CHAPTER - I

1. Introduction

An urban area is characterized by higher population density and vast human features in comparison to areas surrounding it. Urban areas are created and further developed by the process of urbanization. Urbanization or urban drift is the physical growth of urban areas as a result of global change. Urbanization is also defined by the United Nations as movement of people from rural to urban areas with population growth equating to urban migration. While defining metropolitan, it is often confused with the urban. Unlike an urban area, a metropolitan area includes not only the urban area, but also satellite cities and intervening rural land that is socio-economically connected to the urban core city, typically by employment ties through commuting, with the urban core city being the primary labour market. Urbanization is closely linked to modernization, industrialization, and the sociological process of rationalization.

Urbanization is a two-way process because it involves not only movement from village to cities and changes from agricultural occupation to business, trade, service and profession but also it involves change in the migrants attitudes, beliefs, values and behaviour patterns. It is notable that the process of urbanization is rapid all over the world. The facilities like education, healthcare system, employment avenues, civic facilities social welfare and transport are reasons attracting people to urban areas.

1.1 Urbanisation in Tamil Nadu

Most of the theories defining urban takes population as one of the major factors. Tamil Nadu is the seventh most populous state in India with a population of 72,138,958 (5.96% of India's population; census 2011). It is the seventh most densely
populated state in India with a population density of 555 persons per square kilometre as of 2011, having increased from 429 in 1991, significantly higher than the Indian average of 382 persons per square kilometre. 44% of the state's population live in urban areas, the highest among large states in India.

Population in Tamil Nadu grew by 15.6% between 2001 and 2011, the sixth lowest rate for that period amongst populous states (states whose population exceeded 20 million in 2011). Although its decadal rate of population growth has declined since 1971, the population growth during the last decade (2001–2011) has increased.

The urban population of India and Tamil Nadu are 285.4 and 27.48 million respectively. Tamil Nadu thus accounts for 6% of the country's total population and 9.6% of country's urban population. Tamil Nadu ranks first in urbanisation among the fifteen major States in the country. Urbanisation has been on the increase since 1901. According to the 2001 Census, Tamil Nadu has emerged as the State with the highest level of urbanisation (44%) in the country among the larger States. While the percentage of urban population in the country increased from 10.85% to 27.78% during 1901-2001, Tamil Nadu registered a much higher percentage increase i.e., from 14.15% to 44.04% during the above period.

Urbanisation levels and growth trends over a century period since 1901, it can be witnessed a gradual increase in the urbanisation levels and growth of urban population in Tamil Nadu, comparatively higher than the all other states of India level, Tamil Nadu is steadily transforming into a predominantly urban society.

The term urbanization can represent the level of urban relative to overall population or it can represent the rate at which the urban proportion is increasing.
The census of India (1971) defines some criteria for urbanization. These are:

- Population is more than 5000
- The density is over 400 persons per sq.km
- 75% of the male population engages in non-agricultural occupations.

1.2 Urbanisation in India

India is primarily an agrarian society, where majority of the population are dependent on agriculture and allied activities in rural areas. In the urban areas of the country, people are not dependent on agriculture. Normally an urban area is one in which 75 percent of the population lives by non-agricultural occupations but in the beginning of 20th century this was not the case in India. In 1901, one out of every nine Indians lived towns and cities. Today, after consecutive decades the situation has experienced remarkable changes. Today every fourth Indian is a city-dweller. In 1901, the sum total people living in urban areas were around 26 million. By 1991, the number of people living in urban areas and escalated up to 218 million. This figure far surmounts the total population of Russia, Canada and Australia taken together. More alarming here is the fact that two third of India’s total urban population lives cities that have a populace of several lakh people. This ever-increasing exerts terrific pressure on the existing brittle civic, social and sanitary services.

