban population. As mentioned earlier, there are 53 urban agglomerations with the population of one million or more as of 2011. So, there is found approximately 43 per cent of the urban population living in these cities in India. One of the important aspect of metropolitan growth is that there is very favourable geospatial spread of these large

cities that may help in achieving the goals of the balanced urban growth in the country, India.

So, the urban population projections indicate that by 2030, the urban population will be about 575 million constituting over 40 per cent of total population in India. In lieu of this, there is found that most of the cities are experiencing a steady decline in the quality of physical environment. For instance, there is found a lots of stress on the physical infrastructure, inadequate delivery of basic services, air and water pollution, uncollected wastes, etc. are some of the more recently emerging problems in the urban areas of the country. So, the urbanization is inevitable and needs to be considered as positive in national development. The response to increasing urbanization and growth and development of cities needs to be viewed positively. There is no denial of the fact that it should be more balanced and more responsive in context to the national development goals. The basic prerequisite of the present is that these cities need to be better managed and efforts are to be made to improve urban land governance in the country, India.

Table 1: Urban Population – Towns, Cities and Urban Agglomerations, 1981 to 2011.

Urban Population	1981	1991	2001	2011
Urban Population (as % to total population)	23.73	26.13	27.82	31.20
Statutory Towns	-	-	3,799	4,041
Census Towns	-	-	1,362	3,894
All Class Towns & Cities – Urban Settlements & Centres (I-VI size classes)	4,019	4,680	5,161	7,935
Urban Agglomerations (UA) & Cities *	216	296	394	475
Urban Out Growth (OG)	-	-	962	981
Metropolitan cities**	12	23	35	53

Notes: *Class-I Town/City with population of 1, 00,000 & above; **Metropolitan Cities having population more than million plus (+);

Source: CoI (2011) [7-8] *Census of India 2011, Primary Census Abstract*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

The total urban population has been increased over the periods as it is accounted for about 23.73 per cent which further increased to about 26.13 per cent and about 27.82 per cent in 1981, 1991 and 2001, respectively. In addition to this, the total urban proportion was further increased to about 31.20 per cent in 2011 which accounted for about 377 million persons of the total population as also evidenced by the above Table 1. Whereas, the statutory towns are first category of urban units notified under law by the concerned State and Union territory governments. These statutory towns have local bodies like municipal corporations, municipalities, municipal committees, etc. irrespective of their demographic characteristics. The number of statutory towns were accounted for about 3,799 in 2001 which further increased to about 4,041 in 2011. Besides this, the second category of towns are known as the Census Towns. These were identified on the basis of census data which accounted for about 1,362 towns in 2001 and later on increased to about 3,894 in 2011. In addition to this, the number of all class size towns was increased from 4,019 in 1981 to 4,680 in 1991 and further increased to 5,161 in 2001. In addition to this, at the 2011 Census, there were about 7,935 towns in the country, India. So, there by an increase of about 2,774 towns

since the last Census 2001. Many of these towns are part of urban agglomerations and the rest are independent towns in the country, India (CoI, 2011)^[7-8].

The urban agglomeration is a continuous urban spread constituting a town and its adjoining outgrowths (OGs). In other words, the two or more physically contiguous towns together with or without outgrowths of such towns form the urban agglomeration. The urban agglomeration must consist of at least a statutory town on the one hand and its total population including all the constituents put together which should not be less than 20,000 on the other hand, as per the 2001 Census. In varying local conditions, there were similar other combinations which have been treated as urban agglomerations satisfying the basic condition of contiguity. There were about 216 cities and urban agglomerations in 1981 which number increased to about 296 in 1991. Likewise, their number was further increased to about 394 in 2001. And, thereafter, it was increased to about 475 in 2011. For instance, the Greater Mumbai and the Delhi Metropolitan, are some of the distinct urban agglomerations of the country, India.

The Outgrowth is a viable unit such as a village or a hamlet on the one hand. And, an enumeration block made up of such village or hamlet and clearly identifiable in terms of its boundaries and location, on the other hand. Some of the examples of the urban outgrowth are the railway colony, university campus, port area, military camps, etc. All these usually come up near a statutory town outside its statutory limits but within the revenue limits of villages contiguous to the town. While determining the outgrowth of a town, it has been ensured that it possesses the urban features in terms of infrastructure and amenities such as metalled roads, electricity, tap water, drainage system for disposal of sewage wastes, educational institutions, post offices, medical facilities, banks etc., on the one hand. And, it must be physically contiguous with the core town of the urban agglomeration, on the other hand. There were about 981 towns out growth in 2011 Census as compared to 962 towns out growth in 2001 Census in the country, India which is also evidenced by the Table 1.

Table 2: Towns and Cities based on Population Size in India: 1981 to 2011.

