

## **Population Growth – Trends, Projections, Future Plan And Development**

P. Sujatha<sup>1</sup> and P.V.S. Janardhanam<sup>2</sup>

<sup>1</sup>Asst. Professor, Dept. of Geography, Bharathi Women's College (A), Chennai-108, TN, India

<sup>2</sup>GM-IT-Operations, PLINTRON Global Technologies Ltd., Chennai.

---

**ABSTRACT** :Expressions like 'teeming millions', the population 'bomb', 'overpopulation', 'the population problem' have become commonplace in the media, at meetings and even during casual discussions over a cup of tea. Sometimes this discussion is about poverty, sometimes about the environment or even when there is a traffic jam or when railway reservations become difficult to obtain. These words and expressions are actually loaded, unconsciously drawing on theories and arguments put forward by some thinkers. Serious thinking about the issue of population started some two hundred years ago. Much of the general discussion on population (especially with regard to overpopulation) is based on the alarmist view that population is a threat to middle class survival. The opposite view – that population is not a serious problem -- is not so aggressively promoted and thus has not gained wide currency. In this paper will try to acquaint the reader with some of the debates, issues and terminology associated with population and demography. An attempt will also be made to place the issue of population and demography in the context of the present social reality in the country. Human population trends are centrally important to environmental science because they help to determine the environmental impact of human activities. Rising populations put increasing demands on natural resources such as land, water, and energy supplies.

**KEYWORDS** :Demography, Environmental Impact, Over Population, Population, Population problem..

---

### **I. INTRODUCTION**

Expressions like 'teeming millions', the population 'bomb', 'overpopulation', 'the population problem' have become commonplace in the media, at meetings and seminars and even during casual discussions over a cup of tea. Sometimes this discussion is about poverty, sometimes about the environment or even when there is a traffic jam or when railway reservations become difficult to obtain. These words and expressions are actually loaded, unconsciously drawing on theories and arguments put forward by some thinkers. Serious thinking about the issue of population started some two hundred years ago. Much of the general discussion on population (especially with regard to overpopulation) is based on the alarmist view that population is a threat to middle class survival. The opposite view – that population is not a serious problem -- is not so aggressively promoted and thus has not gained wide currency. The logic here is that people are a resource and the poor opt for larger families as part of their survival strategy. There is also a big debate about the role and position of women in entire population- related discussions, policies and programs. For the not-so-well-informed person, the entire issue becomes further clouded when statistics and studies are quoted or different technical terms used. For the present study an attempt will be made to place the growth of population and demography in the context of the present and future plan. Human population trends are centrally important to environmental science because they help to determine the environmental impact of human activities. Rising populations put increasing demands on natural resources such as land, water, and energy supplies. As human communities use more resources, they generate contaminants, such as air and water pollution and greenhouse gas emissions, along with increasing quantities of waste. Population interacts with several other factors to determine a society's environmental impact.

### **II. THE CHALLENGE OF DEMOGRAPHY**

Demography, the study of the size, structure and development of human populations, is finally beginning to receive more attention among ancient historians (Scheidel 2001b). Yet we still have a long way to go, not only in establishing even the most basic features of ancient populations but even more so in applying this information to our interpretations of all aspects of the Greco-Roman world. Concerned with birth, death and migration and desperate to measure, model and quantify, populations studies may seem both forbiddingly technical and safely remote from the humanistic interests and skills of most students of antiquity. Moreover, usable evidence is scarce, and generally requires comparative and interdisciplinary approaches to make any sense at all. At the same time, however,

we must bear in mind that demography is much more than just numbers, and relevant to much of what we seek to know and understand about the distant past. In pre-modern societies, population size was the best indicator of economic performance; the distribution of people between town and country was instrumental in the creation of collective identity and may reflect the scale of division of labor and commerce; human mobility mediated information flows and culture change; mortality and morbidity were principal determinants of well-being and determined fertility (and thus gender relations), investment in human capital, and economic productivity, and more generally shaped people's hopes and fears. The same is true of marriage customs and household structure. Classical civilization was the product of a thoroughly alien environment of frequent pregnancy and sudden death. Along with technological progress and scientific discovery, it was demographic change that separated the modern world from the more distant past. Archaic patterns of marriage, reproduction and death seemed as natural and immutable then as they are exotic to us, and we cannot hope to approach ancient history without a solid understanding of what these conditions were and how they permeated life. This is the true challenge of demography.

#### **AIM & OBJECTIVE IF THE STUDY**

**AIM:** Aim of the study in find out the existing population growth in Chennai city – a demographical study.

#### **OBJECTIVES:**

To fulfill the above mentioned aim the following objectives are selected. They are.

- [1] To show the population growth in Chennai City.
- [2] To show the existing population growth in Chennai City..
- [3] To show the population projection and population planning for proposed years.

**SCOPE :** The scope of the study will be the past, present and future position of the population growth. Through the outcome of this study will helpful to allocate the infrastructure and planning to provide facilities for the people.

**STUDY AREA :** Chennai is the capital of Tamil Nadu. It is largest city in south India and one of the four metropolitan cities in India. Chennai was established as a trading settlement of Chennai pitman extended along his coast from the mouth of River coeval up to the northern end of the present fort St. George completed. Chennai was made the capital of an independent presidency of east India Company. It is stated as port city and administrative city. Due to the natural growth of population and migrated population the city become metropolitan city. Because of population growth the land use and land cover changed. In this study deals with Chennai city's existing land use pattern and how the lead land use determine the land values.

**METHODOLOGY :** To study is based in the secondary data in Chennai profile. Such as physical, cultural and demographic characters are collected from Census Office. Methodology adopted, assumption made, estimate arrived. The data has been analyzed in a simple statistical techniques and cartographical techniques. The maps and graphical presentation has been used as well as the maps also prepared.