At present in India, the ten leading populated urban districts include Kolkata, Chennai, Mumbai, Hyderabad, Delhi, Chandigarh, Pune, Bengaluru, Ahmedabad and Kanpur. These ten city districts alone account for more than 5 percent of the total population of the country. The average density of these districts is around 6888 persons per square km. Among the large states of India, Maharashtra, Gujarat and Tamil Nadu are considered as the most urbanized states. More than 35 percent of the total population of
these states lives in cities. Another fact of enormous significance is the fast development of major cities. Each of such cities has more than one million people. In 1981 there were 12 such cities, however, the number had risen to 23 in 2001.

1.3 Urbanisation at the world

The United Nations (UN) projects that world population will expand from 6.1 billion to 7.8 billion between 2000 and 2025; 90 percent of this growth will occur in urban areas of less developed countries. By 2020, a majority of the population of less developed countries will live in urban areas. Due to urbanisation, it can be found that the cities are developing into large cities. Because of rapid urbanisation, large cities are being developed, by 2015, the number of cities with more than one million residents is projected to be about 564 up from 195 cities in 1975. Asia, Africa, and other less developed regions have seen the most dramatic increase in the number of cities with one million or more residents and in the proportion of the total population concentrated in these “million-plus” cities. Megacities with 10 million or more residents are also becoming more numerous and will play an important role in the world’s urban future. Many of present largest cities are likely to absorb enormous population increments due to urbanisation reasons. Lagos, Nigeria, for example, is expected to add nearly 10 million people between 2000 and 2015, while Dhaka, Bangladesh, will add 9 million. The tremendous population growth in the urban areas of less developed countries can be viewed as a welcome or as an alarming trend.

In 1950, UN report expected 47% population increase in developed countries. The population of the more developed world was already 55 percent urbanized in 1950, reached 76 percent in 2000, and is expected to be 82 percent in 2025. It is because more developed countries are already highly urbanized, and the urban share
from the developed countries increased substantially. The less developed world is urbanizing as quickly now as was the United States and other more developed countries during the first half of the 20th century. Rapid urbanization is occurring because there is a large pool of potential migrants to the cities from countryside, and because rates of natural are increase substantially high in urban. The rapid urbanisation can be found in both developed and less developed countries. Rapid concentration is projected for the urban populations of less developed countries. The future will bring not just an urbanizing world but, perhaps more significantly, a world in which people is more likely to be residents of very large cities.

The levels of urbanization in less developed countries lag 75 years behind those of the more developed countries. In Europe, North America, and other more developed regions, urbanization increased from 26 percent to 40 percent between 1900 and 1925. The urban population of South Asia is projected to reach nearly one billion by 2030. Urbanization levels rose by a similar margin in less developed countries between 1975 and 2000. The urban challenge facing countries of South Asia-including Bangladesh, India, and Pakistan is of unparalleled scale. Yet urbanization in most less developed countries today differs from the early 20th-century trends in Europe and the United States in at least five key respects: It is taking place at lower levels of economic development; it is more dependent on changes in the international economy; it is based on lower mortality and higher fertility; it involves many more people; and governments have intervened to modify it. Urban change in less developed regions is so diverse that it defies generalization.

Over the next quarter century, increases in urbanization will be almost entirely challengeable to sub-Saharan Africa and Asia. Urbanization is projected to increase from 34 percent to 49 percent in sub-Saharan Africa and from 35 percent to
50 percent in Asia (excluding Japan). In Latin America and the Caribbean, 75 percent of the population already resides in urban centers so the future pace of urbanization will be slow.

The UN projects that the population of Southern Europe will decline from 144 million to 136 million between 2000 and 2025, for example. The urban population is projected to rise from 96 million to more than 100 million over the period, while the rural population is projected to fall from 48 million to 34 million. As a result, the level of urbanization in Southern Europe will increase from 66 percent to 75 percent.

The overall review on UN urbanization report, it is found that there is a rapid increase on worldwide population notably. According to UN report less developing countries have double rate of increase in urbanization. In the developed countries 75% of people live in urban already, so it may be expected a slow increase in urbanization. In Indian context in 25 years that will be 35% increase in the development of urbanization.