Size of Population	Class/Category	1981	1991	2001	2011
1,00,000 & above	I	226	322	441	468
50, 000 to 99, 999	II	325	421	496	601
20, 000 to 49, 999	III	883	1,161	1,399	2,047
10, 000 to 19, 999	IV	1,247	1,451	1,563	2,451
5, 000 to 9, 9999	V	920	971	1,041	2,147
Less than 5, 000	VI	348	289	232	221
	Total	3,949	4,615	5,161	7,935

Source: CoI (2011)^[7-8] *Census of India 2011, Primary Census Abstract*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

The Towns and urban agglomerations are grouped on the basis of their population size for different censuses as presented in the Table 2. The towns and urban agglomerations which have at least 1,00,000 population are categorized as Class I urban center. In the Census 2011, there are about 468 such urban centers. The corresponding number of such towns was about 441 in 2001 Census. There were about 264.90 million persons, constituting 64.82 per cent of the total urban population, who live in these Class I towns

and urban agglomerations as evidenced by the Table 3. Besides this, the proportion of Class I towns was increased in 2011 Census in comparison to the previous 2001 Census. While, in the remaining classes of towns, the growth was nominal as evidenced by the Table 2.

In other words, out of the total towns and cities of about 7,935, there were about 468 towns and urban agglomerations belonging to Class I category, 53 towns and urban agglomerations, each one of them having population of one million or above as evidenced by the Tables 2 and 4. Besides this, there were number of major urban centers in the country known as the million plus cities and urban agglomerations. For instance, there was about 160.7 million persons which accounted for about 42.61 per cent of the urban population who live in these million plus cities and urban agglomerations (CoI, 2011)^[7-8]. Whereas, there were about 18 new towns and urban agglomerations which added to this list since the last Census 2001.

Table 3: Population Growth among the Six-fold Classification of Towns and Cities in India: 1981 to 2011.

Size of Population	Class/Category	1981	1991	2001	2011
1,00,000 & above	I	52.66	56.68	61.48	64.82
50, 000 to 99, 999	II	13.98	13.33	12.23	11.42
20, 000 to 49, 999	III	17.04	16.35	15.00	14.12
10, 000 to 19, 999	IV	11.21	9.77	8.08	7.45
5, 000 to 9, 9999	V	4.40	3.43	2.85	1.98
Less than 5, 000	VI	0.72	0.45	0.29	0.21
	Total	100	100	100	100

Source: CoI (2011)^[7-8] *Census of India 2011, Primary Census Abstract*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

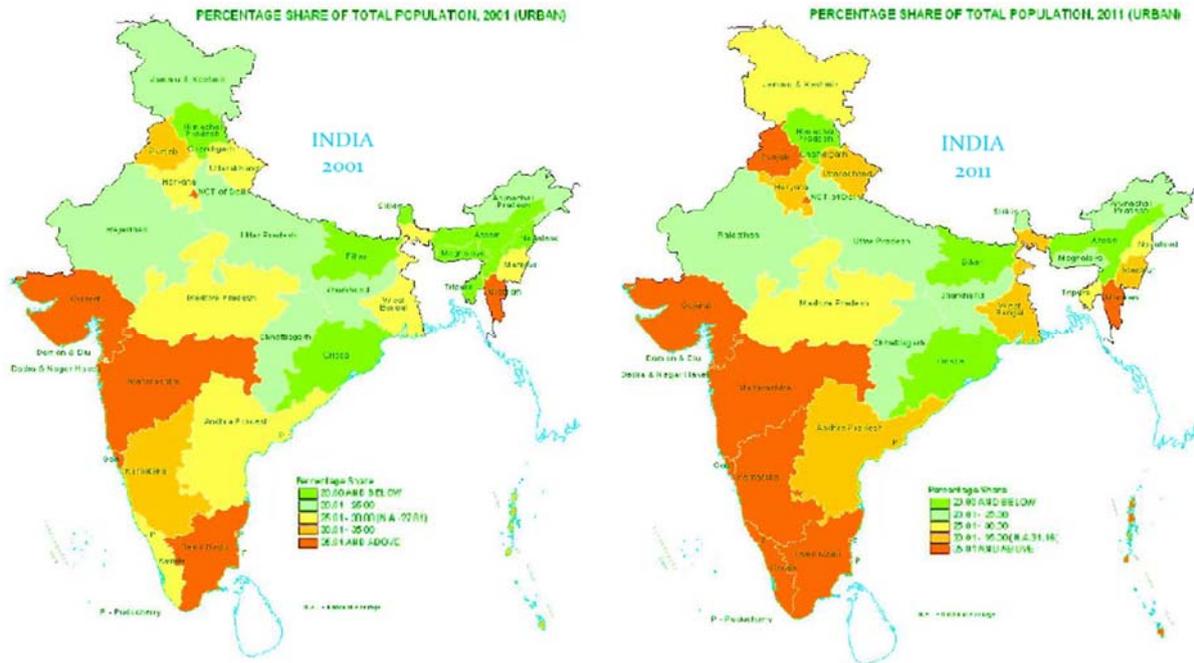
Besides this, it is noteworthy to mention that among the million plus cities and urban agglomerations, there are three very large cities and urban agglomerations with more than 10 million peoples, in the country, India. These are known as the mega cities. The Greater Mumbai urban agglomeration which accounted for about 18.40 million population. Whereas, The Delhi urban agglomeration accounted for about 16.30 million population. The Kolkata urban agglomeration accounted for about 14.10 million population. It is also important to mention that the largest urban agglomeration is the Greater Mumbai which is followed by Delhi urban agglomeration in the country, India. Whereas, the Kolkata urban agglomeration which was held the second rank in Census 2001 replaced by Delhi urban agglomeration in Census 2011. The population growth of these mega cities has been slowed down considerably during the last decade. For instance, the Greater Mumbai urban agglomeration, which had recorded about 30.47 per cent population growth during 1991-2001 recorded about 12.05 per cent during 2001-2011. Similarly, the Delhi urban agglomeration recorded the growth of about 52.24 per cent in 1991-2001 which was declined to about 26.69 per cent in 2001-2011. Likewise, the Kolkata urban agglomeration recorded the growth of about 19.60 per cent in 1991-2001 which was declined to about 6.87 per cent in 2001-2011. So, all these mega cities growth of population have been slowed down considerably over the periods.

