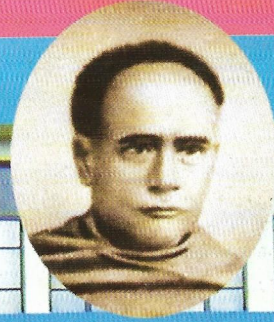


DISTANCE LEARNING MATERIAL



BINAY BADAL DWIVEDI BHAWAN
DIRECTORATE OF DISTANCE EDUCATION



VIDYASAGAR UNIVERSITY

DIRECTORATE OF DISTANCE EDUCATION

MIDNAPORE - 721 102

M. A. / M. Sc. in Geography

PART - I

Paper : III • Module No. : V • Unit : 01 & 05

Paper : III • Module No. : VI • Unit : 02, 03 & 04

**DIRECTORATE OF DISTANCE EDUCATION
VIDYASAGAR UNIVERSITY, MIDNAPORE**



**M.A. / M. Sc. in
GEOGRAPHY**

PART - I

PAPER - III

MODULE - V ★ UNIT - 01 & 05

MODULE - VI ★ UNIT - 02, 03 & 04

M.A./ M. Sc. PART – I
Paper – III

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M.A./ M. Sc. PART – I
Paper - III : Module - V
Unit – 01

Module Structure

- 5.1.0 Introduction
- 5.1.1 Objectives
- 5.1.2 Definition of settlement
- 5.1.3 Evolution and growth of human settlement
- 5.1.4 Settlement Hierarchy
- 5.1.5 Christaller's Central Place Theory
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M.A./M.Sc. PART – I
Paper - III : Module – V
Unit – 01

■ **5.1.0 Introduction:**

Among the basic needs of human beings, shelter ranks high on this list. All over the world not only in the coldest regions but also in the warmest regions, in the rainiest and also in the deserts, in the jungles and also in the bare lands the shelter not only used to protect themselves from the vagaries of the nature but to lead a social life also. It is a place of comfort, a place to accumulate belongings and of course to display our values and achievements. Geography as a socio spatial science deals with the earth, the housing of the world's population, cities, villages comes under this subject as a special branch named settlement geography. Settlement study is important because a house reveals much about regions and cultures, the building materials, the social and economic needs and the cultural tradition of the occupants and the controlling natural environmental factors. Settlement geographers are also interested in the spacing of houses all over the world.

■ **5.1.1 Objectives**

Every study has some specific objective. After go through this unit the reader will fulfill the following objectives

- What is the meaning of the term settlement?
- The evolution of human settlement
- The theories of settlement hierarchy
- The theories regarding spatial distribution of settlement.

■ **5.1.2 Definition of settlement:** Settlement is defined as a place inhabited more or less permanently by human population. To a layman settlement refers to the dwelling place of human beings as a village, town or city. According to the oxford dictionary –human settlement is an assemblage of persons settled in a locality. From a geographers perspective settlement can be defined as an area of interaction of a given group of people and includes residential, social and economic activity. The term settlement includes an idea of permanency, habitation and interaction. From this point of view settlement is different from a fair, camp or historical monument.

■ **5.1.3 Evolution and growth of human settlement :** Though the actual reason and time behind the formation of settlement are not known but from the very beginning of the human civilization different types of settlements are come into existence. Type, pattern and building material of

the settlement changes with changing serial stages as well as changing time space continuum. In the Neolithic period, after the domestication of plants and animals, the settlement was established on permanent basis. Before that the human beings were nomads. Cultural anthropologists and historians have given several explanations for the development of human settlement. These causes are –

Socio-cultural factor - As a social animal human have to lead a social life. Women play the role for family welfare as well as to make pots, crafts, baskets, clothes and men to wander farther in search of food. In this way socio-cultural factor was important for the formation of early settlement.

Religious factor - The history about the settlement states that the first settlement probably found near the places to bury the dead and the rituals like memorial services on the anniversary for the dead etc. are also reasonable for the establishment of settlement.

Political and military cause - For the protection of the weaker section of the society and to perform political activities also compelled human to form settlement.

Economic cause - Early settlement formed not only for social interaction but also for economic dependencies among different strata of a society.

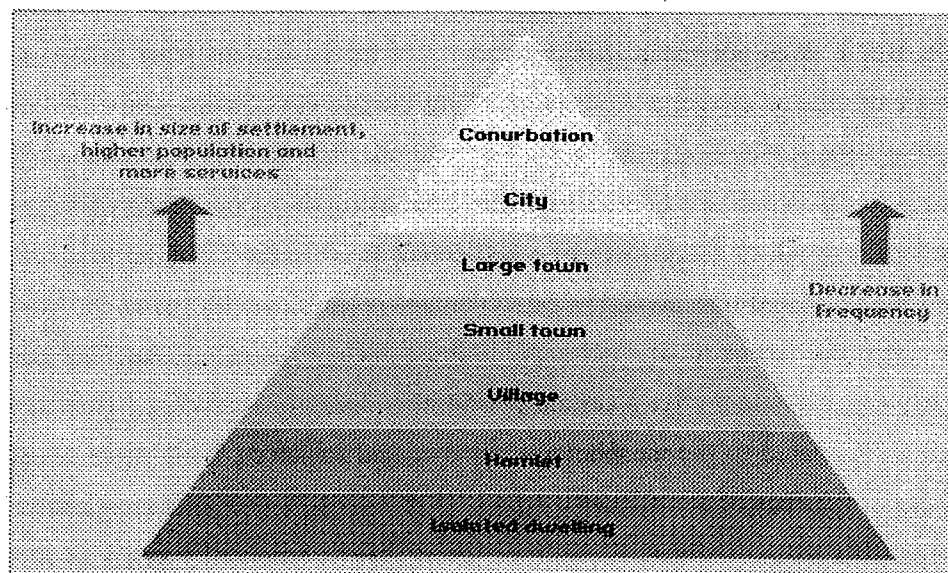
The above mentioned factors are responsible for the formation of settlement. But the process of growth and evolution of settlement is a critical process. After the establishment of primary settlement the process is going on rapidly because it is the only concrete medium for interaction between and among individuals and groups. Soon after administrative centers, trade activities became a part of human life. The simple economic system converted to complex system. But it does not mean that the growth of all settlement must follow a same rule or technique or they change in a same manner. For the growth of some settlement the rate may be slow or in some cases it may be rapid. For example the growth of post industrial societies in Europe were so rapid. The model used for demonstration of evolution of settlement traces a hierarchical growth or the growth of a settlement from isolated hamlet to a metropolis. Such kind of model stated that evolution of settlement resembles with the cyclic concept of Davis where after the maturity of landscape it must face a decaying stage or may rejuvenate. Similarly the settlement after a certain period may decay or rejuvenate. However evolution of settlement is related to the morphology, number and structure, population, occupation pattern and types of services of a settlement, from hamlet stage to metropolis stage the characteristic of settlement became complicated. Another theory of evolution of settlement is about rural to

urban change. This theory stated that urban settlement is an evolutionary form of rural settlement, but cities do not always evolve from village only, other factors are also responsible.

■ 5.1.4 Settlement Hierarchy

The term hierarchy usually denotes to identify an order or gradation of phenomena, each grade being superior to the one below it and subordinate to the one above. Hierarchy is like the steps of a ladder. If we group and classify a number of settlements according to their size, the result is called settlement hierarchy. A settlement hierarchy ranks settlement according to their shape and size. Population size of course is one of the important determinants of settlement hierarchy. Thus a hamlet is a settlement of < 100 population usually has the smallest number of services. For example there might be a general shop or village market etc. But it is mere possibility to have a post office or more specialized service center in a hamlet. In a village, larger than hamlet with more than 100 settlements a couple of grocery, post offices obviously draw more people than hamlet. A town about 2500 inhabitants has a still greater variety of functions and services. Different kinds of specialized activities and diversified people would come for specialized doctors, stores and bank facilities. It has often hinterland of hamlets and villages. Thus the settlement hierarchy goes up to cities, metropolis and conurbation etc. Thus one moves up the hierarchy, the size of settlement increases and the frequency the number of similar settlement decreases.

As you move up the hierarchy the size of the settlement increases and the frequency - the number of similar settlements - decreases. As you can see from the diagram below, there are more cities than conurbations, more towns than cities, and more villages than towns.



The number of **services** that a settlement provides will increase with settlement size.

Small settlements will only provide **low order services** such as a post office, doctors and newsagents.

Large towns, cities and conurbations will provide low and **high order services** such as leisure centers, chain stores and hospitals.

■ 5.1.5 Christaller's Central Place Theory

Central Place Theory (CPT) is an attempt to explain the spatial arrangement, size, and number of settlements. The theory was originally published in 1933 by a German geographer Walter Christaller who studied the settlement patterns in southern Germany. In the flat landscape of southern Germany Christaller noticed that towns of a certain size were roughly equidistant. By examining and defining the functions of the settlement structure and the size of the hinterland he found it possible to model the pattern of settlement locations using geometric shapes.

Assumptions:

Christaller made a number of assumptions such as:

All areas have

- An isotropic (all flat) surface
- An evenly distributed population
- Evenly distributed resources
- Similar purchasing power of all consumers and consumers will patronize nearest market
- Transportation costs equal in all directions and proportional to distance
- no excess profits (Perfect competition) to be earned by any central place.

Explanation of some terms: Central Place, low order, high order, sphere of influence

A Central Place is a settlement which provides one or more services for the population living around it.

Simple basic services (e.g. grocery stores) are said to be of low order while specialized services (e.g. universities) are said to be of high order.

having a high order service implies there are low order services around it, but not vice versa.

Settlements which provide low order services are said to be low order settlements.

Settlements that provide high order services are said to be high order settlements.

the sphere of influence is the area under influence of the Central Place.

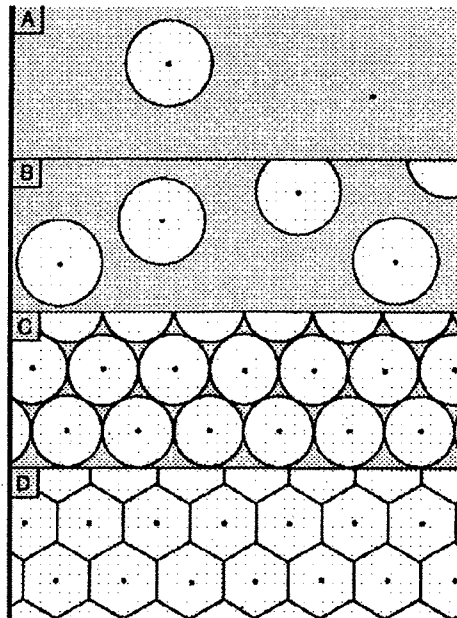
Details of the theory

The theory consists of **two basic concepts**:

- **Threshold-** The minimum population that is required to bring about the provision of certain good or services
- **Range of good or services-** The average maximum distance people will travel to purchase goods and services. From these two concepts the lower and upper limits of goods or services can be found. With the upper and the lower limits, it is possible to see how the central places are arranged in an imaginary area.

Arrangement of the Central places/ settlements:

As transport is equally easy in all direction, each central place will have a circular market area as shown in C in the following diagram:



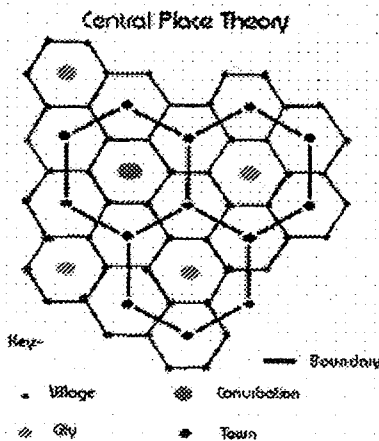
However, circular shape of the market areas results in either un-served areas or over-served areas. To solve this problem, Christaller suggested the hexagonal shape of the markets as shown in D in the above diagram. Within a given area there will be fewer high order cities and towns in relation to the lower order villages and hamlets. For any given order, theoretically the settlements will be equidistance from each other. The higher order settlements will be further apart than the lower order ones.

The principles in the arrangement of the central places:

1. The first property is that all hinterland areas of the central places at the same hierarchical level form a hexagonal covering of the plane with the centers on the initial homogeneous triangular lattice presenting the centers of the hexagons from the Christaller primary covering. The properties of hexagonal coverings of the plane in the Christaller - Losch Central Place theory are based on the following theorem from elementary geometry:
2. The second property is that the size of the hinterland areas increases from the smallest (on the lower tier of Central Place hierarchy) to the largest (on the highest tier of hierarchy) by a constant nesting factor k .
3. The third property is that the center of a hinterland area of a given size is also the center of hinterlands of each smaller size (Christaller, 1933). The nesting factors 3, 4, 7 play the most important role in the Christaller Central Place theory: they express one of the Christaller three principles, namely, marketing ($k = 3$), transportation ($k = 4$) and administrative ($k = 7$) principles.

Christaller noted three different arrangements of central places according to the following principles:

1. The marketing principle ($K=3$ system);
2. The transportation principle ($K=4$ system);
3. The administrative principle ($K=7$ system).