### **III. PROFILE OF CHENNAI CITY**

#### **HISTORY**

Chennai City has emerged as a composition city, playing an important role for historical, cultural and intellectual development of south India. The Chennai presidency then was third in population among the cities of the British Empire during 1871. For fifty years, the population growths in Chennai have been very low until 1921. There had been a rapid population growth from 1921 to 1971. Apart from natural increase of population in the city, immigration from time to time has been listed a chief contributing factor. The Chennai City came into being due to strategic necessity and historical events. Its symbolize the rise of British power ink south Indis by setting up and consolidation of the East India company in the 17<sup>th</sup> century with its headquarters at Fort St. George as a trading centre. Within 350 years a few scattered villages (important being Mylapore, Triplicane and Chennai patnam) were developed into a modern metropolitan city without shedding its tradition custokms and religion.Chennai has been an important center historically for various purposes, specifically on strategic point of view , trade and commerce. Chennai was originally known as Chennai patnam, which was a part of Thondaimandalam. The formation of the institution of a Mayor and corporation of Chennai City was begins during 1687-1692, this status was given to this city after the Chennai patnam was brought under differentrules like Golkondas, Mughal, and Europeans. The status of government of Chennai in 1698 continued for 11 years in whose period was granted with the towns of Tondiarpet, Purasawalkam and Egmore the local Nawab. This period also gained remarkable development in trade and commerce,as Chennai was an important and historical place.

From 1799 onwards and other places scattered around Chennai got agglomerated gradually with Chennai City. Consolidation and development of institutions in Chennai were held between 1803 and 1827. To improve the literacy, various steps were taken [place between 1820 and 1827. The educational institution of higher learning like school of industrial arts was begun in 1850. Civil Engineering college begun in 1834, Chennai Medical college in 1835 and Chennai Medical University in 1857, while considering the growth of population and development, the Chennai High Court was established in 1862 to cater the needs of the public. Though the railway company was formed in 1845, the actual construction work in Chennai begun from 1853, with the moderate development of railway facilities and requirements in South India, Chennai city was facilitated with headquarter for South Indian Railway in 1858. Several important events took place between 1872 and 1875, while the session of Indian National Congress held in 1887 at Chennai. From 1900 onwards several establishments of different nature started functioning in Chennai, which helped for socio-economic development of the city. From time to time, the area under Chennai City kept extending due to population growth and expansion of industrial development.

**URBAN AGGLOMERATION :** Continuous urban spread of a few intense urban areas where in the urban characteristic features has actually been extended could be considered under agglomeration. The urban area, which extended to the neighboring districts, which reported in 1991 census, is 612.11 sq.kms belongs to the Chengalpattu-MGR Districts. The total population of 7 urban Agglomeration areas including Chennai corporation in 1991 census returned as 5,421,985, 3,05,566 males and 2,616,419 females of the total population Chennai corporation shared major population (70.85%) and the rest of the population have read over in 56 urban areas belong to Chengalpattu-MGR districts. Numbers of household urban agglomerated area are 1,139,438 while Chennai belong to Chennai corporation areas.

**LOCATION AND PHYSIOGRAPHY :** Chennai City, one of the metropolis in India is the capital of Tamil Nadu, serves a gateway to the South Civilian culture. Chennai is situated on the Northeast corner of Tamil Nadu on the coast of Bay of Bengal. Lies between 12.9° and 13.9° Eastern Longitude. Chennai district or otherwise Chennai City has a stretch of seacoast of about 25 kms along the Bay of Bengal from Thiruvanniyur in the south to Tjiruvottiyur in the North. The east by Bay of Bengal and other three sides by Chengalpattu-MGR Districts surround the district. The average elevation of the city is not more than 22 above the sea level while most of the localities are just above the sea level. Two Streams-the Cooum and Adyar, interest the city. The Cooum runs through the heart of the city and enters into sea. While the Adyar River passes through the Southern part of the city Buckingham canal runs through the city, almost parallel to Coromandel Coast, within the limit of 5 kms. From the coast

**AREA AND POPULATION :** The population, according to 1991 Census, of Chennai District was 3,841,396; 1,986,278 males and 1,855,118 females which constitute 6.88% of the total urban population in the state, Chennai share 20.14%. In 1981 Census, the population in Chennai District was 3,276,622 (1,694,107 males and 1,582,515 females) and the population growth rate for the decade returned higher (17.24%) than the state (15.339%). The sex ratio in Chennai District has been returned as 934 females per 1000 males against 974 females at state level. The population density in Chennai district numbered 22,077 persons per sq.km. Being a cosmopolitan center and urban agglomeration, education development among different sections of the population stated to be remarkable. The literacy rate, according to 1991 Census in Chennai district has been returned as 13.79% to the total population. The Scheduled Tribe population in the district reported very less (0.21% to the state population). Numbers of households in Chennai reported in 1991 census were an average of 4.8 persons in a households. The work percentage rate among type main and the marginal workers to the total population in the district returned as 30.5%. There has been a wide differentiation between men and women main and marginal workers. Men participate at 51.14% while women participation reported to be only 8.4% in primary sectors (cultivation agricultural labour, livestock, forestry, fishing, hunting, mining and quarrying), the main worker reported negligible. Main workers in secondary sector (manufacturing, processing, servicing and repairs in households industries and in other than households industries and construction) where relatively high compared to tertiary and primary and primary sectors. The secondary sector workers constitute 30.59% to the total main workers: 31.98% males and 21.53% females. A significant proportion of main workers are reported from tertiary sectors (trade and commerce, transport, storage and communication and in other services). The major proportion (68.36%; 66.83% males and 78.32% females) of workers was engaged in tertiary sectors. Chennai City with its area of 174.0 has a population of 3,841,396 expressing the highest degree of urbanization and density mainly due to immigration and sporadic development of industries and the outskirts.

**GROWTH OF POPULATION IN CHENNAI CITY :**The population of the city as per 1871 census was 3,97,552, which increased by more than 6 fold during a course of a century. The last two decades of the 19<sup>th</sup> century recorded a moderate growth of 11.55 and 22.185 respectively. During the last 60 decades from 1921 to 1982 interpreted growth in population is the striking future. The tremendous growth of population after 1941 is attributed to two major factors. Firstly, a large number of immigrants poured into the city from various places during the end of Second World War. Secondly the mortality rate declined considerably in the past independence area. The average density of Chennai City is in 1981 was 15,462 persons per sq.kms, which increase to 19,274 persons per sq.kms during 1991. In 2001,43,645person per sq.kms total population.