5.2. Geospatial Patterns of Urbanisation

The Geospatial patterns of urbanization in terms of the percentage share of urban population to total population was

found high among the industrialized States, particularly, the western and southern States as the Gujarat, Maharashtra, Tamil Nadu in 2001 and likewise in 2011 with the addition of Karnataka State in the country as evidenced by the Figures 3 and 4. So, the comparative scenario of the levels of

urbanization in terms of percentage share of urban population to total population for the whole country, India for the periods of 2001 and 2011 were also presented in the Figures 3 and 4.



Source: CoI (2011) [7-8] *Census of India 2011, Primary Census Abstract*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

Fig 3 & 4: Geospatial Patterns of Urbanisation in India, 2001 and 2011.

The Geospatial distribution patterns of cities and mega cities found highly uneven among the States and Union territories of the country, India during the periods of 1981, 1991, 2001 and 2011 as clearly evidenced by the Table 4. It is noteworthy to mention that in terms of the total number of

cities, there is found an increasing trend over the periods since 1981. Such as, there was about 12 cities in 1981. These cities were almost doubled to about 23 in 1991. These cities were further increased to about 35 in 2001. Moreover, there were about 53 cities in 2011 as also evidenced by the Table 4.

Table 4: State-wise Distribution of Number of Towns and Cities in India: 1981 to 2011.

S. No.	States	1981	1991	2001	2011	Cities
1.	Andhra Pradesh	1	2	2	3	Hyderabad, Vishakhapatnam (GVMC) & Vijayawada
2.	Arunachal Pradesh	-	-	-	-	-
3.	Assam	-	-	-	-	-
4.	Bihar	-	1	3	1	Patna
5.	Chhattisgarh	-	-	-	2	Raipur, Durg-Bhilainagar
6.	Goa	-	-	-	-	-
7.	Gujarat	1	3	4	4	Ahmedabad, Surat, Vadodra & Rajkot
8.	Haryana	-	-	1	1	Faridabad
9.	Himachal Pradesh	-	-	-	-	-
10.	Jammu & Kashmir	-	-	-	1	Srinagar
11.	Jharkhand	-	-	1	3	Jameshedpur, Dhanbad & Rachi
12.	Karnataka	1	1	2	1	Bangalore
13.	Kerala	-	1	1	7	Kochi, Kozhikode, Thrissur, Malappuram, Triuvananthapuram, Kannur & Kollam
14.	Madhya Pradesh	-	2	3	4	Indore, Bhopal, Jabalpur & Gwalior
15.	Maharashtra	3	3	4	6	G. Mumbai, Pune, Nagpur, Nasik, Vasai Virar City & Aurangabad
16.	Manipur	-	-	-	-	-
17.	Meghalaya	-	-	-	-	-
18.	Mizoram	-	-	-	-	-
19.	Nagaland	-	-	-	-	-
20.	Orissa	-	-	-	-	-
21.	Punjab	-	1	2	2	Ludhiana & Amritsar

22.	Rajasthan	1	1	1	3	Jaipur, Jodhpur & Kota
23.	Sikkim	–	–	–	–	–
24.	Tamil Nadu	1	3	3	4	Chennai, Coimbatore, Madurai & Tiruchirappalli
25.	Tripura	–	–	–	–	–
26.	Uttar Pradesh	2	3	6	7	Kanpur, Lucknow, Ghaziabad, Agra, Varanasi, Meerut & Allahabad
27.	Uttarakhand	–	–	–	–	–
28.	West Bengal	1	1	1	2	Kolkata & Asansol
S. No.	Union Territories	1981	1991	2001	2011	Cities
1.	Andaman & Nicobar Islands	–	–	–	–	–
2.	Chandigarh	–	–	–	1	Chandigarh
3.	Dadra & Nagar Haveli	–	–	–	–	–
4.	Daman & Diu	–	–	–	–	–
5.	Lakshadweep	–	–	–	–	–
6.	NCT of Delhi	1	1	1	1	Delhi
7.	Puducherry	–	–	–	–	–
	Total	12	23	35	53	

Notes: Table excludes the states of Assam and Jammu & Kashmir.

Source: CoI (2011) ^[7-8] *Census of India 2011, Primary Census Abstract*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

5.3 Geospatial Growth Trends of Slums

The population of slums is accounted for about 18.30 per cent in 2001 which slightly declined to about 17.40 per cent in 2011. Whereas, the actual slums population was increased in the country over the periods from 2001 to 2011. The

growth of slums population was about 25.10 per cent during 2001-2011. Whereas, the urban population growth was about 31.80 per cent in 2001-2011 as also clearly evidenced by the Table 5.