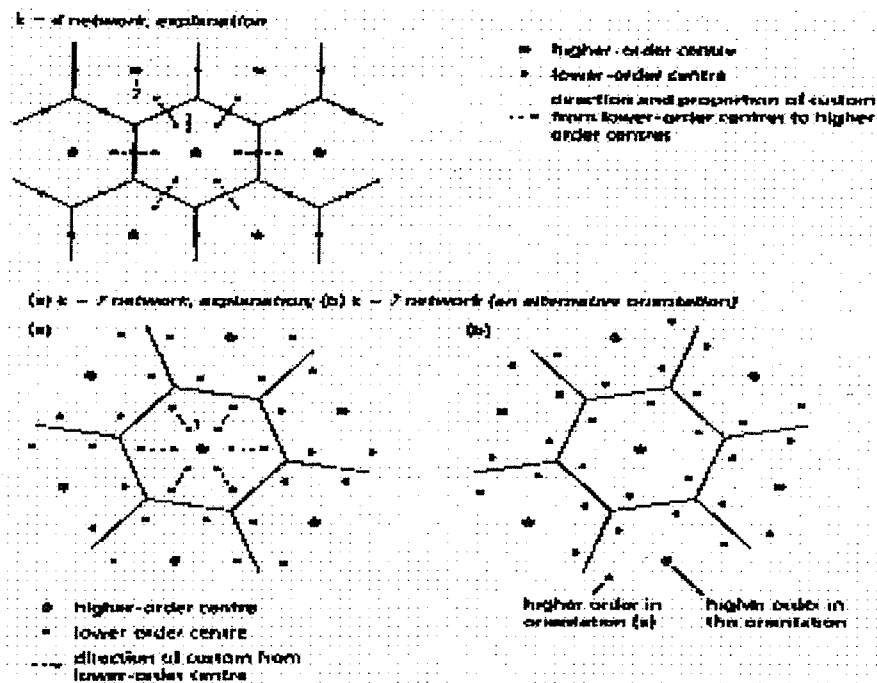


1. **The marketing principle-** The hierarchical diagram shows the principle of marketing of an area. Different orders of a market system are showing different orders of services. The different orders of settlements arranged themselves as a hierarchical or nesting system. Generally lower order hierarchy represents larger number of settlements. Thus a settlement of every order is surrounded by six other settlements of the higher order. Each higher order settlement then receives $1/3$ of the customer of the immediately lower order centers which are located on the boundary of its market area ($6 \times 1/3$) along with its own population.

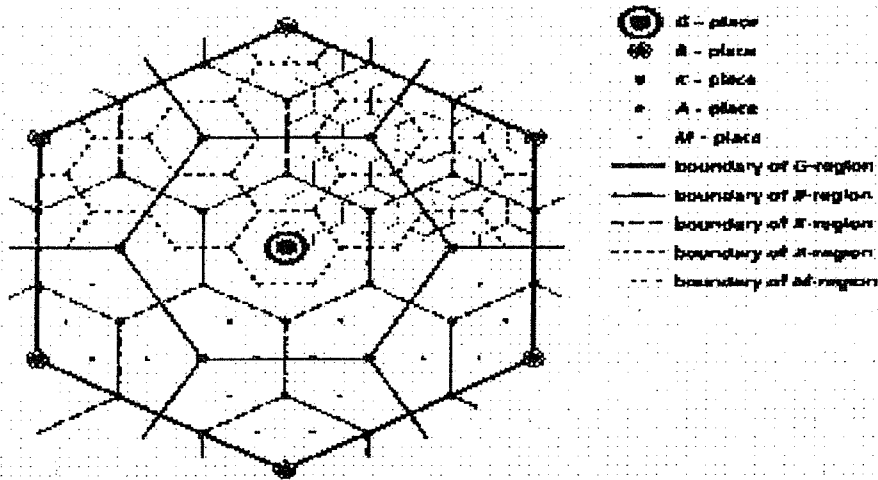
Therefore it serves a total of three central places ($K=6 \times 1/3 + 1 = 3$).

2. **The transportation principle -** Christaller pointed out that the marketing principle is an awkward arrangement in terms of connecting different levels of the hierarchy. As an alternate arrangement,

Christaller suggested that central places could be organized according to what he called the transport principle. The traffic principles states that the distribution of central places is most favorable when as many important places as possible lie on one traffic route between two important towns, the route being established as straightly and as cheap as possible. The more unimportant places may be left aside. According to the transport principle, the central places would thus be lined up on straight traffic routes which fan out from the central point. When Central places are arranged according to the traffic principle, the lower order centers are located at the midpoint of each side of the hexagon rather than at the corner. Thus the transport principle produces a hierarchy organized in a $k=4$ arrangement in which central places are nested according to the rule of four. The following table shows how the $k=4$ principle can be interpreted as- $6 \times 1/2$ plus its own $= 3 + 1 = 4$. Level of hierarchy Equivalent number of central places dominated by higher order center Equivalent number of marker areas dominated by higher order center.

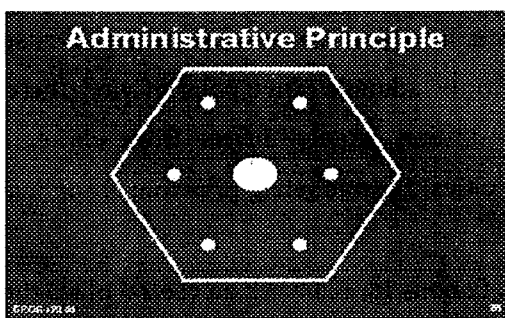


The marketing principle, $k = 3$, the G-system. (Top right sector shown in full detail.)



| Level of hierarchy | Equivalent no. Of central places dominated by highest order centers | Equivalent no. Of market areas dominated by the highest order centers |
|--------------------|---|---|
| Metropolis | 1 | 1 |
| City | 3 | 4 |
| Town | 12 | 16 |
| Village | 48 | 64 |
| Hamlet | 192 | 256 |

3. **The administrative principle-** Christaller's other suggested organizing principle was based upon the realization that from a political or administrative viewpoint centers it was unrealistic for centers to be



'shared'. Any pattern of control which cuts through functional units is potentially problematical. Christaller suggested that an arrangement whereby lower order centers were entirely within the hexagon of the higher order center would obviate such problems. Such a pattern is shown in the following diagram. All the six lower order centers are fully subordinate to the higher order center which,

therefore, dominates the equivalent of seven market areas ($K=6+1=7$) at the next lowest level. The numerical progression in this system would be 1, 7, 49, 343 and so on.

Evaluation of Central-Place Theory

The following passages are some of the evaluation of Christaller's central place theory. Can you summarize the ideas?

The pattern of cities predicted by central place theory may not hold because of the failure to meet initial assumptions.

1. Production costs may vary not only because of economies of scale but also by natural resource endowments (i.e. not a homogeneous plain)
2. Transportation costs are not equal in all directions
3. Rural markets (initially households) are not evenly distributed
4. Non economic factors (culture, politics, and leadership) may be important but not evenly distributed
5. Competitive practices may lead to freight absorption and phantom freight (other forms of imperfect competition)

Criticism: This rarely occurs in practice since factors such as soil fertility and climate vary from a place to another and distort the structure. Also, the domination of a large center which may create a "shadow effect", discouraging the growth of smaller centers. Central place theory is probably the most researched and well-known model of the regional spatial structure of a system of cities. It is a purely deductive theory of a highly simplified and abstract nature developed on the basis of very idealized assumptions. It relates only to the service element of regional structure, failing to explain distortions in the hierarchy caused by the location of primary and manufacturing industry, which tends to group into cluster or agglomerations due to resource location. The theory is essentially static, explaining the existence of a regional spatial structure but failing to explain how that structure has evolved and it might change in the future. It will serve a useful role identifying important concepts such as the interdependence of a city and region, a hierarchy of functions and centers, and market range and threshold populations

Central place system in India: In India the central place theory is partly applicable because of diversified character of Indian settlement system. According to the administrative point of view there are six level of hierarchy. But the Indian system of administration largely differs from Christaller's administrative principle. Though in some cases (South Indian cities) the marketing principle is applicable.

■ 5.1.6 Location Theory of Losch

August Losch (1906-1945) was a German Economist. He is famous for his work on central place theory, published in 1940. He modified and extended Christaller's central place theory.

Losch thought the hexagon shape to represent the market area perfectly, because in reality it is more applicable to bridge the gap. The size of the market area is determined by the tradeoff between the economies of scale and the market cost.

Assumptions

Losche's work is based on some assumptions like-

- An isotropic plane
- Constant supply of goods and services
- People live in isolated evenly spaced farmsteads
- Demand decreases with increase in price. If the price increase as a result of an increase transport costs, demand would decrease with distance from the production centre, would be a cone shaped and market area looks like a circle(fig. no 2).

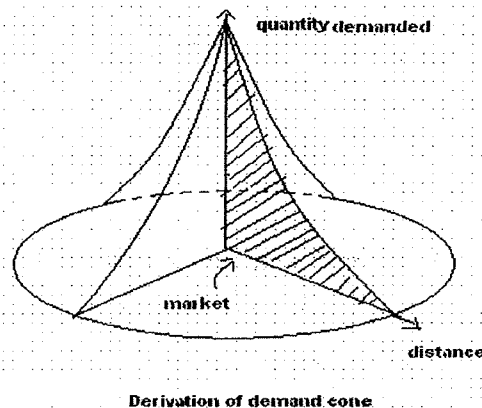
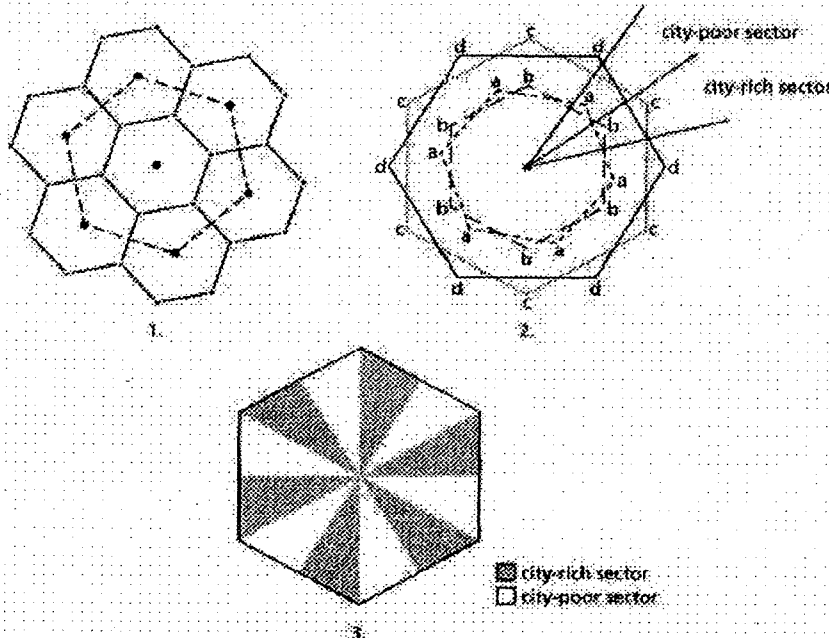


fig.no.2

Details of the theory: Losch verified the ways in which spatial demand cone are derived and verified the optimal hexagonal shapes of complementary regions where the population was uniformly distributed. But the main contribution of Losch was lies in the fact of fixed K hierarchies. The all hexagonal networks of Christaller were extended by Losch towards to superimpose them on a common central place. This central place is the dominating place of trade and service in the whole of the surrounding region. Every net work is rotating centering the common central place. Such kind of rotational arrangement gives rise to a fact that the sum of the minimal distances between settlements is small and that not only consignments, but transport lines are reduced to a minimum.

The diagrams below that the central place system changed with distance away from the common central point of attraction with the rotational networks. Twelve sectors are produced, six with many production sites and six with poor. Losch named them as city rich sector and city poor sector



Thus using the same basic hexagonal unit and the same K concept of Christaller, Losch evolved a markedly different hierarchy which is less rigid in contrary to Christaller's hierarchy. Loschian hierarchy is consisting of nearly continuous sequence of centers rather than distinct hierarchy. Thus there are more K functions than the $K=3, 4$ and 7 . Indeed there are 150 different K values ($K=9, 12, 13, 16, 19, 21$ etc) with differential market areas.

Merits of Loschian concept: The concept of Losch is more applicable in the real world than the Christaller's one. At the same time more number of production centre are able to serve more consumer and also minimizes the transport cost.

■ 5.1.7 Christaller & Losch compared

"The basic difference between Losch and Christaller arise out of the different procedures employed in combining the market networks of the individual goods. While Losch considers first the commodity with the smallest market area and then introduces other commodities with successively larger market areas, Christaller starts, in effect, with the largest market area and then turns to commodities with ever smaller market areas. Thus, Christaller constructs his system from the top to the bottom, while Losch builds his starting from the bottom."