1.4 City

City is a relatively large and permanent settlement. Cities generally have complex sub-systems like sanitation, utilities, land usage, housing, and transportation etc. A big city or metropolis usually has associated suburbs and exurbs. Such cities are usually associated with metropolitan areas and urban areas, creating numerous business commuters travelling to urban centers for employment. The concentration of development greatly facilitates interaction between people and businesses.
According to Census of India, city is defined as the towns with population of 1,00,000 and above. The most popular cities in Tamil Nadu are Chennai, Madurai, Trichy, Coimbatore and Salem. Chennai is the first city of Tamil Nadu and the present Gateway to South India. It is 372 years old and India's fourth largest metropolitan and also 34th largest metropolitan area in the world.

In India there are 23 cities have over million residents. Delhi, Calcutta, Mumbai and Chennai are the four main cities of India. The first three cities have over 10 million residents each. Calcutta is the most populated city of India. In the early 1990s Mumbai became the most populated city of India. Most of the larger cities such as Mumbai, Calcutta, Chennai, Bangalore, Ahmedabad, Agra, Jaipur and Bhopal are industrial centres of India.

In Canada, the granting of city status is handled by the individual provinces and territories. In British Columbia and Saskatchewan, towns can become cities after they reach a population of 5,000 people, but the threshold is 10,000 in Alberta, New Brunswick, and Ontario. In Manitoba, an urban municipality may not be named as a city unless its population meets or exceeds 7,500 people.

There is a formal definition of city in China provided by the Chinese government. A minimum 100,000 non-agricultural population in an urbanized area, usually the administrative centre of a county, is required to establish it in an administrative sense as a city. By its non-agricultural population is a city classified: 100,000-200,000 a small city, 200,000-500,000 a medium city, 500,000-1,000,000 a large city and greater than 1,000,000 an extra-large city. In 1998, there were 668 cities in China. China has the largest urban population in the world although half of its population still lives in rural areas.
In France, there is no distinction between a town and a city. There is only a difference between a city or town, a village which is smaller (around 50 to 2000 inhabitants), and a hamlet which does not have more than around 50 inhabitants. French people usually make a difference between a city that has more than around 10000 inhabitants and one that has less than around 10000.

In German also there is no difference between city and town, while a city with more than 100,000 inhabitants is called a big city. On the other hand, most towns are communities belonging to a county or rural district, but there are some cities, usually with at least 50,000 inhabitants, that are counties by themselves. Germany's largest cities are Berlin, Hamburg, Munich, Cologne and Frankfurt am Main while the largest urban area is in the Rhine-Ruhr region with over 12 million inhabitants. Frankfurt, Munich, Dusseldorf, Berlin, Stuttgart and Cologne are characterized as world cities or global cities.

In Japan the definitions of city are followings 1. Population is more than 50,000. 2. 60% or more of buildings are in the city centre. 3. 60% or more of the households work for non Primary sector of the economy.4. Has a system to function as a city.

In New Zealand, a local authority may be proclaimed a city only if it meets certain criteria. Specifically, "a city must have a minimum population of 50,000, be predominantly urban in character, be a distinct entity and a major centre of activity within the region." Some early settlements, such as Nelson and Christchurch, were proclaimed cities by royal charter. A city is simply a large, important urban centre, regardless of the composition of its local government (which may be a combination of
one or more cities or districts). For example, Gisborne has a population of only 44,500 is treated as city because of administrative purposes. Some city councils, such as Christchurch and Dunedin, also administer large areas of rural hinterland; the communities in these areas, such as the towns of Akaroa and Middlemarch, are not often thought of as part of their cities, except for certain legal and administrative purposes. Statistics of New Zealand has introduced the concept of main urban areas, which have a minimum population of 30,000. The 16 main urban areas identified in 2001 and 2006 correspond closely to the urban settlements traditionally regarded as cities. Auckland, the largest city in New Zealand.