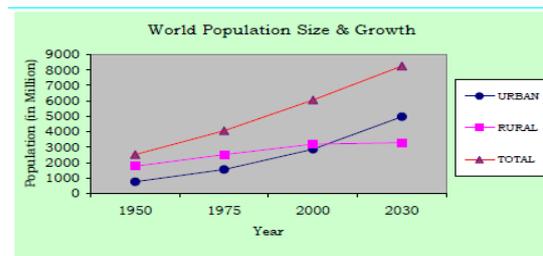
**IV. POPULATION GROWTH IN CHENNAI**

**Demographical Aspects**

History of the world during the last century has shown that the process of urbanization and economic growth progress are mutually reinforcing. Cities are the loci and motors of economic and social change. According to United Nations Projections, the World's urban population will grow from 2.86 billion in 2000 to 4.98 billion by 2030 and the World's annual urban growth rate is projected as 1.8 per cent in contrast to the rural growth rate of 0.1 per cent. About 60 per cent of the World's population will live in cities<sup>1</sup> by 2030.

	Mid-year population size (million)				Population growth rate (percent)		
	1950	1975	2000	2030	1950-75	1975-00	2000-30
<b>Urban</b>							
World Total	751	1543	2862	4981	2.9	2.4	1.8
High-income countries	359	562	697	825	1.8	0.9	0.6
Middle and low income countries	392	981	2165	4156	3.7	3.2	2.2
<b>Rural</b>							
World Total	1769	2523	3195	3289	1.4	0.9	0.1
High-income countries	219	187	184	139	-0.6	-0.07	-0.9
Middle and low income countries	1550	2336	3011	3151	1.6	1	0.2

Note: High-income countries have gross national income per capita of US\$9266 or more based on World Bank estimates.  
Source: National Research Council, 2003, P.85.

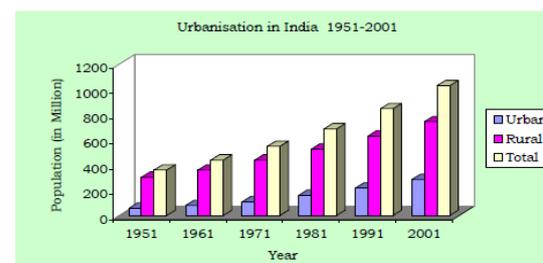


**Urbanisation in India**

India, the second largest populous country in the World has one of the longest urban traditions. By the year 2000 BC itself India had an extensive network of towns. Even before the British traders made contact with India (by AD 1600), there was broad regional distribution of towns. These towns were not just of administration, but also of trade and marketing, cultural activities and religious pilgrimage, defence and fortification. New cities - Madras, Calcutta and Bombay were founded by 17th Century. The early British settlements became the means of transforming urban system in India. During the 19th century, the Cities were to be for industrial activities and also became hub of the transport network. In a formerly rural economy country like India, because of the need to decrease the number of persons dependent on agriculture and to improve productivity in rural areas, urbanisation is viewed as a prerequisite of growth. The urban population in India has grown from 25.7 million in 1901 to 286.1 million in 2001. After Independence in 1947, the rate of growth of urban population increased from 2.64 percent in 1951 to 3.88 percent in 1981 and thereafter declined to 2.77 in 2001; but the share of urban population to the total population of the country constantly increased from 10.9 percent in 1901 to 15.92 percent in 1951, and thereafter to 27.81 per cent in 2001.

	1951	1961	1971	1981	1991	2001
<b>Urban</b>						
Population (in million)	57.50	78.90	109.10	159.70	217.60	286.10
Annual Rate of Growth (Percent)	2.64	3.21	3.29	3.88	3.14	2.77
% of urban total population	15.92	17.96	19.90	23.30	25.71	27.81
<b>Rural</b>						
Population (in million)	303.60	360.30	439.10	525.50	628.70	742.60
Annual Rate of Growth	1.02	1.73	2.00	1.81	1.81	1.68
% of rural to total population	84.08	82.04	80.01	76.70	74.29	72.19
<b>Total</b>						
Population (in million)	361.10	439.20	548.20	685.20	846.30	1028.70
Annual Rate of Growth	1.26	1.98	2.24	2.26	2.13	1.97

Source: Census of India

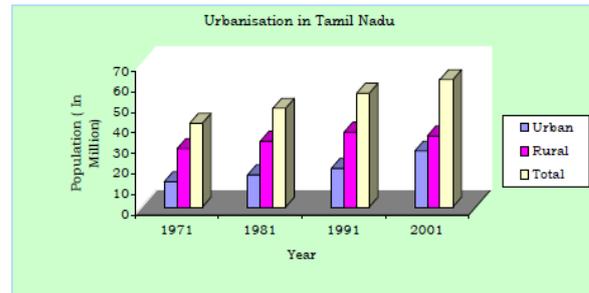


**Urbanization in Tamilnadu :**Tamilnadu has emerged as the third largest economy in India. Cities exist and grow because of economies of urban agglomeration associated with industrial and trade activities. In the recent past, liberalisation, rapidly growing IT sector, an educated, hardworking and disciplined work force etc, accelerating economic development also contributed to the growth of urban areas in Tamilnadu. The extent of the State is 130,058 sq.km. of which the urban area accounts for 12,525 sq.km. Tamilnadu is the most urbanised

state in India. It is one of the few states in India with hierarchy of urban areas dispersed fairly uniformly through-out the State. Its urban population has grown from 12.46 million in 1971 to 27.48 million in 2001. Its percentage share of urban population to total population stood always much above the national average.

	1971	1981	1991	2001
<b>Urban</b>				
Population (in million)	12.46	15.95	19.08	27.48
Annual, Rate of Growth (percent)	3.32	2.50	1.91	3.72
% to total	30.26	32.95	34.15	44.04
<b>Rural</b>				
Population (in million)	28.73	32.46	36.78	34.92
Annual, Rate of Growth (percent)	1.53	1.23	1.26	-0.52
% to total	69.74	67.05	65.85	55.94
<b>Total</b>				
Population (in million)	41.19	48.41	55.86	62.40
Annual, Rate of Growth (percent)	2.03	1.63	1.44	1.11
Area in Sq.Km.	130,069	130,050	130,050	130,050