Table 5: Slums and Urban Population in India: 2001 and 2011.

Indicator	Absolute		Absolute change 2001-11	Decadal Growth 2001-11	Slum Percentage	
	2001	2011			2001	2011
Slums						
Persons	5,23,71,589	6,54,94,604	1,31,23,015	25.1	18.3	17.4
Males	2,77,59,224	3,39,68,203	62,08,979	22.4	18.4	17.4
Females	2,46,12,365	3,15,26,401	69,14,036	28.1	18.2	17.4
Sex ratio	887	928	41			
Urban (all towns)						
Persons	28,61,19,689	37,71,06,125	9,09,86,436	31.8	100.0	100.0
Males	15,05,54,098	19,54,89,200	4,49,35,102	29.8	100.0	100.0
Females	13,55,65,591	18,16,16,925	4,60,51,334	34.0	100.0	100.0
Sex ratio	900	929	29			

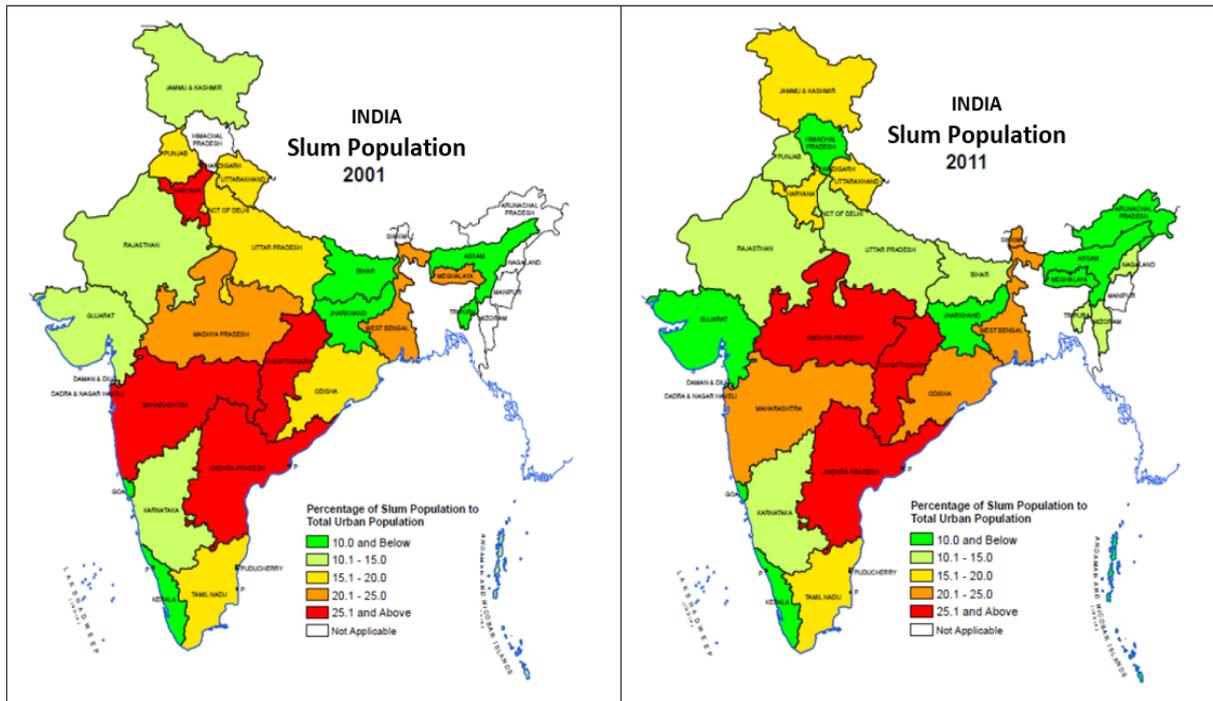
Source: CoI (2011) ^[7-8] *Census of India 2011, Primary Census Abstract for Slum, 2011*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

The Slum reported towns were accounted for about 2,613 in 2001 Census. Whereas, in the 2011 Census the total number of slum reported towns were accounted for about 1,816 in the country, India. So, the slums and the urban population actual figures and their proportions for the country, India for the periods 2001 and 2011 are presented in the above Table 5. In addition to this, the number of statutory towns and slum reported towns along with the types of slum and their population distribution for the States and Union territories of the country, India for the periods 2001 and 2011 are presented in the Tables 6 and 7.

5.4 Geospatial Patterns of Slums

There is found wide variation in the geospatial distribution patterns of slum population among the States of the country, India during 2001 and 2011. The large proportion of slum population in term of the percentage of slum population to

total urban population is found in the number of States as the Maharashtra, Chhattisgarh, Andhra Pradesh and Punjab with a proportion of more than 25.00 per cent in 2001. Over the periods, some of these States were retained their position, except the Maharashtra and Punjab States with the addition of the Madhya Pradesh State in 2011 as evidenced by the Figures 5 and 6. In comparison to this, the small proportion of slum ranging below 10 per cent was found in the number of States as the Goa, Kerala, Bihar, Jharkhand and Assam in 2001. Likewise, there were number of States with small proportion of slum population as the Himachal Pradesh, Gujarat, Goa, Kerala, Jharkhand and most of the north-eastern States as Meghalaya, Assam and Arunachal Pradesh in 2011. Such comparative levels of the geospatial distribution patterns of the slum population at the States level for the country, India for the periods of 2001 and 2011 is presented in the Figures 5 and 6.