South Korea has a system of dividing into metropolitan cities, provinces, a special city and one specially self-governing province. In South Korea, cities should have a population of more than 150,000, and if a city has more than 500,000, it would be divided into 2 districts and then sub-communities follow as a name of dong with similar system of normal cities. Seoul is one of the largest cities in the world.

In the United Kingdom (UK), a city is treated as city historically or given city status by government or authorities. In England and Wales, prior to 1907 the criterion was simply the establishment of an Anglican Cathedral. In the United Kingdom cities generally include the suburbs in that. Though the cities are small, by the cathedral, they treated as cities and example: St David's in Wales and Wells in England. Other places such as Reading, Northampton, Luton, Bournemouth and Milton Keynes all harbour populations of over 200,000 inhabitants but are not cities. Each cities includes a number of towns, villages or rural areas including the urban area from which the city takes its name. Examples for cities are: Bradford, Leeds, Newport, Preston,
Wakefield and Winchester. The situation in London is a historical anomaly: the City of Westminster and the City of London are geographically small but historically significant parts of the Greater London conurbation that have independent city status. London, Birmingham, Leeds, Manchester and Glasgow, are the largest five cites in UK.

In the United States of America, the classification of population centers is a matter of state law; consequently, the definition of a city varies widely from state to state. In Illinois, cities must have a minimum population of 2,500 but in Nebraska, cities must have a minimum of only 800 residents. In Oregon, Kansas, Kentucky, North Dakota, Minnesota, and Iowa, all incorporated municipalities are cities. In Ohio, a municipality automatically becomes a city if it has 5,000 residents counted in a federal census but it reverts to a village if its population drops below 5,000. In Nebraska, 5,000 residents is the minimum for a city of the first class while 800 is the minimum for a city of the second class. The Constitution of Idaho makes no distinction between incorporated towns or cities. In Virginia, all incorporated municipalities designated as cities are independent of the adjacent or surrounding county while a town is an incorporated municipality which remains a part of an adjacent or surrounding county. The largest incorporated municipalities by population are all cities, although some smaller cities have a smaller population than some towns. For example, the smallest city of Norton has a population of 3,904 and the largest town of Blacksburg has a population of 39,573. The other U.S. independent cities are Baltimore, Maryland; St. Louis, Missouri; and Carson City, Nevada.
Though definition of cities may be different from region to region, basic common characteristics of cities are observed as,

- A minimum population: varies from 2500 to 500000.
- Basic needs such as hospital, pharmacy, fire department, theatre, museum, library, hotel services, basic and secondary schools, public transport, gardens, etc.,
- Historically features.

1.5 Administrative city

Administrative cities were the habitations of the state rulers. Their major cultural role was to serve as the locus of state administration. State offices and officers had an urban location, from which they exercised a political control and economic exploitation of the surrounding rural areas quite unknown in ritual cities. Administrative cities also had a qualitatively different demographic and social complexity. They contained large populations, densely settled, often ethnically varied, with heterogeneous occupations. Such cities were nodes of communication and transportation and centres of commerce, crafts, and other economic functions for the surrounding countryside.

Administrative cities occurred in agrarian empires, state-level societies associated with the early civilizations of Hindu and Muslim India, China, and Egypt, as well as the Mamlûk Middle East, Tokugawa Japan, Alexandrine Greece, and other expansive territorial states before the advent of the world capitalist system. These states had rulers with great powers of political coercion, which they used to maintain a high level of inequality in wealth between the state ruling elite and the primary producers, the peasantry. This type of urban culture rested on how effectively the state could exploitatively control peasant agricultural productivity for maintaining the elite.
The administrative city brought together the political, economic, transport, and communications functions and institutions necessary for this rural rapine. For just as the state elite preyed on the peasant, so the administrative city’s flamboyant architecture and monumental public works ultimately rested on what could be taken from the rice paddies of the Japanese cultivator or the wheat field of the Indian peasant. There also grew up urban populations that converted the wealth taxed from the rural area into a sumptuous life-style for the urban-resident state elite: artisans and artists, of various levels of reputation. This gave rise to the poor of the city and, often, institutions to help govern and subdue them, such as municipal governments. Merchants also were necessary to convert the peasant’s grain payments into cash. Administrative cities commonly tried to restrain the wealth of urban merchants from fear that such riches might be converted into political power.