Source: Census of India

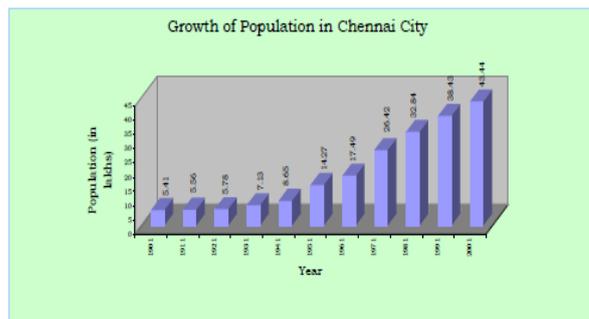


**Growth of population in Chennai city and CMA :** Chennai (earlier called as Madras) was established in 1639, as one of the East India Company's earliest trading Ports and later became the centre of the company's control over Southern India. By 1700, Madras had become a thriving city with about 3 lakhs inhabitants; most of them lived in the Black Town in the north of the British Fort St. George. By the end of the eighteenth century, according to Dupuis (1968), the north of the city had become profoundly different from the south. The north was densely populated, with Black Town, the heart of the city. To the south were the open spaces and scattered settlements of the Europeans. By the time of the first census in 1871, the city had reached over 4 lakh. The first railway line between Madras and Arcot was opened in 1856 and the Madras Port was improved in 1890, which had attracted industrial developments to the north of the black zones renamed as George Town in 1905<sup>2</sup>. The growth of Chennai City continued in the twentieth century and it has grown to the fourth largest Metro City in India. An area about 67 Sq.km. containing 16 hamlets was constituted as the City of Madras in 1798 and subsequently enlarged from time to time. Its enlargement and growth of population since 1901 is given in table No. 3.04.

	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
City population in lakhs	5.41	5.56	5.78	7.13	8.65	14.27	17.49	24.69	32.85	38.43	43.44
Area in sq.km.	68.17	68.17	68.17	68.17	77.21	128.83	128.83	128.83	176	176	176
Annual Rate of growth of population * (in percent)	--	0.27	0.39	2.12	0.69	-0.11	2.06	3.51	-0.27	1.58	1.23
Population density per Hect.	80	82	85	105	112	111	136	192	187	218	247

\*Note: Arrived for a unit area for the purpose of comparison since the city extent varied over time. The figures given are for the decade ended with that year.

Source: Census of India



The city Corporation area recorded a higher growth of more than 2% per annum during the decades 1951-61 and 1961-71. The reasons for this rapid growth rate can be attributed to industrial developments and increase in economic activities and employment opportunities in the City and its suburbs attracting large migrant population. The negative growth arrived for a unit area during 1971-81 is due to the annexation of lesser dense (then) Panchayat areas around, to the City viz. Velacheri, Taramani, Kanagam, Thiruvanmiyur, Kodambakkam, Saligramam, Koyambedu, Senjery, Thirumangalam, Virugambakkam, Nesapakkam, Kolathur, Villivakkam, Konnur, Erukkanchery, Jambuli, Kodungaiyur, and Selaivoyal in 1978, comprising about 47 Sq.km.

Chennai City Corporation area consists of 155 divisions within 10 zones (Zone No. I to X) presently. The number of these divisions and its extent varied over time. Hence, for the purpose of comparison, the demographic details have been arrived for the years 1971, 1981 and 1991 keeping the 155 Corporation division boundaries in 2001 as the basis. Spatial distribution of population growth in the City is given in the table no.3.05.

**Table No. 3.05: Chennai City - Population Growth in Corporation Zones, 1971-2001**

Zone Nos.	Corporation Zone	Area in Sq.km.	Population in Lakhs				Annual rate of growth in percent			Density per Hectare in 2001
			1971	1981	1991	2001	71-81	81-91	91-01	
I.	Tondiarpet	17.30	2.01	2.69	3.72	4.10	2.95	3.28	1.00	243
II	Basin Bridge	11.52	3.59	3.52	3.27	3.76	-0.21	-0.74	1.40	335
III	Pulianthope	13.51	3.34	4.13	4.31	4.60	2.13	0.44	0.64	349
IV	Ayanavaram	19.76	2.22	3.58	4.12	4.97	4.89	1.42	1.89	258
V	Kilpauk	26.38	2.18	3.45	4.94	5.42	4.68	3.66	0.93	211
VI	Ice-House	10.15	3.27	3.49	3.20	3.42	0.63	-0.84	0.65	346
VII	Nungambakkam	12.90	2.91	3.09	3.20	3.48	0.61	0.35	0.83	277
VIII	Kodambakkam	13.00	2.48	3.33	4.39	4.66	2.96	2.81	0.61	368
IX	Saidapet	23.56	1.89	2.61	3.33	4.15	3.25	2.48	2.23	180
X	Mylapore	27.92	2.50	2.97	3.95	4.88	1.70	2.89	2.13	180
	<b>City Total</b>	<b>176.00</b>	<b>26.42</b>	<b>32.85</b>	<b>38.43</b>	<b>43.44</b>	<b>2.20</b>	<b>1.58</b>	<b>1.23</b>	<b>247</b>

Source Census of India

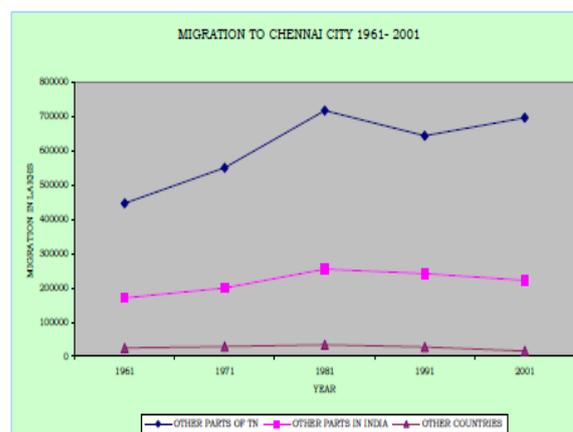
Population growth in different zones within City Corporation area is found to be not uniform and its rate varied from 0.61% to 2.23%; Saidapet and Mylapore zones have recorded growth rate exceeding 2% during 1991 - 2001.

**Migration :** The cosmopolitan nature of Chennai was a reflection of its attractions to migrant groups from all over India. Migrants came not only predominantly from the surrounding Tamil and Telugu speaking areas but also from southern and northern India. These migrant groups from other states have made their distinctive mark on the patterns of residential and social organisations within this Chennai Metropolis. Chennai is a city of migrants like any other metropolitan city in India. According to 2001 Census, migrants to Chennai City from other parts of Tamil Nadu State constitute 74.5 % and the table no. 3.10 shows a downward trend in the migration to the City from 37.24% in 1961 to 21.57% in 2001. Migrants from other parts of India constitute 23.8% and the remaining 1.71 % of the migrants is from other countries.