Source: CoI (2011)^[7-8] *Census of India 2011, Primary Census Abstract for Slum, 2011*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

Fig 5 & 6: Geospatial Patterns of Slum Population in India: 2001 and 2011.

In 2011 Census, the slums have been earmarked in all the statutory towns irrespective of their population size based on the same definition as in 2001. There are three types of slums which have been classified and defined in the Census of India, namely, the notified slums, the recognized slums and the identified slums. It is concluded that there found a wide

gap in terms of slum reported towns and their population size among the States of the country, India. The number of statutory and slum reported towns with type wise slum population for the different States and Union territories for the periods 2001 and 2011 are presented in the Tables 6 and 7.

Table 6: Number of Statutory and Slum Reported Towns with Type wise Slum Population in 2001.

Name of State/ Union Territory	Towns		Total population	Type wise Slum Population		
	Statutory towns	Slum reported towns		Notified slums	Recognised slums	Identified slums
INDIA	4041	2,613	6,54,94,604	2,25,35,13 34.41	2,01,31,336 30.74	2,28,28,135 34.85
Arunachal Pradesh	26	5	15,562	0 00.00	0 00.00	15,562 100.00
Bihar	139	88	12,37,682	0 0.00	0 00.00	12,37,682 100.00
Chandigarh	1	1	95,135	95,135 100.00	0 00.00	0 00.00
Haryana	80	75	16,62,305	14,912 00.90	0 00.00	16,47,393 99.10
Himachal Pradesh	56	22	61,312	60,201 98.19	0 00.00	1,111 01.81
Jammu & Kashmir	86	40	6,62,062	1,62,909 24.61	1,36,649 20.64	3,62,504 54.75
Manipur	28	0	0	0 00.00	0 00.00	0 00.00
Meghalaya	10	6	57,418	34,699 60.43	8,006 13.94	14,713 25.62
Mizoram	23	1	78,561	0 00.00	78,561 100.00	0 00.00
Nagaland	19	11	82,324	0 00.00	48,249 58.61	34,075 41.39
NCT Delhi*	3	22	17,85,390	7,38,915 41.39	0 00.00	10,46,475 58.61
Punjab	143	73	14,60,518	7,87,696 53.93	1,93,305 13.24	4,79,517 32.83
Rajasthan	185	107	20,68,000	0 00.00	0 00.00	20,68,000 100.00

Sikkim	8	7	31,378	31,378 100.00	0 00.00	0 00.00
Tripura	16	15	1,39,780	0 00.00	1,24,036 88.74	15,744 11.26
Uttar Pradesh*	648	293	62,39,965	5,62,548 9.02	46,78,326 74.97	9,99,091 16.01
Uttarakhand	74	31	4,87,741	1,85,832 38.10	52,278 10.72	2,49,631 51.18

Notes: * NCT Delhi and Uttar Pradesh includes 19 and 1 Census Town.

Source: CoI (2011) ^[7-8] *Census of India 2011, Primary Census Abstract for Slum, 2011*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

The statutory towns and slum reported towns were accounted for about 4,041 and 2,613, respectively for the country as whole in 2001. Such towns distribution was found highly variable among the States. The largest number of the statutory towns and slum reported towns which were accounted for about 648 and 293 respectively, in the Uttar Pradesh State in 2001 as also evidenced by the above Table 6. Whereas, in terms of types of slums and their population

distribution were classified as the notified, the recognised and the identified slums. Each one of these slum categories were recorded the population proportion of about 34.41 per cent, 30.74 per cent and 34.85 per cent, respectively for the country as a whole in 2001. Besides this, such types of slum population distribution is found varying among the different States of the country, India in 2001 as clearly evidenced by the Table 6.

Table 7: Number of Statutory and Slum Reported Towns with Type Wise Slum Population in 2011.