The administrative city had some of the properties commonly attributed to cities: it was a locale for cultural elaboration and monumental building, a repository of great wealth but also of extensive poverty, and a heterogeneous locale, both occupationally and in terms of ascriptive identities based on ethnicity, religion, caste, or race. But it was not disorganized or impersonal. Family, guild, and ethnic group framed the allegiances that defined the basic unit of urban cultural practice, the city quarter, which for the urban nonelite functioned with many of the characteristic cohesions of the peasant village.

1.5.1 Determinants

The age of the city, area of the city, education and transport of the city are considered as determinants of the growth of the administrative city size population in Tamil Nadu state.
**Age and Area**

The following cities are having largest area and aged of city. Such as Madras (362 years, 172 square k.m), Trichy (200, 4403.8), Madurai (215, 3741.7), Coimbatore (136,7469) and Salem (193, 5220) (Indian Census report 2001).

**Education**

Tamil Nadu is one of the most literate states in India. Tamil Nadu has performed reasonably well in terms of literacy growth during the decade 2001–2011. The state's literacy rate increased from 83.47% in 2001 to 90.3% in 2011 which is above the national average.

Tamil Nadu has 37 universities, 455 engineering colleges, 449 Polytechnic Colleges and 566 arts and science colleges, 34335 elementary schools, 5167 high schools, 5054 higher secondary schools and 5000 hospitals.

**Transport**

Tamil Nadu has a transportation system that connects all parts of the state. Tamil Nadu is served by an extensive road network, providing links between urban centers, agricultural market-places and rural areas. There are 28 national highways in the state, covering a total distance of 5,036 km (3,129 mi). The state has a total road length of 167,000 km (103,769 mi), of which 60,628 km (37,672 mi) are maintained by Highways Department. This is nearly 2.5 times higher than the density of all-India road network. The major road junctions are Chennai, Trichy, Madurai, Coimbatore, Salem, Karur, Krishnagiri, Dindigul, Kanniayakumari.
Tamil Nadu has a well-developed rail network as part of Southern Railway. Headquartered at Chennai, the Southern Railway network extends over a large area of India's Southern Peninsula, covering the states of Tamil Nadu, Kerala, Pondicherry, a small portion of Karnataka and a small portion of Andhra Pradesh. Tamil Nadu has a total railway track length of 5,952 km (3,698 mi) and there are 532 railway stations in the state. The system connects it with most major cities in India. Main rail junctions in the state include Chennai, Madurai, Coimbatore, Salem, Tiruchirapalli (Trichy) and Erode. Chennai has a well-established suburban railway network and is in the process of developing a metro.

Tamil Nadu has a major international airport, Chennai International Airport, that is connected with 19 countries with more than 169 direct flights every week. This is the third largest airport in India after Mumbai and Delhi and has a passenger growth of 18%. Other international airports present in the state are Coimbatore International Airport, and Tiruchirapalli International Airport. The Madurai Airport, Salem Airport and Tuticorin Airport are domestic airports which connect their respective cities to other parts of the country. Increased industrial activity has given rise to an increase in passenger traffic as well as freight movement which has been growing at over 18 per cent per year.

Tamil Nadu has three major seaports at Chennai, Ennore and Tuticorin, as well as one intermediate port, at Nagapattinam (Seven other minor ports including Cuddalore and Nagapattinam). Chennai Port is an artificial harbour situated on the Coromandel Coast in South-East India and it is the second principal port in the country for handling containers. Ennore Port handles all the coal and ore traffic in Tamil Nadu. The volume of cargo in the ports grew by 13 per cent during 2005.
1.6 Regression Models

Regression Models such as Multiple regression, Poisson regression and Negative binomial regression models are used to study the growth of the administrative city size, because the size of administrative cities dependent its age, area, education, transport factors.