**Table No. 3.10: Migration to Chennai City, 1961-01 (in Lakhs)**

Year	Total Population	Total migrants to the city from								% of Total Migrants to the total population
		Other parts of Tamil nadu		Other parts of India (Excluding Tamilnadu)		Other Countries		Un-classifiable	Total migrants	
		No.	%	No.	%	No.	%			
1961	17.29	4.47	69.45	1.71	26.6	0.25	3.90	--	6.44	37.24
1971	24.69	5.51	70.61	2.00	25.63	0.29	3.76	--	7.80	31.59
1981	32.84	7.19	71.28	2.55	25.31	0.34	3.41	--	10.06	30.70
1991	38.43	6.44	70.51	2.42	26.47	0.28	3.01	0.04	9.18	23.90
2001	43.44	6.98	74.49	2.23	23.80	0.16	1.71		9.37	21.57

Source: Census of India, 1961, 1971 & 1981, 1991 Social and Cultural Table

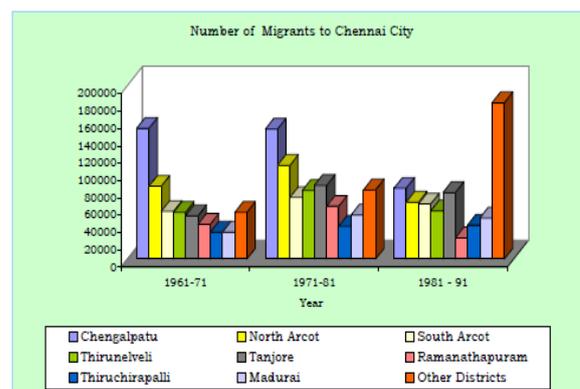


According to 1991 Census migrants from the nearby districts of Chengalpattu District (now bifurcated as Kancheepuram and Thiruvallur Districts), North Arcot District (now renamed as Vellore District) and South Arcot District (now bifurcated as Villupuram and Thiruvannamalai Districts) alone constitute 33% and Thirunelveli and Thanjavur Districts constitute another 21% of total migrant population to Chennai City. From the table no. 3.11 it may also be seen that the proportion of migration from other districts have almost tripled.

**Table No. 3.11: Migration to Chennai city from the Districts of Tamilnadu, 1961-91**

District	No. Of Migrants to Chennai city			Percentage to Total Migrants		
	1961-71	1971-81	1981 - 91	1961-71	1971-81	1981 - 91
Chengalpattu	151000	150000	81830	27.5	20.9	12.8
North Arcot	84000	108000	65550	15.3	15.0	10.3
South Arcot	55000	71000	63670	10.0	9.9	10.04
Thirunelveli	54000	79000	55530	9.8	11.0	8.75
Tanjavur	50000	85000	76760	9.1	11.8	12.1
Ramanathapuram	40000	61000	24390	7.3	8.5	3.84
Thiruchirappalli	31000	38000	39170	5.6	5.3	6.2
Madurai	31000	51000	47292	5.6	7.1	7.5
Other Districts	54000	80000	180230	9.8	10.5	28.4
Total	550000	719000	634422	100.0	100.0	100.0

Source: Structure Plan for MMA, and Census of India 1981 and 1991 Tamilnadu Migration Tables



An interesting and important fact found is the out migration from Chennai City to its suburbs and other areas. The population of the Chennai City in 1991 was 38.43 lakhs which includes 9.18 lakhs migrant population and natural increase of 6.40 lakhs (for 1981-91) population; the net population increase works out to only 5.59 lakhs which shows that there was a net out migration of 10 lakhs (30.4% of 1981 population) from City mostly to the rest of CMA (during 1981-1991). 1991-2001. Though there were large scale building construction activities noted during the above periods, the out migration of resident population from Chennai City proves that considerable conversion of residential premises into non-residential mostly for office, shopping, hotels and other commercial purposes took place; this trend will continue in this metropolis.

### Birth rate, death rate and rate of Natural Increase

Birth rates, death rates and rates of natural increase for the Chennai City are tabulated below:

(Per 1000 population)

**Table No. 3.14: Chennai City - Birth, Death and Natural increase rates 1971-1976**

Year	Crude Birth Rate	Crude Death Rate	Natural increase rate
1971	38.6	12.3	26.3
1972	37.8	12.7	25.1
1973	36.4	12.4	24.0
1974	34.4	11.5	22.9
1975	34.3	13.1	21.2
1976	32.1	12.0	20.1

Source: Structure Plan for CMA, 1980

(Per 1000 population)

**Table No. 3.15: Chennai City - Birth, Death and Natural increase rates 1991-2003**

Year	Crude Birth Rate	Crude Death Rate	Natural increase rate
1991	25.89	9.67	16.22
1992	24.01	9.50	14.51
1993	23.82	9.14	14.68
1994	23.39	9.07	14.32
1995	23.75	8.49	15.26
1996	22.68	8.54	14.14
1997	22.50	8.20	14.30
1998	23.81	9.00	14.81
1999	25.68	8.87	16.81
2000	25.53	8.92	16.61
2001	24.50	8.42	16.08
2002	23.72	8.27	15.45
2003	22.62	8.01	14.61

Source: Corporation of Chennai

From the above two tables, it may be seen that the registered birth rate in Chennai City in 1971 was 38.6 and it was varying from 38.6 to 32.1 during 1971-76. It has now reduced to 22.62 in the year 2003. Similarly the death rate also reduced to a considerable extent from 13.1 in 1975 to 8.01 in 2003. The rate of natural increase declined from 26.3 in 1971 to 14.61 in 2003 as detailed in the tables above. 3.25 The factors which affect birth rate includes age structure of population, the average age of marriage, and the incidence of family planning, among others. Increase in longevity of life due to improved health facilities may also be a reason for reduction in the death rates in Chennai.