Assumptions which need to be made for both systems in order to avoid inconsistencies:

1. All employees are commuters: Population distribution has to be even. (no residential population centers)
2. All firms must draw their employees evenly from all parts of their market areas to avoid uneven commuting costs
3. No employee is allowed to do any shopping on the way to or from work (otherwise the demand is not evenly distributed)
4. On each trip, a household is allowed to accomplish only the purchase of one commodity
5. If firms deliver their goods and services, then only one household can be served on one trip.
6. Thus there are no EXTERNAL ECONOMIES OR DISECONOMIES permitted, in shopping or in production which could distort the systems of hexagons.
7. No statements about the sizes of central places are possible (except, in the case of Christaller, that each higher order central place is at least as large as all lower order central places)
8. There can be no Thunen-type ring formation because of the need to have an even distribution of demand
9. Balance of payment consideration are neglected
10. Industrial & service production can't consume any space, otherwise factor prices for land would be different in different-size centers.

| | CHRISTALLER | AUGUST LOESCH |
|--|---|---|
| Deviations from optimal spatial layouts for individual commodities | relatively large: Possible sizes: 1, 3, 9, 27... | relatively small: Possible sizes: 1, 3, 4, 7, 9, 12, 13, ... |
| Permitted Specialization | strictly hierarchical: smaller centers do NOT supply larger centers | the more flexible distribution of functions between centers permits smaller centers to provide goods and services to larger centers |

■ 5.1.8 Primate city

- *The primate city is commonly at least twice as large as the next largest city and more than twice as significant.*

Mark Jefferson,

Geographer Mark Jefferson developed the law of the primate city (1939) to explain the phenomenon of huge cities that capture such a large proportion of a country's population as well as its economic activity. The basic concept of primate city lies in the fact that the first city which is several times larger than the second. These primate cities are often, but not always, the capital cities of a country. They dominate the country in influence and are the national focal-point. Their sheer size and activity becomes a strong pull factor, bringing additional residents to the city and causing the primate city to become even larger and more disproportional to smaller cities in the country. This concept is contrast to the theory of rank size rule of G.K. Zift However, not every country has a primate city.

The first city develops as dispersed centers of equal status. Each city usually surrounded with many villages. With the advancement of urbanization process it lead to an increase in the number and size of cities, each with its links to specific villages and other cities. This kind of uniform system may be hampered if any one city gains maximum importance and ultimately it becomes a primate city. All major commercial and financial organizations begin to cluster in one city. The important features of a primate city are-

- The primate city is the largest most dominant city in a region.
- The degree of primacy refers to the dominance of the largest city over the rest of the country.
- Most Less Developed Countries have a high degree of primacy while most More Developed Countries have a low degree of primacy.

Preconditions are helpful towards the formation of a primate city.

- Small countries engaged in the production of a relatively few commodity(Austria, Sweden, Netherlands and Denmark)
- Countries with commercialization superimposed on an agrarian system (Srilanka and Mexico).
- Having an underdeveloped economy
- Having an agriculturally dominant economy (Thailand)

- A rapidly expanding population
- Countries with traditional empire system
- A recent colonial history
- Country with a challenge to modernize its economy in a relatively short period.

Primacy index: the degree or the level of primacy is calculated by the primacy index. Primacy index is the measure of relative importance of the largest town in an area. If the second largest city has less than half the population of the largest city, then the degree or the level of primacy is said to be high. At the same time the importance of the primate city increases in all sectors like economic, social and political. On the other hand if primacy ratio decreases it shows that the difference between two cities is decreasing which means decentralized development.

Primacy index = P_1/P_2 where P_1 = population of the largest town

P_2 = population of the second largest town

Examples of Countries With Primate Cities

Paris (9.6 million) is definitely the focus of France while Marseilles has a population of 1.3 million. Similarly, the United Kingdom has London as its primate city (7 million) while the second largest city, Birmingham, is home to a mere one million people. Mexico City, Mexico (8.6 million) outshines Guadalajara (1.6 million). A huge dichotomy exists between Bangkok (7.5 million) and Thailand's second city, Nanthaburi (481,000).

Examples of Countries that Lack Primate Cities

India's most populous city is Mumbai (formerly Bombay) with 16 million; second is Kolkata (formerly Calcutta) with more than 13 million; and third is less than 13 million. China, Canada, Australia, and Brazil are additional examples of non-primate-city countries. Utilizing the metropolitan area population of urban areas in the United States, we find that the U.S. lacks a true primate city. With the New York City metropolitan area population at approximately 21 million, second ranked Los Angeles at 16 million, and even third ranked Chicago at 9 million, America lacks a primate city.

■ 5.1.9 Rank size rule:

“If all the settlements of a country are ranked according to population size, the sizes of the settlements will be inversely proportional to their rank”

Zipf

The characteristic of a region is determined by the settlement system as a whole but to some extent it is determined by the largest city present in that region. So it is necessary to develop a theory or rule that explain the role of the leading city and the role of other settlement of that region also. It is a fact that there is a negative relation between the number of settlement and their size. Generally the number of large cities are smaller in number than the smaller cities. It is a matter of question that why the number of settlement decreases with increasing size and what is the relationship between the number and size of the settlement.

G.K.Zipf in his book “Human Behaviour ad the principle of least effort” proposed the theory of rank size to answer the asked questions. He postulates that the size and number of settlements in any nation are governed by two sets of forces- i. the forces of diversification and ii. the forces of unification. These are expressed in terms of size and number. The forces of diversification which give rise to numbers of settlement and the forces of unification which are responsible for the emergence of a few large cities.

Rank size rule: With the help of the mathematical form below Zipf explains the relationship between size and number of settlement.

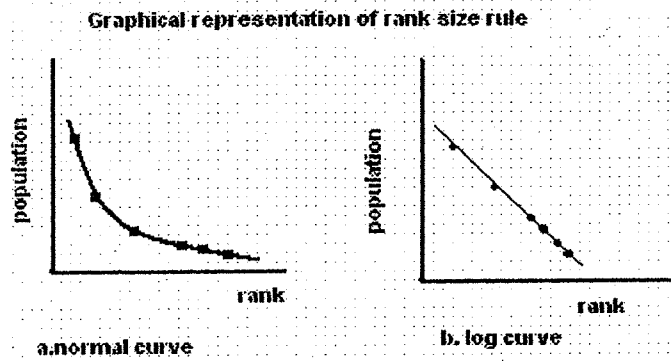
$$Pr = P_1/r^q$$

where Pr = the population of the r^{th} ranking city

P_1 = the population of the first ranking city and

q = is an exponent who can take on any value

q is often assumed as the unity of forces of unification and diversification. Thus the theory describes that if all settlements are ranked according to size with the largest city having the first rank, then the population of a town multiplied by its rank, will equal the population of the largest city. In other words the population of a city of rank R (Pr) can be calculated by dividing the population of the largest city (P_1) by the rank R . thus the second ranking city of a country has one half of the population of the largest city, the third ranking city of the country with one third of the largest and so on down the scale. This relationship if plotted on normal graph it would produce inverse J shape and on logarithmic graph the picture would be straight line.



Since rank size rule is based on observed facts and is not a deductive model, it can be validated by urban population data for different countries.

Examples of Countries With rank size distribution

The countries of both developed and developing in nature are expressing rank size relationship. The developed countries include Italy, Belgium, Finland, U.S.A, Poland, Germany and Switzerland and the developing countries include India, Korea, China, Brazil, El Salvador and the union of South Africa.

Applicability of the theory

Rank size rule is an economic theory of settlement structure rather than a sociological theory. This theory expresses the relation between the settlement size and economic activity. Primary activities are prevalent in smaller settlements where as secondary and tertiary activities characterize larger settlements. Zipf's rank size rule is rather rigid and rarely fits with empirical variation. The main essence of the theory that the population of the second largest city would be half of the population size of the largest city, the third ranking city has one third and so on may not be empirical. On the other hand if this rigid arithmetical relationship is relaxed, the rank size rule becomes a cliché.

Indian scenario: At the national level, the rank size relationship is absent in India. Mumbai, Delhi and Kolkata have a population very close to each other. And Chennai, Bangalore, Ahmedabad and Hyderabad stand at the second level. The reasoning fact behind the absence of rank size rule at the national level is that is no integrated settlement system. At state level it is found in the state of Rajasthan, Uttar Pradesh and Haryana. Other than the said states rank size is absent in Bihar, Kerala, Madhya Pradesh, Punjab, Orissa, Goa, Arunachal Pradesh and Nagaland because of the presence of many settlements of more or less same size in these states.

■ 5.1.10 Self Assessment Questions :

- Q. Define settlement. Give an account on the evolution of settlement
- Q. What do you mean by settlement hierarchy? Briefly discuss about the morphology of settlement.
- Q. Briefly discuss about the evolution and growth of human settlement? In what way it is related to the settlement hierarchy?
- Q. Give an account on the central place theory proposed by Christaller. How far it is applicable in India?
- Q. Write about the principles adopted by christaller in his theory. What are the disadvantages of this theory?
- Q. What is meant by threshold population? What kind of role played by threshold population?
- Q. What do you mean by centrality of a place? Why it is important?
- Q. Briefly discuss about the Loschian economic landscape.
- Q. Differentiate the concepts of Christaller and Losch.
- Q. What are the advantages of Lochian concept of central place? Is central place system found in India?
- Q. Who is the proponent of primate city? Briefly discuss about the primate city concept.
- Q. Give an account on the primate city concept. How far it is practicable in India?
- Q. Give an account on the Zipf's Rank size rule. Why it is not found in India?

Write short note on :

settlement hierarchy, primate city, Rank size rule, marketing principle, transport principle, complementary area, range of good and demand cone.

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PART – I
Paper - III: Module - V
Unit – 05

Module Structure

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PART – I
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■ **5.5.0. Introduction:**

In this chapter, some topics have been discussed which are important in the present context means have some applied significance in the socio-economic environment as well as in physical environment. Present contents specifically cover urban settlement and its different aspects and dimension. Particularly, all features associated with urban environment have come into existence after post-industrial period and now a day their nature and magnitude have been changed remarkably. In the beginning of the human civilization, these kinds of features were not matter of discussion and existence. In true sense the Industrial Revolution, mode of production system, and finally Globalization have given uprising force, resulting the all spheres of life in the urban environment have been altered. Conurbation, Urban agglomeration, Urban Sprawl has come into discussion matter after increasing the population pressure at the urban area. Growing rate of population and vertical and horizontal spatial expansion of urban area is being faster in the developing countries. Not only that, development and expansion but also social change, individualization and pluralism of lifestyle, the terms of social inequality and socio-spatial differentiation has come into existence. The residential segregation and socio-spatial structure of an urban area reflects the social differentiation of society in geographical space. Basically, urban people are divided into various groups in terms of class, gender, ethnicity, race, material condition, sexuality etc.

■ **5.5.1.Objective:**

Main objectives of the topic are as under

- a) To know how conurbation is developed.
- b) To review the importance of conurbation in present context.
- c) To identify why the rate of urbanization is so fast than earlier in developing countries.
- d) To become familiar with social area apart from physical area.
- e) To know why social area in urban centre is more prominent than that of rural area.
- f) To take an account about social differentiation of society in geographical space.
- g) To evaluate the class, gender, race, ethnicity, sexuality as the parameters of social segregation or social stratification.

h) To know how urban sprawl and rural-urban fringe are becoming crucial matter in urban environment.

Key words: *Conurbation, urban field, metropolis, hinterland, social area, cultural capital, economic capital, social stratification, cultural diffusion, urban renewal, urban sprawl, quasi-urban area*

■ 5.5.2. Concept of Conurbation

Conurbation is a specific type of geographical region. It has occupied a dominant position in the patterns of urban development. Conurbation has recently attracted the attention of geographers and hence there is utter lack of literature on this topic. The growth of conurbation has attained a significant form due to the industrial and technological development. Both the physical and population growth have taken place to such an extent that urban centers coalesce with each other like brick and mortar continuity, and thereby forming a conurbation.

The aim of this discussion is to assess the viability of the concept of conurbation in context of some of the metropolitan cities of India. At such centres due to the location of several industries the expansion of cities boundary and the coalesce of one urban centre with the other is a slow but continuous process of urbanization and regional development. How far the evolution of conurbation helped in regional economic development as Fawcett has observed in cities of U.K., is to be examined.