Name of State/Union Territory	Towns		Type-wise Slum Population			
	Statutory Town	Slum Reported Town	Total Population	Notified Slums	Recognised Slums	Identified Slums
INDIA	2,496	1,816	4,93,29,471	1,98,60,908 40.26	1,48,11,926 30.03	1,46,56,637 29.71
Andaman & Nicobar Islands	1	1	14,172	0 00.00	0 00.00	14,172 100.00
Andhra Pradesh	125	125	1,01,86,934	83,38,154 81.85	8,77,172 8.61	9,71,608 9.54
Assam	88	31	1,97,266	9,163 04.64	70,979 35.98	1,17,124 59.37
Chhattisgarh	168	94	18,98,931	7,13,654 37.58	7,64,851 40.28	4,20,426 22.14
Dadra & Nagar Haveli	1	0	0	0 00.00	0 00.00	0 00.00
Daman & Diu	2	0	0	0 00.00	0 00.00	0 00.00
Goa	14	3	26,247	6,107 23.27	0 00.00	20,140 76.73
Gujarat	195	103	16,80,095	0 00.00	0 00.00	16,80,095 100.00
Jharkhand	40	31	3,72,999	64,399 17.27	59,432 15.93	2,49,168 66.80
Karnataka	220	206	32,91,434	22,71,990 69.03	4,45,899 13.55	5,73,545 17.43
Kerala	59	19	2,02,048	1,86,835 92.47	8,215 04.07	6,998 03.46
Lakshadweep	0	0	0	0 00.00	0 00.00	0 00.00
Madhya Pradesh	364	303	56,88,993	19,00,942 33.41	25,30,637 44.48	12,57,414 21.10
Maharashtra	256	189	1,18,48,423	37,09,309 31.31	34,85,783 29.42	46,53,331 39.27
Odisha	107	76	15,60,303	0 00.00	8,12,737 52.09	7,47,566 47.91
Pondicherry	6	6	1,44,573	70,092 48.48	73,928 51.14	553 0.38
Tamil Nadu	721	507	57,98,459	25,41,345 43.83	19,78,441 34.12	12,78,673 22.05
West Bengal	129	122	64,18,594	48,918 00.76	37,03,852 57.71	26,65,824 41.53

Source: CoI (2011) ^[7-8] *Census of India 2011, Primary Census Abstract for Slum, 2011*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

For the country as a whole, the statutory towns and slum reported towns were accounted for about 2,496 and 1,816, respectively in 2011. Such kind of slum towns distribution were found highly variable among the States and Union territories. The largest number of the statutory towns and slum reported towns were accounted for about 721 and 507, respectively in the Tamil Naidu State in 2011 as also evidenced by the above Table 7. So, the statutory towns and slum reported towns distribution were found highly variable among the States and Union territories in the country, India. The largest number of the statutory towns and slum reported towns were accounted for about 364 and 303 respectively, in the Madhya Pradesh State in 2011 as also evidenced by the above Table 7. Whereas, in terms of types of slums and their population distribution was classified as the notified, the recognised and the identified slums. Each one of these slum classes were recorded the population proportion of about 40.26 per cent, 30.03 per cent and 29.71 per cent, respectively for the country as a whole in 2011. Besides this, such types of slum population distribution is found varying

among the different States of the country, India in 2011 as also clearly evidenced by the Table 7.

5.5. Geospatial Trends of Slum Workers

There is an absolute increase in the number of workers in slum during 2001-2011. The slum work participation rate was about 33.10 per cent in 2001. This ratio of slum workers was slightly increased to about 36.40 per cent in 2011. So, it is significant to point out that there was a decadal growth of slum workers to about 37.70 per cent during 2001-2011 as evidenced by the Table 8. Whereas, the urban slum reported towns work participation rate was about 35.50 per cent in 2001 which increased to about 46.60 per cent in 2011. There was recorded a high decadal growth of the slum workers of about 44.70 per cent during 2001-11. The Urban work participation rate was about 32.30 per cent in 2001 which also increased to about 35.30 per cent in 2011. There was also recorded a high decadal growth of the work participation rate in urban including all towns of about 44.30 per cent during 2001-11. The slum workers participation for India is presented in the Table 8.

Table 8: Work Participation Rate in Slum and Urban India: 2001 and 2011.