**Age Structure :** Age structure of a population in a city / metropolis plays a major role in urban planning. It gives an idea about dependent population, working population, jobs to be created, the present and future requirements of educational, health and other facilities and amenities etc. It depends on natality (birth rate), mortality (death rate) and also migration. Age structure of population in CMA as per Census 1971 to 2001 is given in the table below:

**Table No 3.17: Age Structure in CMA in %**

Age Group	1961	1971	1981	1991	2001
0-4	13.20	12.51	11.03	8.68	7.31
5-9	12.39	11.74	10.35	9.56	7.97
10-14	10.64	10.97	11.37	10.51	8.95
15-19	8.66	9.97	10.61	10.22	9.55
20-24	10.73	11.05	10.68	11.14	10.47
25-29	10.21	9.29	9.61	10.20	10.33
30-34	7.98	7.15	7.46	8.06	8.46
35-39	6.69	6.99	6.66	7.48	8.04
40-44	5.49	5.14	5.36	5.68	6.19
45-49	4.15	4.33	4.70	4.98	5.50
50-54	3.65	3.51	3.70	3.92	4.37
55-59	2.10	2.46	2.73	2.90	3.10
60-64	2.06	2.30	2.40	2.64	2.83
65-69	1.10	1.15	1.37	1.51	1.96
>70	1.20	1.65	1.97	2.33	3.02
not stated		0.00	0	0.18	1.93
Total	100.00	100.21	100	100.00	100.00

M- Male, F- Female, T- Total  
 Source: CMDA / TRF Study data Hand book 1991  
 Census of India, Social and Cultural Tables 1961, 1971, 1981, 1991&2001

From the above, it may be seen that the proportion of primary school going children percentage has reduced from 12.39% in 1961 to 7.97% in 2001 and the proportion of Secondary school going age group has also reduced from 10.64 in 1961 to 8.95 in 2001. But the proportion of old age group has increased from 4.36 to 7.81% in the said period.

**Sex Composition :** Sex ratio is denoted by number of females per 1000 males. In Chennai the ratio has improved over the decades, though it is lower than the Tamil Nadu average. However, it is much above the Indian National average of 900 in urban areas.

**Table No. 3.18: Sex ratio in Chennai City, CMA, Tamil Nadu and India**

Year	Chennai City	CMA	Tamil nadu		India	
			Urban	Total	Urban	Total
1961	901	909	963	992	N.A.	N.A.
1971	904	907	951	978	N.A.	N.A.
1981	934	927	956	977	878	933
1991	930	936	951	972	893	929
2001	957	956	981	987	900	932

Source: Census of India, 1961, 1971, 1981, 1991 Social and cultural Tables and 2001 census of Tamil nadu

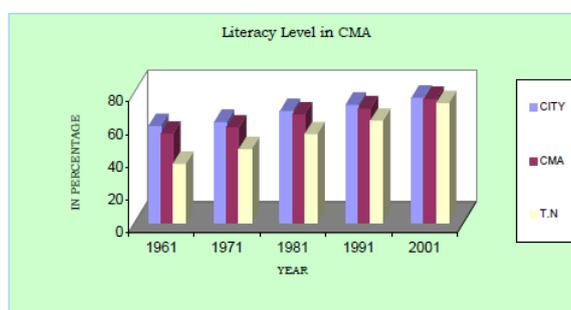
### Literacy

Literacy is defined as the ability to read and write in any single language. The literacy levels in Chennai City and CMA were higher than the state average.

**Table No. 3.19: Trends in Literacy levels in Chennai Metropolitan Area - 1961-2001**

Units	Literacy rate (in percentage)				
	1961	1971	1981	1991	2001
City	59.47	62.01	68.68	72.54	76.81
CMA	54.82	58.64	66.56	70.32	76.09
T.N.	36.39	45.40	54.40	62.70	73.50

Source: Census of India, 1961, 1971, 1981, 1991 Social and Cultural Tables and 2001 Census of Tamil Nadu)



Population projection for Chennai City and CMA had been made earlier on various occasions; the details of the same are given in the Table below summarising the earlier forecasts.

Sl. No.	Description	1991		2001		2011		Method Adopted
		CMA	City	CMA	City	CMA	City	
1.	Master Plan [1971] -Projections -Assigned as per the strategy	58	43	71	53	--	--	
		58	36	71	40			
2.	Madras Urban Development Project (MUDP I) (World Bank 1974)	59	43	71	53	--	--	Exponential Component
		57	43	69	51			
3.	MMA Structure Plan (MMDA, 1980)	73	54	--	--	--	--	
4.	NCU: 1988 - Registrar General Census of India - United Nations			74				
				82				
5.	MMA, Demography, 1981 (MMDA undated)	60	43	81	59	-	--	High Medium
		60	43	77	55			
6.	Department of Statistics Government of Tamil Nadu)	61	43	78	54	98	--	
7.	MMDA Projections: 1989	60	41	79	51	104	58	Geometric
		59	40	75	49	95	60	
	Actual as per Census	58.1	38.4	70.3	43.4	--	--	

Source: Report on Madras 2011, Policy Imperatives-An Agenda for Action by TRF & CMDA 1991 (Volume III)

As part of the Second Master Plan preparation exercise the following population estimate had been made in the 1995 draft Second Master Plan.

Year	Chennai Metropolitan Area			Chennai City		
	Low	Medium	High	Low	Medium	High
1991	54.41	59.17	64.15	37.24	40.34	43.56
1996	58.94	66.76	75.26	39.69	44.69	50.08
2001	63.79	75.22	88.09	42.31	49.47	57.48
2006	69.00	84.64	102.84	45.07	54.72	65.84
2011	74.57	95.09	119.84	48.00	60.46	75.27

It was stated in the report that the population with medium growth rate could be the more accurate population for the period up to 2011 and concluded that the (then) estimated population were as follows:

Year	CMA	Chennai City
1996	66.76	44.69
2001	75.22	49.47
2006	84.64	54.71
2011	95.09	60.46

As the Tables above illustrate, the population projections are not to be considered exact; rather they reflect the natural growth, migration trends and assumption made at the time of the estimates, including vision then for development in the city/CMA. Review of the population forecast made earlier shows that actually there were reductions in natural increase and migration, when comparing the assumptions made for the projections. However, it is seen that the population projected based on land use assignment and first Master Plan strategy is very close to the actual and it showed that the population increase was as anticipated / planned in the first Master Plan.