■ 5.5.3. Definition and process of formation

The word 'conurbation' was originated from two words- 'continuous' and 'urban area'. Many geographers have given their ideas in different ways. Some of important definitions are being discussed. In general sense, "a group of towns forming a continuous built up area as a result of urban sprawl". According to R.L.Dwivedi, the term conurbation means continuous urban developed over a considerable area. A term coined by Partick Geddes (1854-1932) to describe a built up area created by the coalescence of several once separate urban settlements, initially through RIBBON DEVELOPMENT along the main inter-urban routes. Conurbation exhibits the characteristics of neighbouring towns as a city region, agglomerated town, constellation of town, cities of huge population, besides urban agglomeration, urban aggregate of complex, urbanized area, metropolitan area and aggregates of local authority areas. According to C.B Fawcett, "A conurbation is an area occupied by a continuous series of dwellings, factories and other buildings including, docks, urban parks and playing fields and so on which are not

separated from each other by the rural land, although in some times in this country such an area includes exclusion of rural land which is still in agricultural pursuits. The famous geographer R.E.Dickinson has called it urban tract followed by Jean Gottamman, who explained that it is extended city or super Metropolitan Region. According to J.C.Saoyne “conurbation is an area of urban development where a number of separate towns have grown into each and become linked by such factors as common industrial or business interest for a common centre of shopping and education. Sometimes it is known as ‘stadt region’ in Germany, and ‘Standard Metropolitan Area’ in U.S.A. and ‘standard Urban Area’ in India

This type of metropolitan expansion occurring in the industrially developed countries has favoured the extreme cases of urbanization. Conurbation is an asymptotic form of growth of certain sections of the town. Nowadays, these are the nucleus of regional, political, and economic development in India. The term ‘conurbation’ applied to a group of cities that have coalesced and grow together economically while politically remain independent, as in the rural wabs where Dortmund Essen-Duisburg and their suburbs constitute as urbanized cluster of over 5,000,000 persons. Conurbation is also known as an ‘urban nuclei’ which has been more strictly defined as a continuously built-up areas in which there is no apparent gap between several towns which have coalesced. Conurbation considers the ‘brick and mortar continuity’ of the urban centres. In any region when the clusters of urban nuclei in many areas reached toward one another, and numerous cities converged into larger masses in the form of megalopolitan consists of one of more central cities with their contiguous urbanized areas.

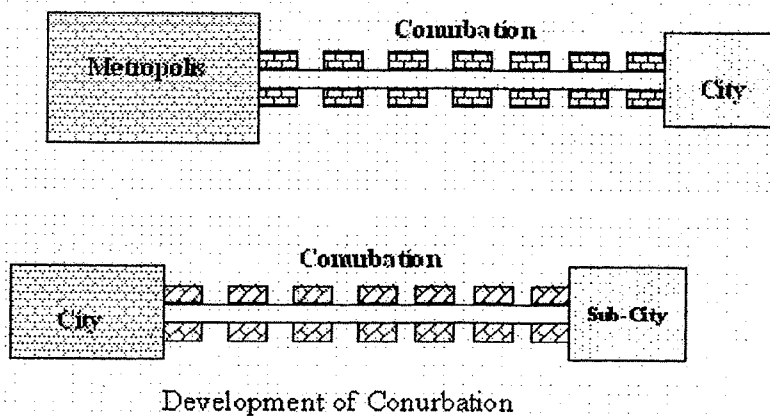


Fig. 1: Development and growth of conurbation

“Conurbation indicates continuous urban development over a Considerable area”- R.L.Dwivedi

According to Geddes the urban built-up area embracing several continuous administrative districts was called conurbation such as Greater London, Paris, Tokyo, New York, Great Mumbai, Calcutta etc. In this respect, C.B. Fawcett considered about conurbations of Britain based on 1921 and 1931 censuses respectively and published a book in 1935. In 1951 British census defined conurbation as "aggregates of local authority areas". In 1971, census in India the term "urban agglomeration" is used in order to demarcate the town group but except few metropolitan centres of India other 'urban agglomerations' are not liable to be called conurbation.

Prosperous and flourishing cities and towns quickly get bigger outer side their formal limits, which not often move far enough to keep pace with the growth of natural community. A recent historical development associated with industrialization has been the rapid massing of population in a few huge urban centres of super cities, which have engulfed the whole neighbouring towns and over-run local government boundaries as in case of Delhi metropolitan expansion in India. This type of urban complex described as 'urban agglomeration' in the United National Demographic Year Book, "Metropolitan Areas" in the United States and as 'Conurbation' in Great Britain.

Processes of the Development of Conurbation

Basically this kinds of development is linked with the old stage of urban development. The urban centres may have a poor contact with the neighbouring towns in the initial stage of its growth and development but in the later stage gets importance because of the development of transport, communication, industry and trade. Conurbation may be formed due to the following reasons:

- i) Conurbation may form due to the expansion of only one metropolitan city as London conurbation.
- ii) Two expanded city may join together with each other and.
- iii) It may form owing to combine of more than two city level centres.

Some geographers divide conurbation into different types on the basis of its origin and nature. These most important types of conurbation are a) Uninuclear conurbation b) Binuclear conurbation and c) Poly nuclear conurbation.

A **uninuclear conurbation**, which has developed around a single city, basically around the great city, such as London. For Binuclear conurbation, which has developed in between two the important cities, example of such type Toronto and Hamilton cities in Canada. The third one is Poly nuclear conurbation,

which has developed in between many cities, such as the West Midlands conurbation of Walsall, west Bromwich, Wednesbury and Wolverhampton.

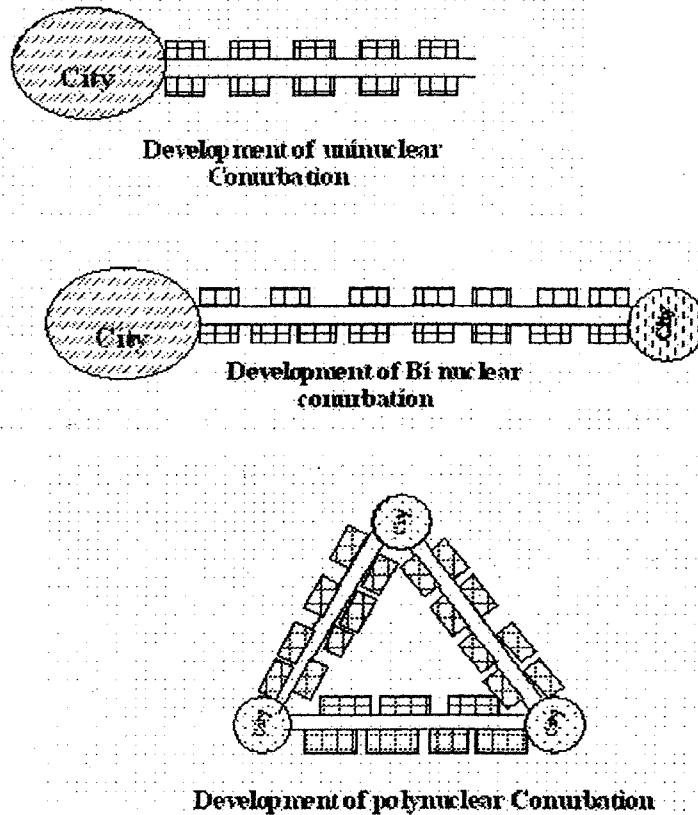


Fig.2: Theoretical aspects of development of Conurbation

■ 5.5.4. Conurbations in Other parts of the Globe

In the north-eastern seaboard of United States of America right from Washington in the south to Boston in the north, there development a well marked conurbational trends which leads to the development of megalopolis over a distance of 960 sq.km. No other continuous chains of metropolitan areas or conurbations, shaping now in other parts of the world, is indeed comparable in size as yet to the American megalopolis. The conurbation of New York is located on either side of the Hudson river in the states of New York, New Jersey and Connecticut and presents a good example from the United State of America. St. Paul and Minneapolis developed into a binuclear conurbation. Although they are politically and geographically separated but there is a wider contact zone, especially in sectors of transport, industry and

urban development. Queanbeyan of Australia although the 11 kilometres long link constitutes arterial lifeline with two-way flow between the two.

In Canada- Waterloo and Kurgber conurbation is also an example of twin cities where one cannot easily recognize that there are two separate civic administrations. The other conurbation is formed by Toronto and Hamilton cities in Canada, which constitute the two nuclei of a vast urbanized region. In Japan the two conurbations are Tokyo-Yakohama and the other one is Osaka and Kobe, which lie in the Tokyo Bay and Osaka Bay respectively. In Isrelo-Tek-aviav-Jaffa conurbaiton is formed by the amalgamation of ten towns. Haifa-acre which comprised eight towns is another well urbanized area in Israel which is fast developing into a conurbation.

In France, Paris is an example of uninuclear conurbation while Lille-Roubaix-Tourloing and St. Etienne formed another example of polynuclear conurbation. In Britain six conurbations are Manchester, Liverpool, Birmingham, Leeds-Bradford, Tyneside and Glasgow.

■ 5.5.5. Characteristics of Conurbation

There are no two such conurbations in the world, which are quite alike either in origination influences, geography and local government organization. Each and every conurbation is an aggregate of local authority area. The other factors of carrying importance are also to be taken into consideration which are as follows:

1. The conurbation is a continuously built up area, but is should not include ribbon development, and should not necessarily exclude a built up area separated by a narrow strip of rural land from the main built up area to which it was strongly attach, for employment or other reasons.
2. The local area also comes in a conurbation which are strongly attached with the centre for work, shopping, higher education, sports and entertainment, etc.
3. High population density is also the main characteristics for forming a conurbation.
4. Conurbation is the provincial focus of densely populated and distinctive industrial region, and has a population much greater than that a surrounding towns. The latter tend to be grouped in a circle as on the rim of a wheel at the hub of which lies the metropolitan centre.

5. Due to location, site and marketing organization each conurbation effected the worldwide distribution of the goods of basic industries of its surrounding area; and the collection and distribution of vital supplies. A metropolis, however is not necessarily an independent but adequately dependent upon transport facilities as is clearly available in case of the surrounding area of Ahmedabad, Kanpur and Calcutta.
6. Each conurbation possesses a great number and variety of miscellaneous industries which owe their origin to the demands of regional market and their localization in the conurbation to its reserves of labour and excellent transport facilities. These are the regional secondary industries, due to the distribution of their products throughout the surrounding area and its business transactions are by no means restricted to its own industrial production.
7. Conurbations are endowed with a varying degree of financial individuality, as they have served in the past as regional centres of banking and insurance.
8. By virtue of cheap and frequent traveling facilities conurbation serves as an outstanding shopping centre for the surrounding hinterland. The maximum extent of the shopping area is roughly coincided with the area which can be easily traveled within two hours from the shopping centre of the conurbations.

In India, population of different cities or towns has increased rapidly among various census years due to some specific factors. Out of which, Migration is the main cause for increasing the population. The table below shows the decadal growth of urban population in principal cities of India covering a period of 70 years from 1931 to 2001.

Table. 1: Growth of population in some Indian cities during 1931-2001

| City | 1931 | 1941 | 1951 | 1961 | 1971 | 1981 | 1991 | 2001 |
|-----------|-------|-------|-------|-------|-------|-------|------|--------|
| Kolkata | 24.85 | 40.54 | 52.53 | 65.75 | 70.31 | 91.60 | 108 | 132.16 |
| Mumbai | 13.03 | 16.95 | 28.39 | 41.52 | 59.70 | 82.00 | 129 | 163.68 |
| Chennai | 6.47 | 7.77 | 14.16 | 17.29 | 31.69 | 42.80 | 54 | 64.24 |
| Delhi | 4.47 | 6.96 | 14.37 | 23.44 | 36.47 | 52.30 | 92 | 127.91 |
| Bangalore | 3.11 | 4.11 | 7.86 | 12.07 | 16.53 | 29.10 | 27 | 56.68 |
| Ahmedabad | 3.14 | 6.07 | 8.28 | 12.06 | 17.41 | 25.70 | 29 | 45.19 |
| Kanpur | 2.44 | 4.87 | 7.08 | 9.71 | 12.75 | 16.90 | 20 | 26.90 |

Source: Census of India 1931-2001

■ 5.5.7. Urban Agglomeration

In the study of human settlements, an **agglomeration** is an extended city or town area comprising the built-up area of a central place (*usually a municipality*) and any suburbs link by continuous Built Up

Area. The words *urbanized area* can also be used as well. In France, INSEE, the french Statistical Institute, translate it by "Unité urbaine" which means continuous urbanized area. However, because of differences in definitions of what does and does not constitute an "agglomeration", as well as variations and limitations in statistical or geographical methodology, it can be problematic to compare different agglomerations around the world. It may not be clear, for instance, whether an area should be considered to be a satellite and part of an agglomeration, or a distinct entity in itself.

The term "agglomeration" can also be linked to "Conurbation", which is a more specific term for largest urban clusters where the built-up zones of influence of distinct cities or towns are connected by continuous built-up development

■ 5.5.8. Extended definition

It's an extended agglomeration or conurbation that also includes peripheral areas not themselves necessarily urban in character but closely bound to the urban area by flows linked to employment or commerce (*see "Aire Urbaine" in France or "agglomération" in Switzerland which take into account at least 40 % of flows from outlying areas to ventral Built Up Area, or agglomeration*). The population may easily travel within an agglomeration by car or mass transit system. In other words, if one lives a thirty minute subway trip away from downtown New York city, and officially lives in a separately-named smaller district or town, that district or town would be considered a part of the New York agglomeration.

■ 5.5.9. Administrative definition

It can also consist of legal administrative divisions where data are easily available because coming from one administrative level (*Metro Area, City, Town, County, ...*) The Greater Tokyo Area provides an example of the difficulties involved because estimates of its population vary according to how it is defined. While the prefectures of Tokyo, Chiba, Kanagawa and Saitama are commonly used to define Greater Tokyo, the Japan Statistics Bureau simply measures the area within 50 kilometers of the Tokyo Metropolitan Government Offices in Shinjuku.