Multiple Regression Model

Multiple regression is a flexible model of data analysis that may be appropriate whenever a quantitative variable is to be examined in relationship to any other factors. Relationships may be nonlinear, independent variables may be quantitative or qualitative, and one can examine the effects of a single variable or multiple variables with or without the effects of other variables taken into account. The multiple regression model can be written as

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + \epsilon$$

where $\beta$ is the intercept, $\beta$ is the parameter associated with $x_1$, $\beta$ is the parameter associated with $x_2$ and so on and $\epsilon$ is the error term or disturbance.

Poisson Regression Model

The standard model for count data is the Poisson regression model, which is a nonlinear regression model. This regression model is derived from the Poisson distribution by allowing the intensity parameter $\mu$ to depend on covariates (regressors). A regression model based on the Poisson distribution follows by conditioning the distribution of $y_i$ on a $k$-dimensional Vector of covariates, $X_i = [x_{i1}, \ldots, x_{ik}]$ and parameters $\beta$, through a continuous function $\mu x_i, \beta$, such that $E[y_i | X_i] = \mu x_i, \beta$
That is, \( y_i \) given \( X_i \) is Poisson-distributed with density

\[
f(y_i | X_i) = \frac{e^{-\mu_i} \mu_i^{y_i}}{y_i!} \quad y_i = 1, 2, \ldots ; \quad i = 1, 2, \ldots, k \quad (1.6.1)
\]

In the log-linear version of the model, the mean parameter is parameterized as \( \mu = \exp(X_i' \beta) \) to ensure \( \mu > 0 \). Equations (1.6.1) and (1.6.1a) jointly define the Poisson regression model.

**Negative binomial regression model**

The negative binomial regression model is the best known and most widely available Poisson-based regression model that allows for overdispersion. Negative binomial regression combines the Poisson distribution of event counts with a gamma distribution of the unexplained variation in the underlying or true mean event counts \( \lambda \). This combination produces the negative binomial distribution, which replaces the Poisson distribution. The formula for the negative binomial is

\[
P(Y_i | y_i) = \frac{\Gamma(y_i + \phi)}{y_i! \Gamma(\phi)} \left( \frac{\phi}{\phi + \lambda} \right)^{\phi} \left( \frac{\lambda}{\phi + \lambda} \right)^{y_i}
\]

where \( \Gamma \) is the gamma function (a continuous version of the factorial function), \( \lambda \) is the mean parameter and \( \phi \) is the reciprocal of the residual variance of underlying mean counts, \( \alpha \) (Wayne Osgood, 2000, p.29).

**1.7 Objective**

**General Objective**

To propose the regression model for describing the administrative city size which is the function of age of the city, area of the city, education and transport facilities.
Specific Objective

To analyse the growth of administrative city size empirically using Multiple regression, Poisson regression, Negative Binomial regression model.


1.8 Date Source

Data about the administrative city populations, age of cities, area of cities, education and transport are obtained from District Census Handbook (DCHB) of Tamil Nadu for the year 1971, 1981, 1991 and 2001.

1.9 Chapterisation

The entire study is divided into six chapters. The first chapter deals with definition and the status of urbanisation, cities and administrative cities. It also consists of objective of the study, source of the data collected, and short introduction to models used in the study. Review of literature deals with the earlier studies regarding city size and count data in a detailed manner explained in the second chapter. The third chapter deals the methodology which includes the methods, models, techniques of the study. The regression models and model testing are given in the fourth chapter. The fifth chapter deals with the analysis on the data collected and interpretation about the administrative city size. The sixth chapter concluding with a summary and highlights the major findings of the study and offers a few suggestions.