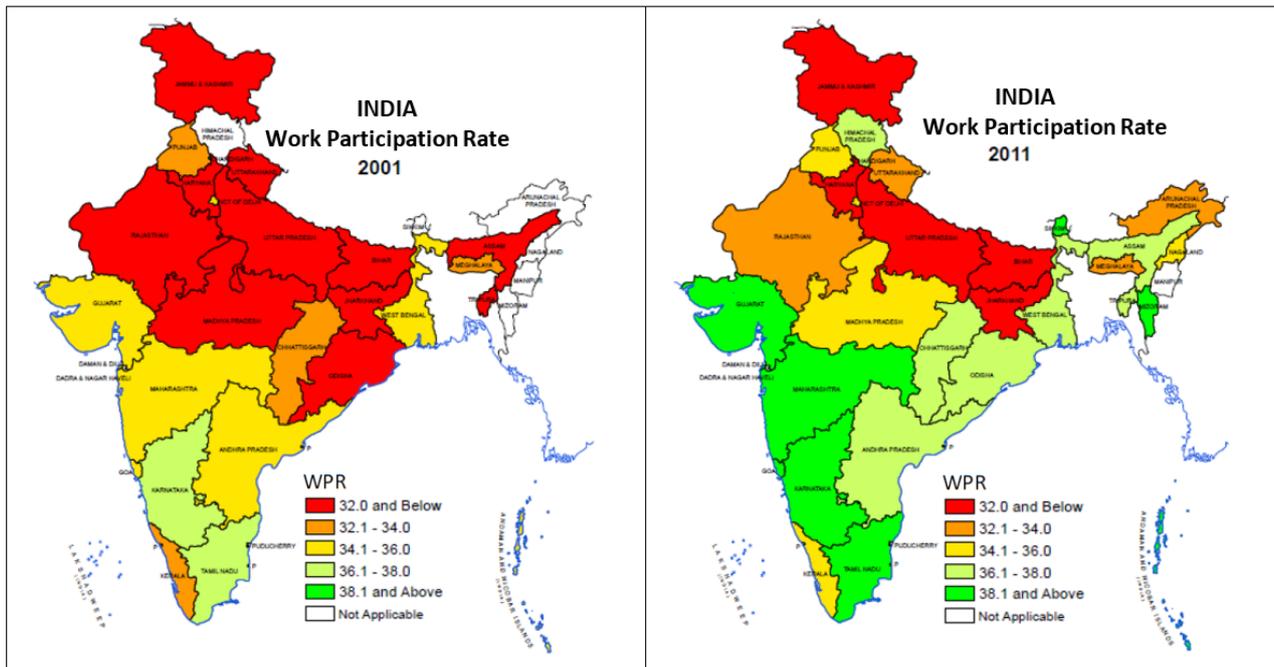
Indicator	Absolute		Absolute Change	Decadal Growth	Work Participation Rate	
	2001	2011	2001-11	2001-11	2001	2011
Slum						
Persons	1,73,10,568	2,38,39,259	65,28,691	37.7	33.1	36.4
Males	1,41,72,030	1,84,53,228	42,81,198	30.2	51.1	54.3
Females	31,38,538	53,86,031	22,47,493	71.6	12.8	17.1
Urban (slum reported towns)						
Persons	7,15,65,430	10,35,90,630	3,20,25,200	44.7	35.5	46.6
Males	5,96,62,525	8,20,68,288	2,24,05,763	37.6	54.1	65.8
Females	1,19,02,905	2,15,22,342	96,19,437	80.8	15.4	27.7
Urban (all towns)						
Persons	9,22,78,654	13,31,45,776	4,08,67,122	44.3	32.3	35.3
Males	7,61,75,323	10,51,02,862	2,89,27,539	38.0	50.6	53.8
Females	1,61,03,331	2,80,42,914	1,19,39,583	74.1	11.9	15.4

Source: CoI (2011)^[7-8] *Census of India 2011, Primary Census Abstract for Slum 2011*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

5.6. Geospatial Patterns of Slum Workers

There was found variation in the geospatial distribution patterns of slum workers over the periods in India as evidenced by the Figures 7 and 8. The low work participation rate was found exist in the northern States in comparison to the southern States. The low work participation rate ranges between below 32 per cent was recorded among the States as the Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Haryana, Punjab, Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand and Orissa in 2001. Whereas, in 2011 the work participation rate scenario was different as compared to the 2001. The low work participation rate was found in some of

the northern States as the Jammu and Kashmir, Haryana, Uttar Pradesh, Bihar and Jharkhand. Besides this, the high work participation rate ranges between 36 per cent and above was found in the States of Karnataka and Tamil Naidu in 2001. There were many States as the Gujarat, Maharashtra, Goa, Karnataka, Tamil Naidu, Sikkim and Mizoram where the work participation rate was ranges between 36 per cent and above in 2011. So, the Geospatial pattern of participation rate of slums was found varying in different States of the country, India during the periods 2001 and 2011 as also evidenced by the Figures 7 and 8.



Source: CoI (2011) [7-8] *Census of India 2011, Primary Census Abstract for Slum, 2011*, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

Fig 7 & 8: Geospatial Patterns of Slum Workers in India: 2001 and 2011.

6. Challenges for Informal Settlements

In terms of the economic development, there were developed two parallel sectors of economy as the social sector, on the one hand, and the informal sector, on the other hand. The social sector is managed by the government. Whereas, the informal sector lies outside the purview of the government and primarily serves to the low-income groups. So, it is noteworthy of mention that defining the informal settlements has been one of the major challenges, as no formal definition of informal settlements is available. Because, the informal settlements are generally symbolized with slums which are settlements of urban poor population. So, among the major challenges which comes forward for informal settlements are as the slums and the squatter settlements development under the different plans and policies in order to provide sustainable life style to the people in the country, India.

The Squatter settlements have been in existence for over the periods. The squatter settlements are concerning with the individual other than the land owner. The Poor people usually settle down and built houses with or without consent of the land owner in urban areas. So, these are not illegal settlements as defined and categorized, at present. The term squatter settlement in fact a more recent western originated development which was pointed out in the literature by the number of scholars (Turner, 1969) [29]. In other words, it came into existence particularly after the Habitat Conference of 1976 in Vancouver, Canada. Such explanation of the informal settlements as “squatter” settlements now characterised a growing change in approach in order to provide support and protection to the poor peoples.

The person as a squatter usually settles on new especially public land without legal possession of the land. In other words, a person unauthorized possession of unoccupied premises is known as “squatter”. So, a residential area occupied by squatters becomes a squatter settlements. For instance, everything from a brick and concrete used in construction of the multi-storeyed house to an “occupied” cardboard carton usually become “squatter settlements”.