■ 5.5.10. Largest Urban Agglomerations

The term "agglomeration" is more appropriate for determining the populations of large super-cities like Tokyo, New York, and Seoul. These examples are super-cities which have expanded enough to consume other neighborhoods. Although administration may be separate for outlying districts, the population might say they are from the central city.

■ 5.5.11. Nature of Urban agglomeration in India

Comprises a city or town proper and the suburban fringe or thickly settled territory lying outside, but adjacent to, its boundaries. A single large urban agglomeration may comprise several cities or towns and their suburban fringes.

| URBAN AGGLOMERATION/ CITIES HAVING POPULATION OF OVER ONE MILLION | | | | |
|--|---|-------------------------|--------------------------|------------------|
| Census year | Number of urban Agglomeration/cities | Population (Million) | % of population of urban | |
| | | | Total | Urban Population |
| 1901 | 1 | 1.51 | 0.63 | 5.84 |
| 1911 | 2 | 2.79 | 1.11 | 10.76 |
| 1921 | 2 | 3.17 | 1.26 | 11.29 |
| 1931 | 2 | 3.45 | 1.24 | 10.32 |
| 1941 | 2 | 5.37 | 1.68 | 12.16 |
| 1951 | 5 | 12.00 | 3.32 | 19.22 |
| 1961 | 7 | 18.47 | 4.21 | 23.40 |
| 1971 | 9 | 28.48 | 5.20 | 26.10 |
| 1981 | 12 | 43.33 | 6.34 | 27.48 |
| 1991 | 23 | 71.00 | 8.39 | 32.63 |
| 2001 | 35 | 107.00 | | |

*Source: Office of Registrar General of India.

This concept was first adopted in 1971 Census and continued in the subsequent Censuses. This is a kind of place, which is identified as an outgrowth in the following manner. In several areas around a core city or statutory town, fairly large well recognised railway colonies, university campuses, port areas, military areas etc. might have come up and are lying outside the statutory limits of the Corporation, Municipality

or Cantonment, but falling within the revenue limits of the village or villages which is or are contiguous to the town. Though these areas are fully urbanised, the village / villages where the areas are lying cannot be recognised as urban since they have not been statutorily declared as towns and/or they do not satisfy the demographic criteria prescribed to treat it as an urban area. But it is not realistic to treat the portion / portions of the village / villages which are fully urbanised as rural units. Therefore, such areas have been termed as outgrowths (OGs.) and reckoned along with the town. Each such town together with its outgrowth(s) is treated as an integrated urban area and is called as an 'Urban Agglomeration'

An Urban Agglomeration may have the following constituents.

- i) A Town with a continuous outgrowth, the outgrowth being outside the statutory limits but falling within the boundaries of the adjoining village or villages; or
- ii) Two or more adjoining towns with or without their outgrowths,
- iii) A city and one or more adjoining towns with their outgrowths all of which form a continuous urban spread.

■ **5.5.12. Explanatory note on Town/City and Urban Agglomeration as adopted in Census of India, 2001**

In Census of India, 2001 two types of towns were identified: -

- a) **Statutory towns:** All places with a municipality, corporation, Cantonment board or notified town area committee, etc. so declared by a state law.
- b) **Census towns:** Places which satisfy the following criteria: -
 - i) a minimum population of 5,000;
 - ii) at least 75 per cent of male working population engaged in non-agricultural pursuits; and
 - iii) a density of population of at least 400 persons per sq. km.

Urban agglomeration is a continuous urban spread constituting a town and its adjoining urban outgrowths (OGs), or two or more physical contiguous towns together and any adjoining urban outgrowths of such towns. Examples of Outgrowth are railway colonies, university campuses, port area, military camps etc. that may have come up near a statutory town or city but within the revenue limits of a village or villages contiguous to the town or city. For Census of India, 2001, it was decided that the core town or at least one of the constituent towns of an urban agglomeration should necessarily be a statutory town and the total population of all the constituents should not be less than 20,000 (as per 1991 Census).

Urban Agglomerations/Cities having population of more than one million in 2001

| Rank in 2001 | Urban Agglomeration/City (1,000,000 + population) | Civic Status | Population 2001 | | |
|--------------|---|--------------|--------------------|-------------------|-------------------|
| | | | Persons | Males | Females |
| 1 | Greater Mumbai | UA | 16,368,084 | 8,979,172 | 7,388,912 |
| 2 | Kolkata | UA | 13,216,546 | 7,072,114 | 6,144,432 |
| 3 | Delhi | UA | 12,791,458 | 7,021,896 | 5,769,562 |
| 4 | Chennai | UA | 6,424,624 | 3,294,328 | 3,130,296 |
| 5 | Bangalore | UA | 5,686,844 | 2,983,926 | 2,702,918 |
| 6 | Hyderabad | UA | 5,533,640 | 2,854,938 | 2,678,702 |
| 7 | Ahmadabad | UA | 4,519,278 | 2,397,728 | 2,121,550 |
| 8 | Pune | UA | 3,755,525 | 1,980,941 | 1,774,584 |
| 9 | Surat | UA | 2,811,466 | 1,597,093 | 1,214,373 |
| 10 | Kanpur | UA | 2,690,486 | 1,440,140 | 1,250,346 |
| 11 | Jaipur | M.Corp. | 2,324,319 | 1,239,711 | 1,084,608 |
| 12 | Lucknow | UA | 2,266,933 | 1,199,273 | 1,067,660 |
| 13 | Nagpur | UA | 2,122,965 | 1,097,723 | 1,025,242 |
| 14 | Patna | UA | 1,707,429 | 925,857 | 781,572 |
| 15 | Indore | UA | 1,639,044 | 861,758 | 777,286 |
| 16 | Vadodara | UA | 1,492,398 | 783,237 | 709,161 |
| 17 | Bhopal | UA | 1,454,830 | 766,602 | 688,228 |
| 18 | Coimbatore | UA | 1,446,034 | 743,161 | 702,873 |
| 19 | Ludhiana | M.Corp. | 1,395,053 | 789,868 | 605,185 |
| 20 | Kochi | UA | 1,355,406 | 670,462 | 684,944 |
| 21 | Visakhapatnam | UA | 1,329,472 | 674,080 | 655,392 |
| 22 | Agra | UA | 1,321,410 | 708,622 | 612,788 |
| 23 | Varanasi | UA | 1,211,749 | 644,922 | 566,827 |
| 24 | Madurai | UA | 1,194,665 | 604,728 | 589,937 |
| 25 | Meerut | UA | 1,167,399 | 624,904 | 542,495 |
| 26 | Nashik | UA | 1,152,048 | 619,962 | 532,086 |
| 27 | Jabalpur | UA | 1,117,200 | 588,556 | 528,644 |
| 28 | Jamshedpur | UA | 1,101,804 | 580,336 | 521,468 |
| 29 | Asansol | UA | 1,090,171 | 576,813 | 513,358 |
| 30 | Dhanbad | UA | 1,064,357 | 578,602 | 485,755 |
| 31 | Faridabad | M.Corp. | 1,054,981 | 580,548 | 474,433 |
| 32 | Allahabad | UA | 1,049,579 | 581,876 | 467,703 |
| 33 | Amritsar | UA | 1,011,327 | 543,638 | 467,689 |
| 34 | Vijayawada | UA | 1,011,152 | 531,084 | 480,068 |
| 35 | Rajkot | UA | 1,002,160 | 525,797 | 476,363 |
| | TOTAL | | 107,881,836 | 57,664,396 | 50,217,440 |

■ 5.5.13. Social area analysis of urban centres

A theory and technique developed by two American sociologists, Eshref Shevky and Wendell Bell (1955), linking changing urban social structure and residential patterns to economic development and urbanization process (which they termed the increasing scale of society). Before industrialization and urbanization all societies were rural based, and maximum population

According to them, increasing scale involves three interrelated trends:

- Changes in the range and intensity of social relations produced by a greater division of labour, as reflected in the distribution of skills and their rewards with society- Shevky identified this trends with the construct that he termed social rank, though Bell preferred the term economic status.
- An increasing differentiation of functions within society and its constituent households, which generates new lifestyles and house hold forms – a construct Shevky termed urbanization and Bell family status and
- The concentration of people from different cultural backgrounds in cities- producing SEGREGATION for Shevky and ETHNIC STATUS for Bell.

This theory of changing urban society was linked to residential differentiation with urban areas although, as critics pointed out (e.g. Timms, 1971), the link was far from clear. Shevky and Bell's empirical work identified three dimensions to the residential differentiation of Los Angeles and San Francisco which were consistent with the three trends, though their statistical procedures involved selecting variables to represent the three, suggesting that the theory may have been invented inductively to account for their empirical mapping rather than as the source for a study of district socio-economic differences.

Shevky and Bell's technique for analyzing urban residential differentiation use US CENSUS TRACT data. Variables were selected to represent the three constructs- occupation and schooling for social rank; fertility, women at work and households in single family swelling units for urbanization; and population in certain ethnic and immigrant groups for segregation. These were combined to produce three standardized indices, and used to create residential area categories- such as high social rank, high urbanization, and low segregation (i.e. tracts with many well-educated, white-collar workers living in apartments with low fertility levels and many adult women employed in the workforce, and with few members of ethnic groups).

Further work by Bell tested the validity of the constructs in other cities and used the classification as a SAMPLING framework for investigating differences in social behaviour with cities. The technique was largely replaced by the more technically sophisticated inductive procedure of FACTORIAL ECOLOGY, and the absence of a clear theoretical base meant that this initial stimulus to work in URBAN GEOGRAPHY soon became little more than an important historical reference.

■ 5.5.14. Urban Sprawl

Urban sprawl, also known as **suburban sprawl**, is the spreading out of a city and its suburbs over rural land at the fringe of an urban area. Residents of sprawling neighborhoods tend to live in single-family homes and commute by automobile to work. Low population density is an indicator of sprawl. Urban planners emphasize the qualitative aspects of sprawl such as the lack of transportation options and pedestrian friendly neighborhoods. Conservationists tend to focus on the actual amount of land that has been urbanized by sprawl. The extension of the city into the countryside particularly associated with improvements in mass transport. In general sense, Urban sprawl" may be defined as development of low-population-density settlements around high-density cities, either by emigration from the core cities or by influx of new residents from elsewhere.

In recent years, the rapid expansion of metropolitan areas has been termed "urban sprawl"-referring to a complex pattern of land use, transportation, and social and economic development. As cities extend into rural areas, large tracts of land are developed in leapfrog, low-density pattern. Different land uses housing, retail stores, offices, industry, recreational facilities, and public spaces such as parks are kept separate from each other, with the separation enforced by both custom and zoning laws. Extensive roads need to be constructed, for suburban dwellers, most trips, even to buy a newspaper or a quart milk, require driving a car. Newly built suburbs are relatively homogeneous in both human and architectural terms, compared with the diversity found in traditional urban or small town settings. With the expansion of suburbs, capital investment and economic opportunity shift from the center to the periphery. Regional planning and coordination are relatively weak.

The term urban sprawl generally has negative connotations due to the health and environmental issues that sprawl creates. Residents of sprawling neighborhoods tend to emit more pollution per person and suffer more traffic fatalities. Sprawl is controversial, with supporters claiming that consumers prefer

lower density neighborhoods and that sprawl does not necessarily increase traffic. Sprawl is also linked with increased obesity since walking and bicycling are not viable commuting options. Sprawl negatively impacts land and water quantity and quality and may be linked to a decline in social capital.

▲ Characteristics of urban sprawl:

Sprawl is characterized by several land use patterns which generally occur in unity:

▲ A) Single use zoning:

This refers to a situation where commercial, residential and industrial areas are separated from one another. Consequently, large tracts of land are devoted to a single use and are segregated from one another by open space, infrastructure, or other barriers. As a result, the places where people live, work, shop, and recreate are far from one another, usually to the extent that walking is not practical, so all these activities generally require an automobile (though a bicycle may also be feasible).

▲ B) Low-density land use

Sprawl consumes much more land than traditional urban developments because new developments are of low density. The exact definition of "low density" is arguable, but a common example is that of single family homes, as opposed to apartments. Buildings usually have fewer stories and are spaced farther apart, separated by lawns, landscaping, roads or parking lots. Lot sizes are larger, and because more automobiles are used much more land is designated for parking. The impact of low density development in many communities is that developed or "urbanized" land is increasing at a faster rate than the population.

Another kind of low-density development is sometimes called leap-frog development. This term refers to the relationship, or lack thereof, between one subdivision and the next. Such developments are typically separated by large green belts, ie tracts of undeveloped land, resulting in an average density far lower even than the low density described in the previous paragraph. This is a 20th and 21st century phenomenon generated by the current custom of requiring a developer to provide subdivision infrastructure as a condition of development (DeGrove and Turner, 1991). Usually, the developer is required to set aside a certain percentage of the developed land for public use, including roads, parks and schools. In the past, when a local government built all the streets in a given location, the town could expand without interruption and with a coherent circulation system, because it had condemnation power. Private developers generally do not have such power (although they can sometimes find local

governments willing to help), and often choose to develop on the tracts that happen to be for sale at the time they want to build, rather than pay extra or wait for a more appropriate location. The cheaper the land, the higher the profit margin.