## V. POPULATION PROJECTION IN CHENNAI

### INTRODUCTION

Now, for projecting the population up to 2026, the following methods have been adopted:

- [1] Linear method
- [2] Geometric growth method
- [3] Exponential Curve method
- [4] Urban-Urban Growth Difference (UGD) method
- [5] Urban-Urban and Rural Growth Difference (URGD) method

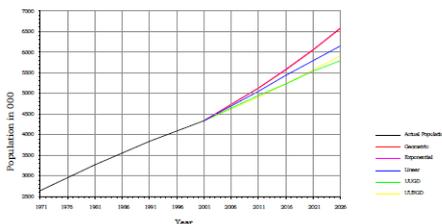
Methodology adopted, assumption made, estimate arrived are given in the Annexure to this Chapter. For projection of the population, UUGD method is found suitable for the City and UURGD method is found more appropriate for the CMA as a whole, with the assumption of growth rate based on history and judgment and also the future urbanization and population policies. For forecast of population of individual municipalities and other local bodies within CMA, the exponential curve method is found suitable (when considering also the trends in growth over the past decades). The population projections made for the CMA as a whole, Chennai City, 16 Municipalities, 20 Town Panchayats and for the villages in 10 Panchayat Unions in CMA are given in the

Tables below:

Year	Actual Population	Projected Population				
		Linear	Geometric	Exponential	UUGD	UURGD
1971	2642403					
1981	3284622					
1991	3843195					
2001	4343645					
2006		4706630	4718968	4722228	4627915	4724150
2011		5069614	5126721	5133807	4950145	5144832
2016		5432599	5569707	5581259	5238817	5565962
2021		5795584	6050970	6067710	5540456	6024451
2026		6158569	6573818	6596559	5855804	6524126

Sl. No.	Description	Projection					
		2001	2006	2011	2016	2021	2026
1	CMA	70.41	78.96	88.71	99.66	111.97	125.82
2	Chennai City	43.44	46.28	49.50	52.39	55.40	58.56

Chennai City Population Projection



**FLOATING POPULATION:** Arrival of passengers by the 92 intercity trains is estimated to be .125 lakhs per day. Similarly arrival of passengers in intercity buses (2028 arrivals) is estimated to be about 83,000 per day. In addition, there are people who commute every day for work, education, business and others from the adjoining and nearby districts and return home in the evening. These daily commuters estimated to be 20,000. Hence the people arriving in CMA through trains, buses and air is estimated to be about 2.25 lakhs and an equal number of persons may be departing from the metropolitan area. This floating population should also be taken into account in planning for infrastructure development in CMA appropriately.

**Urban - Urban Growth Difference (UUGD) Method**

$$U^1 = \left[ \frac{T^1 + dR}{T} \right] \times U$$

where U - Urban population at time 't';

U<sup>1</sup> - Urban population at time 't+1';

T - Total population at time 't';

T<sup>1</sup> - Total population at time 't+1';

d - u-r, where u - urban growth rate;  
r - rural growth rate;

R - Rural population at time 't';

$$C^1 = \frac{U^1 + dU_1 \times C}{U}$$

Where

C - City population (Chennai/CMA) at time 't';

C<sup>1</sup> - City population (Chennai/CMA) at time (t+1);

U<sup>1</sup> - Urban population (CMA/Tamil Nadu) at time (t+1);

U<sub>1</sub> - Rest of urban population (i.e. U-C);

U - Urban population (CMA/Tamil Nadu) at time 't';

d - r<sub>0</sub> - r<sub>u</sub> where

r<sub>0</sub> - the rate of growth of city population;

r<sub>u</sub> - the rate of growth of urban population.

**Urban - Urban - Rural Growth Difference (UURGD) Method:**

$$C^1 = \left\{ w_1 \left[ \frac{U^1 + d_u U_u}{U} \right] + w_2 \left[ \frac{T^1 + d_r R}{T} \right] \right\} \times C$$

Where U - Urban population at time 't';

U<sup>1</sup> - Urban population at time 't+1';

U<sub>u</sub> - Rest of urban population (i.e. U-C);

T - Total population at time 't';

T<sup>1</sup> - Total population at time 't+1';

R - Rural population at time 't';

d<sub>1</sub> - r<sub>0</sub> - r<sub>u</sub>

d<sub>2</sub> - r<sub>0</sub> - r<sub>r</sub>

w<sub>1</sub>, w<sub>2</sub> - Weights of these population components;

C - City population at time 't';

C<sup>1</sup> - City population at time t + 1;

r<sub>0</sub> - rate of growth of city population;

r<sub>u</sub> - rate of growth of urban population;

r<sub>r</sub> - rate of growth of rural population.

Note: w<sub>1</sub> + w<sub>2</sub> = 1.0. The quantum of weight is determined based on urbanisation level. At low levels of urbanisation contribution from rural areas will be more, and vice versa. The weights adopted based on the U.N. method is as follows:

Level of Urbanisation in percent	w <sub>1</sub>	w <sub>2</sub>
25	0.2	0.8
30	0.3	0.7
50	0.4	0.6
60	0.6	0.4
75	0.8	0.2

#### ASSUMPTIONS MADE

**TAMIL NADU POPULATION :** 2. The historical pattern of annual growth rate of Tamil Nadu population was as detailed in Table A in Annexure III B. It varied from 0.85% to 3.72% in respect of urban, -0.52% to 1.53% in respect of rural, and 0.34% to 2.03% in respect of total population. 3. The annual rate of growth assumed for Tamil Nadu for population projection as low, medium and high category of growth rate, is 2.0%, 2.5% and 3.0% for urban, and 1.0%, 1.1% and 1.2% for the total population; the rural population growth rate has been arrived out of the total and urban population growth rates assumed.

**CMA/CITY POPULATION:** 4. The annual growth rates of population in 1971-81, 1981-91, and 1991- 2001 were 2.76%, 2.37% and 1.93% respectively for CMA and 2.2%, 1.58% and 1.23% respectively for the Chennai City. The average rate of annual growth arrived for these three periods was 2.35% for CMA and 1.67% for City and the same was adopted for linear, geometric and exponential growth methods of projection. Projection of population for individual Corporation Division was made based on average annual growth rates. In respect of villages, Town Panchayats and Municipalities, future growth rates were assumed based on the past and judging the future trends. For UUGD and UURGD method, the assumption made based on the historical pattern is given below:

Growth Rates assumed in %						
Year	Growth rate category	Tamil Nadu (TN)	TN Urban population	Rest of TN Urban population	Chennai City	CMA
2006	Low	1.00	2.00	2.50	1.00	2.00
	Medium	1.10	2.50	3.00	1.50	2.50
	High	1.20	3.00	4.00	2.00	2.75
2011	Low	1.00	2.00	2.50	1.00	2.00
	Medium	1.10	2.50	3.00	1.50	2.50
	High	1.20	3.00	4.00	2.00	2.75
2016	Low	1.00	2.00	2.50	1.00	2.00
	Medium	1.10	2.50	3.00	1.25	2.50
	High	1.20	3.00	4.00	1.50	2.75
2021	Low	1.00	2.00	2.50	1.00	2.00
	Medium	1.10	2.50	3.00	1.25	2.50
	High	1.20	3.00	4.00	1.50	2.75
2026	Low	1.00	2.00	2.50	1.00	2.00
	Medium	1.10	2.50	3.00	1.25	2.50
	High	1.20	3.00	4.00	1.50	2.75