There is an urgent need to understand such settlements so that a concerted action can be taken. The definition of a squatter settlement varies widely from country to country. It also depends on a variety of defining parameters. In general, it is considered as a residential area in an urban locality inhabited by the very poor people. These people have no access to tenured land of their own, and hence “squat” on vacant land, either private or public in the urban areas (UN-Habitat, 2003) [30]. So, a squatter settlement therefore, can be defined as a residential area which has developed without legal claims to the land. In other words, no permission is given from the concerned authorities to build settlements to the squatter. By virtue of this, no question arises for the illegal or semi-legal status, infrastructure and services provision to the people of squatter settlements. There are essentially three defining characteristics that helps to understand squatter settlement as the Physical, the Social and the legal which are interrelated to each other.

The Squatter settlements are an inevitable phenomena in urban areas. The urban areas offer economies of scale and agglomeration economies. The large towns and cities will always continue to grow by attracting migrants from rural as well as smaller urban areas. It will be leading to more squatting settlements in urban areas. There is no universal quick fix solution which can resolve problems of squatter settlements particularly in the developing world (Sanyal, 1988) [26]. There is prerequisite for a change in attitude towards squatter settlements. There has been considerable attention from various government and public authorities for creation an environment for unique local solutions for their housing and shelter problems.

In this context, it is noteworthy to mention that informal settlements has been one of the major challenges, because there is no formal definition of informal settlements. The informal settlements are largely symbolized with slums which provides settlements to the urban poor. Furthermore, the Census of India 2011 results shows the reflection that in States as the Andhra Pradesh, Delhi and Maharashtra, the

portion of slum households to total urban poor households is high as compared to States as the Bihar, Jharkhand, Assam, Kerala etc. (CoI, 2011) ^[7-8]. So, this is not because there are less proportion of urban poor in these states, but due to the fact that their status may be underestimated. Whereas, there are approximately 65.03 per cent slum population in the largest 10 cities of the country, India.

In addition to this, there is a need for the comparative analysis of urban schemes and services accessible to the people on the one hand and the no accessibility to various schemes and services to the people in the informal settlements. Such kinds of examination will definitely convey greater incite in the understandings of the various issues and challenges for socio-economic development of the informal settlements. So, it involve to review the government allocations and utilization of resources on the urban growth planning as well as on the infrastructure development policies. The government development and planning agencies should also incorporate suggestions and inputs from the academia and other such organisations for improvement in the conditions of the informal settlements in the country, India.

So, there are number of challenges encountered and comes forward for the slums and squatter settlements which are as firstly, to integrate slum settlements into the urban area as a whole; secondly, to strengthen legal and policy agenda to expedite the process of slum development and improvement on sustainable basis; and thirdly, to institute stakeholders for the well-organized implementation of various development plans and policies for betterment of slums and squatter settlements. So, such challenges are to be efficiently tackled under the various development plans and policies for the sustainable urban development in the country, India.

7. Conclusions and Suggestions

The Slum is an urban phenomena. There is found that out of the total population of 1210.19 million, about 377.10 million live in urban areas which is accounting for 31.15 per cent of the total population in 2011. The proportion of people living in the urban areas of country were increased from 27.80 per cent in 2001 to about 31.15 per cent in 2011. The number of towns have also been increased from 5,161 in 2001 to 7,935 in 2011. Such kind of the increasing pace of urbanization resulted into increasing pressure on the level of services in the urban centres. So, by and large, the urbanization has also been accompanied with an increase in the urban poor population resulting into the advancement of informal settlements.

It is important to mention that the significant feature of urbanization is the growth of large towns and metropolitan cities. Such growth of urban centres are the challenges of urbanization in India. For instance, in 1901 only the Calcutta City had more than a million population. Later on, such cities number was increased over the periods and there were about 12 cities in 1981, which was almost doubled to about 23 in 1991. Moreover, their number was increased to about 35 in 2001 and to about 53 in 2011. So, the urban population projections indicate that by 2030, the urban population will be about 575 million constituting over 40 per cent of total population in India.

The Cities act as beacons for the rural population as they represent a higher standard of living and offer opportunities to people not available in rural areas. The Cities have, in effect become an indicator of humankind's progress into the

21st century, whether this is an upward trend or downward. So, the concentration of people and their engagement in many activities as the economic, social, political and administrative are components of a nation or region in cities which have made them as a magnet for rich as well as poor households settling down in the formal and informal settlements.

The number of infrastructure facilities and amenities available in towns and cities results in large scale migration from rural to urban areas. There were about 52 million slum dwellers in 2001. It was grew to about 65 million persons in 2011. There was an absolute increase of about 13 million slum dwellers over the decade period. The slum population was about 18.30 per cent in 2001. Moreover, the slum population was increased to about 17.40 per cent in 2011. There was slum population growth of about 25.10 per cent during 2001-11. So, among the major challenges which comes forward for urban areas is the slums and squatter settlements development under different plans and policies for sustainable life style to the people in the country, India.

So, in this context, there are number of challenges of the slums and squatter settlements, as there is found a lots of stress on the physical infrastructure, inadequate delivery of basic services, air and water pollution, uncollected wastes, etc. Such challenges are to be efficiently tackled under the various development plans and policies for the sustainable urban life style in the country, India. And, also it is a fact that the phenomenal increasing pace of urbanization is inevitable and needs to be considered as positive for the all-round national development.

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