▲ C) Car-dependent communities

Areas of urban sprawl are also characterized as being highly dependent on automobiles for transportation, a condition known as automobile dependency. Most activities, such as shopping, commuting to work, concerts, etc. require the use of a car as a result of both the area's isolation from the city and the isolation the area's residential zones have from its industrial and commercial zones. Walking and other methods of transit are not practical; therefore, many of these areas have few or no sidewalks.

▲ D) Housing subdivisions

Housing subdivisions are large tracts of land consisting entirely of newly-built residences. Duany and Plater-Zyberk claim that housing subdivisions "are sometimes called villages, towns, and neighborhoods by their developers, w Subdivisions often incorporate curved roads .Such subdivisions may offer only a few places to enter and exit the development, causing traffic to use high volume collector high is misleading since those terms denote places which are not exclusively residential. streets. All trips, no matter how short, must enter the collector road in a suburban system.

▲ E) Strip malls

Shopping centers are locations consisting of retail space. In the US and Canada, suburban context these vary from strip malls which refer to collections of buildings sharing a common parking lot, usually built on a high-capacity roadway with commercial functions (i.e. a "strip"). Similar developments in the UK are called Retail Parks. Strip malls/retail parks contain a wide variety of retail and non-retail functions that also cater to daily use (e.g. video rental, takeout food, laundry services, hairdresser). Strip malls consisting mostly of big box stores or category killers are sometimes called "power centers" (USA). These developments tend to be low-density; the buildings are single-story and there is ample space for parking and access for delivery vehicles. This character is reflected in the spacious landscaping of the parking lots and walkways and clear signage of the retail establishments. Some strip malls are undergoing a transformation into Lifestyle centers ; entailing investments in common areas and facilities (plazas, cafes) and shifting tenancy from daily goods to recreational shopping. European countries such as France, Belgium and Germany have implemented size restrictions for superstores found in strip malls in an effort to limit sprawl (Davies 1995).

▲ F) Shopping malls

Another prominent form of retail development in areas characterized by "sprawl" is the shopping mall. Unlike the strip mall, this is usually comprised of a single building surrounded by a parking lot which contains multiple shops, usually "anchored" by one or more department stores (Gruen and Smith 1960). The function and size is also distinct from the strip mall. The focus is almost exclusively on recreational shopping rather than daily goods. Shopping malls also tend to serve a wider (regional) public and require higher-order infrastructure such as highway access and can have floorspaces in excess of a million square feet (ca. 100,000 m²). Until recently, the largest shopping mall in the world was the West Edmonton Mall while the largest in the United States is the Mall of America. Now, several larger ones have been built and/or are planned in China. Shopping malls are often detrimental to downtown shopping centers of nearby cities since the shopping malls acts as a surrogate for the city center (Crawford 1992). Some downtowns

have responded to this challenge by building shopping centers of their own.

▲ G) Fast food chains

Fast food chains are common in suburban areas. They are often built early in areas with low property values where the population is about to boom and where large traffic is predicted, and set a precedent for future development. Eric Schlosser, in his book *Fast Food Nation*, argues that fast food chains accelerate suburban sprawl and help set its tone with their expansive parking lots, flashy signs, and plastic architecture (65). Duany Plater Zyberk & Company believe that this only reinforces a destructive pattern of growth in an endless quest to move away from the sprawl that only results in creating more of it.

Example: After years of rapid growth, the Boom Town area was covered with housing developments and small commercial centers, loosely connected by a network of county highways. Residents often referred to this as *urban sprawl*, evidence of the failure of local authorities to deal with the problems of growth.

■ 5.5.15. Urban Sprawl and Public Health

Newly incorporated area with the established urban sector does create varies type of problems which have some inverse effect on human health and environment. Some of these effects relate directly to heavy reliance on automobiles: air pollution, automobile crashes, and pedestrian injuries and fatalities. Other effects relate to land use patterns that typify sprawl: sedentary lifestyles, threats to water quantity and quality, and expansion of the urban heat island effect. Finally, some mental health and social capital effects are mediated by the social dimensions of sprawl. Many of these health effects are individually

recognized as environmental health issues, and certain aspects of sprawl, such as reliance on automobiles, have been analyzed as public health issues. Yet the broad phenomenon of sprawl, a complex of issues related to land use, transportation, urban and regional design, and planning, has been the intellectual property of engineers and planners. Public health professionals have provided neither an intellectual framework nor policy guidance. This is striking departure from the legacy of the 19th and early 20th centuries, when public health and urban design were overlapping and largely indistinguishable concerns.

▲ Direct effects of reliance on automobiles:

● Air Pollution:

Motor vehicles are a leading source of air pollution. Even though automobile and truck engines have become far cleaner in recent decades, the sheer quantity of vehicle miles has driven results in large releases of carbon monoxide, carbon dioxide, particulate matter, nitrogen oxides, and hydrocarbons into the air. Nitrogen oxides and hydrocarbons, in the presence of sunlight, form ozone.

● Motor Vehicle Crashes:

Automobile bow claim more than 40,000 lives each year in the United States, a number that has slowly declined from about 50,000 per year in the 1960s. Rates of automobile fatalities and injuries per driver and per mile driven have fallen thanks to safer cars and roads, seat belt use, laws that discourage drunk deriving, and other measures, but the absolute toll of automobile crashes remains high. Automobile crashes are the leading cause of death among people 1 –24 years old account for 3.4 million nonfatal injuries annually. According to the American College of Emergency Physicians, traffic crashes are predictable and preventable, and therefore are not accidents. In fact the determinants of motor vehicle injuries and fatalities are well recognized.

● Pedestrian Injuries and Fatalities:

Urban sprawl is the extended part of any urban part to show the importance getting by this urban area. Most of the time urban sprawl is connected with its main mother area by good transport system. The most dangerous stretches of road are those built in the style that typifies sprawl: multiple lanes, high speeds, no sidewalks, long distances between intersections or crosswalk and roadways line with large commercial establishments and apartments blocks. Across the country, the pattern seen for driver and passenger fatalities is repeated for pedestrian fatalities. Pedestrian's account for about one in eight automobile-related fatalities.

● Physical Activities:

A considerable body of research establishes that sprawl as measure by low residential density, low employment density, low connectivity, and other indicators is associated with less walking and bicycling and with more automobile travel than denser communities. Low levels of physical activity threaten health both directly and indirectly. A sedentary lifestyle is a well-established risk factor for cardiovascular disease, stroke, and all cause mortality, whereas physical activity prolongs life. There are strong and often compelling social reasons or perceptions why many Americans prefer low-density suburban to urban living, beyond the known or hidden subsidies that promote this population shift. However, to the greatest extent possible, the public health impacts need to be consciously factored into the public costs of sprawl so that provisions are made to minimize these costs to those (especially inner-city residents) who are negatively affected and to offer everyone more balanced choices of places to live and work. The so-called "Smart Growth" movement offers a variety of land use choices that minimize the negative public health impacts.

■ 5.5.16 Rural-Urban Fringe

Rural-urban fringe refers to marginal areas of rural as well as urban. Generally, it is zone of frontier of discontinuity between city and country in which rural and urban land use are intermixed. In other words rural-urban fringe is an area which lies at the rear end of the urban area. The concept of rural-urban fringe was propounded by R.J.Pryor in 1968. It is a zone of transition between the continuously built-up urban and suburban areas of the central city and the rural hinterland. The rural-urban fringe has also been defined as the area of transition between well recognized urban land use and the area devoted to agriculture. The definition is universally applicable. In the opinion of Blizzard and Anderson, the rural-urban fringe is that "area of mixed urban and rural land use between the point where full city services to be available and the point where agricultural land use predominate." In the context of India, the definition of the rural-urban fringe can be as follows :-

"The rural-urban fringe is an area of mixed rural and urban populations and land uses, which begins at the point where agricultural land use appear near the city and extends to the point where villages have distinct urban land uses or where some persons, at least, from the village community commute to the city daily for their essential work or other purposes.

Recently, the study of rural-urban fringe has gained importance because the research scholars or urban geography, sociology, land economics, authorities of town administration and planners have given due

attention about the study of rural-urban fringe. Rural-urban fringe is a quasi-urban area where the experiments of both rural and urban development have been gaining ground especially for the construction. The area displays a changing mix of land use, social and demographic characteristics and is an area in which the large-scale urban amenities are located. In other words, certain types of land use are characteristics of this zone. For instance, garden centres, farmhouses, horse-riding stables, golf courses, sewage works, airports, vegetable and flower fields. The rural-urban fringe is neither urban nor rural in true sense.

● Some specific definition

Rural-urban fringe has mixed characteristics of both rural and urban. Some specific definition are as under

1. *H. Carter*-Rural-urban fringe is an area with distinctive characteristics which is only partly assimilated into the urban complex, which is still partly rural.
2. *R.L. Singh*- where the urban influences are essential mingled with rural forces often without striking a proper adjustment as in the case of unplanned growth designates the nature of the rural urban fringe.
3. *R.E. Dickinson*- The fringe is the extension of housing estates of buildings along the main arterial roads, and by the location of new factories, golf courses, water-works, cemeteries..... and the like.
4. *G.S. Wehrwein*- the rural-urban fringe is an area of transition between well-recognized urban land use and the area devoted to agriculture.

● *Delimitation of the Rural-urban fringe*

In the light of the definition of the rural urban fringe given above, it is possible to study and evaluate the problem of the actual determination of the inner and outer boundaries of the fringe zone around Indian cities. Ideally, the delimitation of the fringe zone ought to be based on a field survey of all the villages within a radius of 10-20 km from a city. This area would include as many as 100-200 villages. It is also worth nothing that most, if not all, villages in the fringe zone are connected to the city by road and are easily accessible by bicycle. Furthermore, most fringe villages are also connected by the city bus service system. In view of all this, it is most surprising that detailed field surveys of fringe villages have not so far been attempted by geographers in India. It must, however, be important that for a proper demarcation of the inner and outer boundaries of the rural under fringe, a field survey of all the villages is a necessity. A sample survey of the villages is not adequate.

The demarcation of the rural-urban fringe has been attempted for a number of important cities in our nation. Among these, the studies on major cities are notable. None of these studies, however, is based on

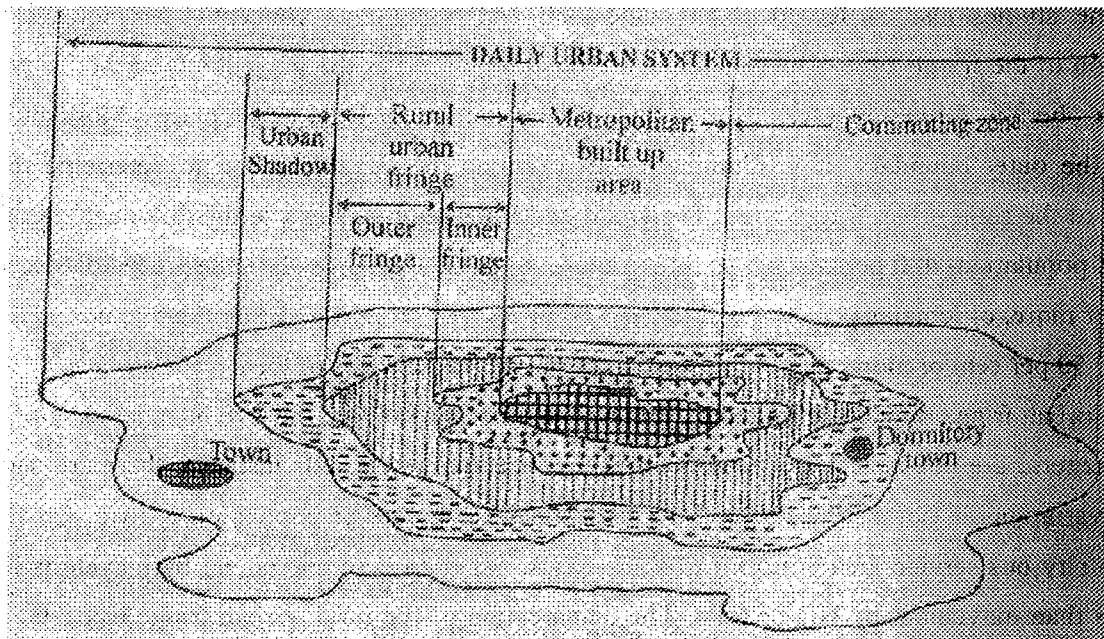
actual field survey of villages in the fringe zone. Instead, without exception, they all depend on secondary data on revenue villages, especially from the Census of India, for the delimitation of the rural urban fringe. The studies also suffer from an inadequate and ambiguous conceptual framework for the delimitation of the fringe zone. The city limits are invariably used as the inner limits of the fringe zones, and the city here is defined in a way as to include all the contiguous legal urban places. More attention is given to the outer boundary, it is illuminating to examine the variables used to determine the outer boundary of the rural urban fringe zone. The Delhi and Bangalore studies use the following variables: a) density of population- 400 persons per sq. km or more; b) population growth in the preceding decade – 40 per cent or more; c) females per thousand males-800 or less; d) proportion of workers in non-agricultural activities- 50 per cent or more; and e) the outer limit of city bus services of local train services.