#### VI. SUMMARY AND CONCLUSION

**GROWTH OF POPULATION IN CMA :** Chennai has a long history since 1639. The Chennai City Corporation was constituted in 1798. The City extending over an area of 68 sq.km in 1901 had a population of 5.40 lakhs. Since 1941, it had grown rapidly and the growth of population in Chennai City The Municipalities and Town Panchayats have experienced higher growth rate than that of the City. The density pattern indicates that the City has the highest gross density of 247 persons/ha, whereas the average gross density in CMA is only 59 persons/ha. The gross density in most of the municipal areas and Town Panchayats is very low, indicating that these areas offer high potential for growth and would be the receiving residential nodes in future.

**BIRTH & DEATH RATES :** The registered birth rates in Chennai City in 1981 were 31.20 and varied from 38.6 to 24.06 during 1981-91 and have reduced to 22.62 in the year 2003. Similarly the death rate also reduced to a considerable extent from 9.20 in 1981 to 8.01 in 2003. The rate of natural increase declined from 22.00 in 1981 to 14.61 in 2003.

**MIGRATION :** Chennai is a city of migrants like any other metropolitan city in India. According to 2001 Census, migrants to Chennai City from other parts of Tamil Nadu State constitute 74.5 %, and the table below shows a downward trend in the migration to the City from 37.24% in 1961 to 21.57% in 2001. Migrants from other parts of India constitute 23.8% and the remaining 1.71 % of the migrants is from other countries. An interesting and important fact found is the out-migration from Chennai City to its suburbs and other areas. The population of the Chennai City in 1991 was 38.43 lakhs which include 9.18 lakh migrant population and natural increase of 6.40 lakh (for 1981-91) population; the net population increase works out to only 5.59 lakhs which shows that there was a net out-migration of 10 lakhs (30.4% of 1981 population) from City (during 1981-1991). Similarly, an out-migration of 10.19 lakhs (26.5% of the 1991 population) is noted during 1991-2001. Though there were large-scale building construction activities noted during the above periods, the out-migration of resident population from Chennai City proves that considerable conversion of residential premises into non-residential mostly for office, shopping, hotels and other commercial purposes took place; this trend will continue in this metropolis.

**SEX RATIO :** Sex ratio is denoted by number of females per 1000 males. The sex ratio in CMA increased from 936 in 1991 to 956 in 2001.

**LITERACY :** Census figures indicate that the literacy rates in Chennai City and the CMA are more or less equal and these figures compare favourably with the overall literacy rate in urban Tamil Nadu.

**AGE STRUCTURE :** Age structure of a population in a city / metropolis plays a major role in urban planning. It gives an idea about dependent population, working population, jobs to be created, the present and future requirements of educational, health and other facilities and amenities. It depends on birth rate, death rate and also migration. From the above, it may be seen that the proportion of primary school going children percentage has reduced from 12.39% in 1961 to 7.97% in 2001, and the proportion of secondary school going age group has also reduced from 10.64 in 1961 to 8.95 in 2001. But the proportion of old age group has increased from 4.36 to 7.81% in the said period.

**POPULATION PROJECTION :** Population projections have been carried out for Chennai City and CMA based on the past trends. The following assumptions have been made;

- (i) The declining trend in the growth rate will continue in the future years also.
- (ii) Past growth rates, existing density, potential for development, area available for development, accessibility to public transport system ( especially the rail system ), proximity to the employment generating centres etc. could be the basis for working out future projections and assignments. It is estimated that CMA would house a population of 126 lakhs by 2026, of which Chennai City alone would account for 58 lakhs.

**STRATEGIES :** In order to realize the vision of making Chennai more livable and economically vibrant the following strategies are proposed in respect of this sector:

- [1] to increase overall density of the Chennai Metropolitan Area from the present 59 persons per hectare to 105 persons per hect.; while doing so the density of Chennai will increase from 247 persons per hect. in 2001 to 333 persons per hect. in 2026, while in the rest of CMA the average density will go up from the present 27 persons per hect. to 67 persons per hectare.
- [2] to encourage high rise development along wider roads and larger plots; to allow multi-storied buildings in the rest of CMA also in order to have planned development with large open spaces on ground.
- [3] to allow higher FSI along the MRTS influence areas for residential developments with smaller dwelling sizes.
- [4] to consider extension of the Transfer of Development Rights concept for lands taken over for development to solve problems of land acquisition for housing and infrastructure.
- [5] to earmark adequate areas in the plan for employment generating activities.
- [6] to provide better infrastructure facilities like roads, water supply, sewerage, etc. and provide better connectivity through rail and road transport network to the areas identified for development.
- [7] to encourage development of Thiruvallur and Gummidipoondi as satellite towns as envisaged in the FMP by provision of adequate infrastructure like housing and other developments and providing better housing facilities at affordable cost; to develop new towns/ neighbourhoods near Tirupurur in the southern

corridor along Rajiv Gandhi Salai and near Sriperumbudur, in the western corridor along GWT Road. viii) to take up housing development near Mahindra Park SEZ either by provision of plots or by regulating layout development by private entrepreneurs.

- [8] to encourage green building concept
- [9] to provide special facilities to take care of the needs of the elderly persons whose population is likely to go up, e.g. more old age homes, low-floor buses, special seats in buses, special seats in toilets and ramps in public buildings.
- [10] to provide for preservation and conservation of ecologically sensitive areas in CMA and to create more parks and playgrounds for recreation purposes.
- [11] to encourage social housing provision by private developers of large group developments / multi-storeyed developments through Development Regulations.
- [12] to encourage LIG housing by allowing additional FSI of 0.25 to private developers for such developments.

**THE PLAN :** Action plans to achieve the strategies mentioned above have been indicated executed in the sectoral units especially economy, transportation, shelter, infrastructure. Development Regulations proposed for some of the strategies like Transfer of Development Rights, additional FSI for specific purposes and encouragement of green building concept.

### **REFERENCES**

- [1] The state of the World's cities 2004-05 Globalisation and Urban Culture, published
- [2] by Earth scan in 2004
- [3] Urbanisation in India by Robert W. Bradnock, 1984.