The rural-urban fringe may be delimited by joining the outer limits of all the five boundaries noted above. All five criteria are not in fact satisfactory from a conceptual angle. For instance, there are significant regional variations in population density, the sex ratio and the rate of population growth. On the other hand, the city bus service area is useful in some cases, but even here movement by bicycle is far more important than movement by bus or train. The demarcation of the rural –urban fringe using the Census data can give us only approximate results which certainly need to be supplemented by actual field studies.

The use of indirect methods based on secondary data for the delimitation of the fringe zone have shown that the fringe zone extends from a minimum of 8 to an maximum of 16 km around Delhi. In Bangalore the outer limits of the fringe extend up to a distance of 20 km from the centre of the city. Another alternative to the method described above is the use of the limits of the standard urban areas as the outer boundary of the rural-urban fringe. In this perspective, Nangia has selected the some determinants to delimit this zone: a) density of population b) population growth relative change in population density

c) index of interaction d) relative change in population density e) females per one thousand males f) Workers engaged in non-agricultural activities to total workers. Besides these major determinants, many other criteria have been employed in this study, such as spatial determinants, nearest neighbours distance, settlement along selected routes and linkage, and functional determinants: telephone exchange centers, postal delivery zones, frequency of bus services, shuttle services, milk chilling centers and railway marshalling yards. These methods of delimitation were employed to find a median boundary for the rural-urban fringe. Taking the nearest point of this boundary girdle to the city and the farthest point away from the city, two lines were drawn which form the inner and outer boundaries of the rural urban fringe. Towards the city this zone merges into the city and towards outer limits, it grades into the peripheral rural areas.

The structure and types of the rural-urban fringe



Structure of Rural-Urban Fringe

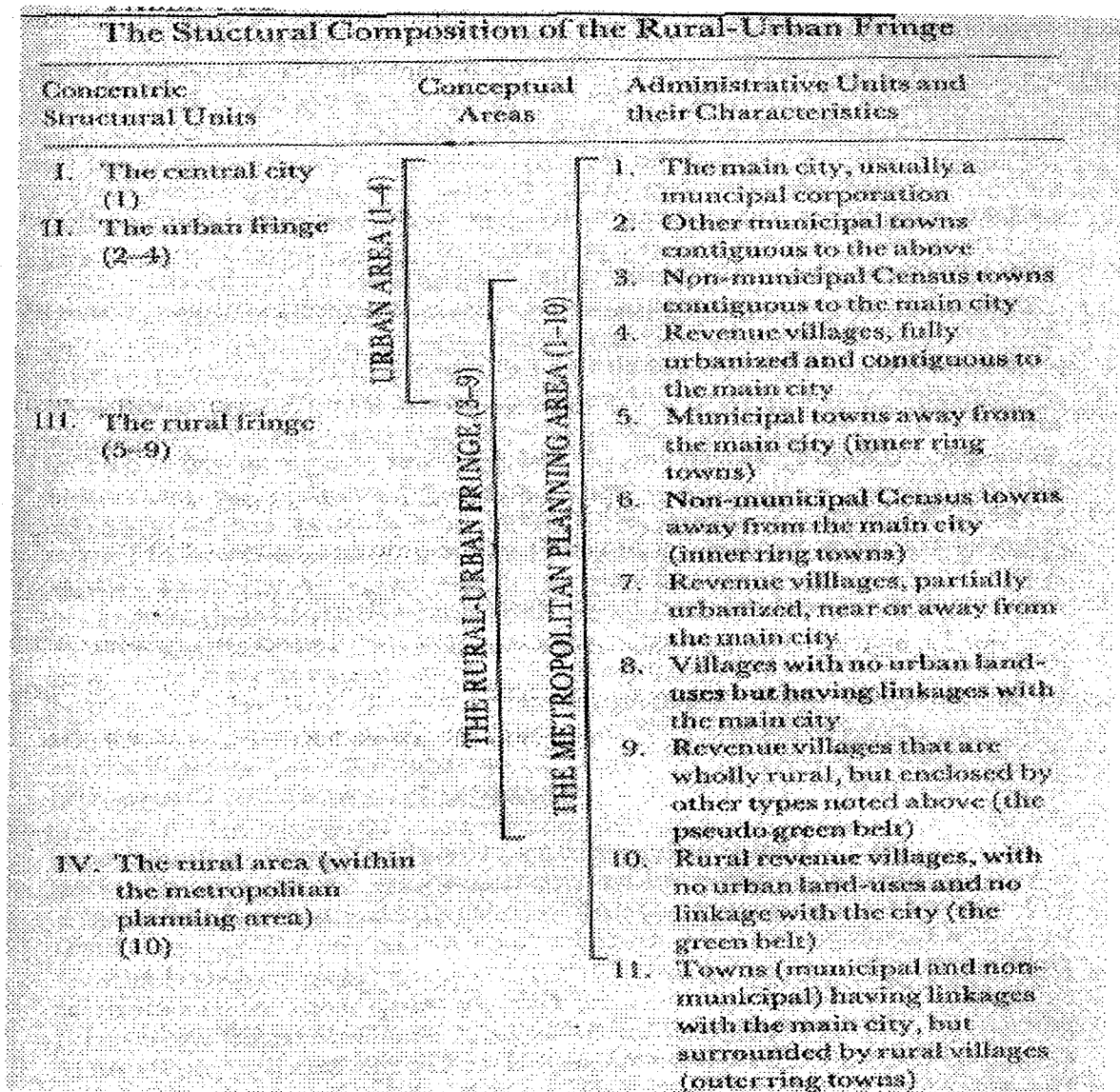
The rural urban fringe lies between the continuous built-up areas of a city and the urban shadow and ecologically it can be viewed as an area of invasion in which population density is increasing rapidly and land values are gradually increasing. The fringe consists of an inner fringe; sometime it is called the urban fringe or primary urban fringe, which is characterized by land in an advanced stage of transition from rural to urban land use. In this area new construction is taking place, which has been approved of planning permission granted by the authority. It has been called by different names by different authors.

| Author | Term |
|------------------|------------------------------|
| Andrews | Urban Fringe |
| Reinemann | Outlying Adjacent Zone |
| Myres and Beegle | True Fringe |
| M.M.P.Singh | Sub-urban Fringe |
| Whitehard | Inner Fringe Belt |
| R.B.Mandal | Sub-urban Zone / Rurban Zone |

The second area in the fringe is the outer fringe, sometimes called the rural fringe or secondary urban fringe or partial zone. This area is found around the primary urban fringe. Which is an area in which

rural land use continues to dominate the landscape but there is infiltration by those urban land uses which take up too much land to be easily located elsewhere, for example, airports, cremations, sewage works etc.

The city and surrounding areas consist essentially of two types of administrative areas; a) the municipal towns or nagar panchayats, and b) revenue villages or gram panchayats. The municipal towns differ in terms of their distance from the main city. Close to the main city, the small municipal towns in particular tend to lose their identity and are indeed part of the geographical city. In these towns the level of municipal services is nearly as good as in the main city. Away from the main city, the provision of amenities in these towns tends to be unrelated to that in the main city and of very poor quality. The non-municipal areas around the city, namely the revenue villages or gram panchayats, show complex variety. Some are completely urbanized with much, if not all, of the agricultural land converted for present or potential urban residential or industrial use. Others are only partially affected, in yet others land use is entirely rural, the only link with the city being the easily commuters. As a result the rural-urban fringe has a complex structure. The major structural, conceptual and administrative units and their main characteristics are listed below and their spatial distribution for a hypothetical city is shown later.



● **Characteristics**

The main characteristics of the rural-urban fringe are as follows

1. The rural-urban fringe is known for the airport, golf course, horse race course, sewage treatment plants, large-sized godowns, and farmhouses.
2. Agricultural land use in general is intensive and the arable land is devoted to perishable commodities, e.g., vegetable, fruits, flowers and dairy products.
3. Encroachment of residential and industrial estates. This is the area into which the city is physically expanding.

4. The size of holdings and farms is generally small.
5. Social amenities and public utility facilities are inadequate.
6. There is constant change in the land use. The land shifts from agriculture to the secondary and tertiary economic activities.
7. The builders develop residential colonies in the rural-urban fringe.
8. This is generally called as the green belt or green field site.
9. The policy makers usually allocate assign land for colleges, schools, hospitals, cremation grounds and cemetery.
10. The rural-urban fringe attracts mobile middle class residents.
11. People living in the fringe areas usually travel daily to their place of work in the city.
12. The rural-urban fringe is the problem area from the point of view of administration. It suffers from the administrative problems and there is nobody responsible for the management of complex problems. Frequently, the criminals escape the administrative boundaries after committing a crime in the neighbouring administrative area.

● *Evolution of Rural-Urban Fringe of Indian Cities*

During the medieval period, the walled cities in India stood apart from the surrounding rural areas. The limits of the physical city were then clearly defined by the walls, the moats and other protective structures around the city. The gates, few in number, provided the only regulated points of entry to and exit from the city. Inside the walled city lived an urban class of people engaged in no agricultural occupations, and in the villages outside the city, there lived rural people who were primarily engaged in agriculture, animal husbandry, forestry and fishery. The city and countryside were clearly divided by a conspicuous boundary. Even, where walls were absent, the boundary between the traditional Indian city and the rural villages was abrupt the clearly defined.

The origin of the rural-urban fringe is a rather recent phenomenon around Indian cities, though its occurrence around the western cities was observed long ago. It has been asserted that the rural urban fringe was non-existent even around the largest metropolitan cities in India before 1950. During the British period, a number of villages around existing towns and cities were totally relocated or dislocated in order to obtain space for the construction of cantonments. City and town expansion throughout the British period was invariably confined to the development of new cantonments and civil lines. They developed the civil lines and cantonments in the vicinity of the old towns.

After independence period, this phenomenon has been changed and has witness a radical transformation of urban area. In particular, during this period, the one-lakh cities and ten-lakh cities began to grow rapidly. This rapid increase in the size of cities led to urban encroachment in the rural areas, the villages in the periphery of the city, which had hardly any administrative or political clout, were an target for the manipulative tactics of the new urbanites- both rich and poor.

The growth of industries, commerce, administration and institutions of learning, arts, and health generates jobs for the rural population. For those who want to continue the farming, the rapidly growing city provides an expanding market for vegetables, fruits, milk etc. As a result; the rural people change their lifestyle. Therefore, we have the emergence of the semi-urban society transitional phase between the rural and urban societies. The rural-urban fringe is not only an Indian phenomenon; it has also its counterparts in the developed countries of the world. The delineation of the rural-urban fringe has been attempted by many of the urban geographers. The bases for the demarcation of rural-urban fringe adopted, by the Indian geographers are as under:

- i) Density of population.
- ii) Population growth in the preceding decade.
- iii) Females per thousand of males- 800 or less.
- iv) Proportion of workers in agricultural activities –50 per cent or more.
- v) The out limit of the city bus services or local train services.

The rural-urban fringe may be in the form of concentric circle, rectangular or linear. Green belt surrounds the city and forms a part of the rural-urban fringe. There may also be satellite towns in the rural-urban fringe, and in due course of time there may emerge new towns and urban countermagnets.

Problems of Rural-Urban Fringe

The rural-urban fringe is an area of rapid change in landuse and population characteristics. This gives rise to multiplicity of problems. Most of the problems are related to the inherent weaknesses of our present administrative framework and its inability to cope with the rapidly changing landscape of the rural-urban fringe.

1. ***Landuse problems-*** the rural-urban fringe is often used for dumping garbage and sewage of the city, for the relocation of city's slums and location of industries emitting noxious gases and generating chemical effluents. The fringe is a zone of haphazard industrial and residential development. This happens when the rural people attracted by attractive prices sell their land to developers who are primarily concerned with profits, do not really develop the lands before they are sold, and the people who buy land from them have to wait for decades to obtain basic urban amenities.

In addition, the fringe areas suffer from concentration of land ownership, speculation on land and rapidly rising land values.

2. Urban amenities and services- the fringe dwellers do suffer various type of problem because most of the services are found in the city proper. Primary urban facilities, such as water supply, sewerage, etc are generally confined within the municipal limits. Outside the municipality, the small towns and revenue villages do not get proper facility. The inhabitants in the fringe areas manage to live without most of the services as they can obtain water from hand pumps, tube wells or ordinary wells and septic tanks can be used as an alternative to sewage system. People in this area generally are able to adjust themselves to the poor quality of local educational, medical, postal and transport facility.

3. Administrative Problems-the rural-urban fringe is a problems area for administration. After independence, the cities started expanding very rapidly towards rural area. But the administrative system has remained unchanged. So the fringe area generally gets some facility like urban areas but is governed by gram panchayat. For all these reasons the rural-urban fringe suffers may administrative problems and there is no responsible authority for the management of complex problems.

4. Population related Problems- the fringe zone, in recent times, has been used for the relocation of slums, which are uprooted from the city. This attitude is basically unfair. While the fringe may have to be developed for the physical expansion of the city, this expansion ought to be will-planned, and the fringe area must be mad as an attractive area.

■ 5.5.17 Glossary

Agglomeration: The concentration of activities, usually industries, near to each other, for example in a specialized industrial region, such as Hoogly, Mumbai industrial regions.

City: City is defined as a large urban centre functioning as a central place which can provide specialized goods and services. There is no world-wide, or even in general agreement over limiting figures of population size or aeas extent for a city.

City Region: An area that surrounds an urban settlement which functions as the regional centre. This area is tied to the regional centre of higher order functions although oriented to local towns for lower order ones. It is an area considerably larger than the urban settlement area. Also known as complementary region, hinterland, sphere of influence, umland, urban-field and tributary area.

Cultural distance: A gap between the cultures of two different groups such as that between the culture of rural societies and that of f cities.

Cultural evolution: The successive stages of societies, involving the diversification of cultures as they adapt to particular environments and the progression of all cultures from hunting and gathering to industrial societies.

Cultural region: A region characterized by a common culture, in other words, an area that is distinguished from other areas on the basis of ethnicity, beliefs, religion, and customs. That is a uniform region.

Hinterland: The hinterland is the area serving and being served by a settlement. The term was originally applied to ports, and one port may share part of its hinterland with another, but has now been extended to refer to the sphere of influence of settlement. Christaller's central place theory was based on nested, hexagonal hinterland.

Megalopolis: A Greek word applied by Gottman (1964) to the almost continuous extent of urban settlements stretching from Boston to Washington D.C in United States. The term is used for the merger of several million cities.

Ribbon settlement: A built up area along a main road running outwards from the city centres.

Rural-Urban Fringe: the transition zone between the city and its suburbs, and the countryside.

Satellite town: A town designed to house the overspill population of a major city, but located well beyond the limits of that city, and operating as discrete, self-contained entity. Most of the early new towns namely Gurgaon, Noida, Ghaziabad etc. are the satellite towns of Delhi.

Settlement Hierarchy: A division of settlements into ranks, usually according to size of population. In central place theory, large, high-order settlements provide high order goods and services. In theory, the greater the rank of a settlement the more goods and services it provides.

Social Geography: Initially this was defined as the study of the spatial patterns of social, as distinct from political and economic factors. The subject now may be again divided into three categories. The first lies in the spatial expression of capitalism, the city has focal structures as an expression of class structures which are reflected in its morphology. Another aspect stresses the alternative view of human geography which studies the response of economically disadvantaged rather than the successful. A third category reflects welfare geography.

Social well-being: A state of affairs where the basic needs of the population are fulfilled. This is a society where income levels are high enough to cover basic wants, where there is no poverty, where unemployment is insignificant, where there is easy access to social, medical and educational services, and where everyone is treated with dignity and consideration. Many steps have been made to quantify social well-being.

Sprawl: Development of new housing sites are relatively of low density colonized, this is an outmoded concept. The term is increasingly used as a synonym for the unland, catchment area, tributary area or urban field of a city.

■ 5.5.18 Self-Assessment Questions

1. Define conurbation. Bring out the important characteristics of conurbation.
2. What are the major types of conurbation? Explain in detail every type of conurbation.
3. How do you consider a place as an urban area?
4. What are the important constituents of urban agglomeration?
5. What do you mean by "social area"? How does any social area on the earth surface separate from other area?
6. What is meant by social diversity? Describe the salient parameters which segregate people into various classes.
7. "Social stratification is more prominent in urban areas"- Explain with suitable example.
8. Define the concept of urban sprawl.
9. What are important features of urban sprawl? What are the problems associated with urban sprawl?
10. Define rural-urban fringe. Describe the significant characteristics of rural-urban fringe.

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M.A./ M. Sc. PART – I
Paper - III : Module - VI
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Module Structure

- 6.2.0 Introduction
- 6.2.1 Objectives
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Structure and Composition
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■ **6.2.0 Introduction**

The study of all aspects of population composition and population related problems, is vital from the point of view of economic welfare and economic development. It is specially importance because human beings are not only instruments of production but also ends in themselves. It is indispensable to know in quantitative terms the number of people living in a country at a particular time, the rate at which they are growing, the composition or structure, distribution of population and problems concerning population explosion. All items in this unit are connected with the vital matter of population. The importance of these studies is not only confined to the literature but it has also significance in applied aspect or in reality. Spatial and temporal variations in different aspect of population composition and structure may portray a lot of disparities and remarkable social and cultural landscape over the space. Some aspects of population composition, mainly, sex and age-composition and the size of families may have even more striking effects upon housing, educational and medical facilities, motor traffic and many other features of cultural landscape. The shortage of young women and children in the society has great effects upon community life. Simply, there are very few religious groups in a country, where event of communal riots or religious conflicts are very few in number in contrast to country with many number of religious group. In this respect, several uses of the study of population structure and characteristics may be identified: (1) It helps in an elaborate study of any population and thus makes comparisons possible; (2) The data on population structure and characteristics are useful in the preparation of inventories of human resources, so necessary for effective developmental planning; (3) When reliable information on births and deaths is not available from the civil registration system, it may be obtained by utilizing the data on the age sex distribution of the population available from a census; and (4) Data on the distribution of population attributes provide material for the study of the social and economic structure of the population and the changes in this structure, if any.

■ **6.2.1 Objectives**

Since the composition or structure of a population is the product of the process of demographic change (fertility, mortality, migration). So its significance in different sphere of life cannot be ignored. Some important aspects of age composition namely age, sex, life expectancy of a population have significant implication for a country's future economic and social development. Not only composition, another

important topic is population related problems in developing and developed countries. Population related problem makes different types of unwanted setback not only on the economy but also every sectors life of human being. I would like to highlight some definite objectives of this study. These are as follows:

- To discuss the types of population structure and their importance in reality.
- To know the nature of attributes of population composition or structure in different parts of the nation mainly in India.
- To identify the determinants and their role in determining the variation among various attributes of population composition.
- To make out the spatial and temporal variation of attributes of population composition.
- To know, why man is identified as problematic factors in developing countries, in spite of the playing role in creating factors of resources.
- To highlight some population related problems, which are prominent in developed countries despite of developed conditions.

■ **Key words : Sex ratio, dependency ratio, growth rate, economic development, modernization, urbanization.**

■ **6.2.2 Population structure and composition:**

In maximum studies of population, generally we pay no attention to the individuality of human beings and the diversity of communities. We have treated man as a unit. Although the population of the world is so varied physically, socially, economically, and politically. So satisfactory classification is almost impossible. A study of the structure and characteristics of population is an important aspect of the study of population. Mainly population geographers have traditionally been interested in the composition of population or population structure as it varies over space. The composition or structure of a population at a given time may be regarded as the product of the processes of demographic change. The term 'population composition' is unclearly defined but it generally taken those characteristics of population for which quantitative data, mainly census data are available. But problem is there about data, which are variable, and international comparability low. Another difficulty is that of isolating any particular aspect of population, say for example, how can one think about size of families without an examination of age structure, and how can one understand social class without study of occupation and income?

The composition of the population or the population structure includes the following basic personal, social and economic characteristics or attributes of any population: age, sex, race, religion, marital status, the size and composition of families and households, language, literacy, nationality, economic activities, income etc. These are sometimes termed the quantitative aspects, in contrast to qualitative aspects such as physical and psychological characteristics and social and cultural groupings. It is also possible to distinguish between those aspects, which are *physical or innate characteristics* such as age, sex, race, and those which are acquired during life known as *social or acquired characteristics* such as marital status, family status, and occupation.

A population may be distributed into sub-groups, according to each of the abovementioned characteristics. For instance, when sex is considered, the entire population may be classified into two groups: males and females, when religion is considered, the entire population may be divided into different religious groups. The study of population structure and characteristics thus relate to the distribution of one or more of these characteristics or attributes within a population. Several interesting questions may be answered as a result of this type of analysis. For example: what is the proportional distribution of males and females in a given population? How are children, young adults, and elderly persons distributed in a population? What percentage of a population is illiterate?

Such a study also endeavors at finding out and measuring changes if any, in these characteristics over a period of time. For instance, according to the 1971 Indian census, while the literacy rate was 34.45, but this rate had been increased in 1991 and 2001, these rates were 52.21% and 64.84 % respectively. In similar way, the sex ratio of India was 972 females per 1000 males in 1901, but this proportion has been reduced in successive census years. The sex ratio was 934, 926 and 933 for the 1981, 1991 and 2001 census years respectively.

In addition to studying the changes in population characteristics of attributes over a period of time, a study of population structure and its compositions also take into consideration the distribution of these attributes and their comparisons at a point of time. For instance, in India and the United States, around 1970, population distribution according to age indicated that the United States had a lower proportion of persons under the age of 15 (28.50 per cent) than India (42.10 per cent).

It is of course not only to study the structure and characteristics of any population. It is necessary to seek explanations for any changes which may have occurred and visualize the consequences of these changes. If it is observed, for instance, that the population of children below the age of 15 has decreased in a certain population, any persons of population studies would definitely want to investigate the reasons for this change. At the same time, he would ponder over its demographic, social and economic consequences.

Sources of data of population composition and structure:

Population structure and characteristics related information generally is obtained from a national census. The individual questionnaire, canvassed during data collection for the census, is the basic source for a study of population structure and characteristics. When the information is needed in between time of census year, data on age, sex, marital status, labour force status, educational attainment, etc., are collected in demographic surveys from sample population, and provide the basis for the study of population structure and characteristics. The main dependence is, however, on the population census.

■ 6.2.3 Types, spatial and temporal variation, determinants and importance of Population Structure and Composition

■ 6.2.3.1 Age-Structure

Among different types of population composition, age structure, sex composition holds a very important place. An analysis of age and sex composition, in fact, forms an integral part in any study on population. Age and sex are the biological characteristics of population, which are different but other achieved characteristics acquired by the individuals during the lifetime. Mainly social scientists have a special interest in the study of age composition as social relations within a community are affected significantly by the age structure. There are aspects of individual or communal life which is affected by age: economic and social activities, military service, political propensities, social attitude, mobility etc. Age is an important variable in measuring potential school population, potential voting population, potential manpower, future population projections and projections for the requirements of teachers, doctors, technical hands, etc. Age is also an important variable in the studies connecting to mortality, fertility other demographic characteristics, like dependency ratio, etc. It is in this context the studies pertaining to age composition of a population become important for a population who is engaged in regional analysis.

Age is a very important biological characteristic of an individual. The age structure of a population- that is to say, the number of males and females in each age group- is an expression of processes of fertility, mortality and migration as they have operated during the lifetime of the oldest number of the population. It has been said that age structure records the demographic and to some extent the socio-economic history of a population over a period of about a century.

Age composition and its determinants

Age composition or structure is directly influenced by three variables: fertility, mortality and migration. These three variables are interdependent and any change in one of these may influence the other two and it is through these variables that the socio-economic conditions influence the age structure. Apart from these variables, the age structure is also influenced notably by wars, catastrophe, natural calamities, population policies and so on.

Methods of age analysis

For the convenience of discussion, generally, population geographers used three different methods of analyzing age composition. These are of three types, namely, age group, age pyramid and age indices.

Age-Groups

The average age of a cricket eleven is meaningful because the age scatter is usually small, but the average age of a large population with a wide scatter is far less significant as it indicates very little about that scatter. So the age structure of given country or region may be analyzed on the basis of age groups. On the basis of physiological and economic activities, the population is generally classified into three groups. Although this division of age groups had not been entirely accepted all over the world. The three groups, which are variously defined, are as follows:

(a) Infants and adolescents or the young (0-14 or 0-19 years) (b) Adults (15-59, 15-64, 20-59, 20-64 years) and (c) The Aged (60 or over, or 65 or over). Although there are not standardized break points, yet the ages of 15 and 60 years are the most commonly used break points in the developing countries and 15 and 65 years in the developed countries. Examination of age group statistics for different parts of the world shows that the proportion of adult populations the least variable of the three groups. The chief regional differences lie in the proportions of children and old people. On the basis of these variations three types of age structure have been identified: namely, the *West European* type; the *United States* type

and the *Brazilian* type. These three types are different from one another on the basis of proportion of people in young and aged age groups.

(a) Infants and adolescents or the young (0-14 or 0-19 years): All over the world, the young age-group includes the population below 15 years of age but somewhere it may be considered up to 19 years. The proportion of population in this age group in any country is determined by the stage of demographic transition through which it is passing. This proportion is large if the country is passing through the first or the second stage of demographic transition. It starts declining as the country approaches the late stage. There are wide regional variations in the proportion of young population ranging from less than 18 per cent in Europe to nearly 43 per cent in Africa and on an average this percentage in Asia is 36 and for Latin America is about the same as Asia. In India, according to 2001 census, about 33 per cent of the total population in 15 years of age. This group is largely non-reproductive and increasingly non-productive, especially in modern societies, where there has been a marked tendency for the proportion in this age group to diminish.

(b) Adults (15-59, 15-64, 20-59, 20-64 years): This group of adults consists of 15 to 65 years in developed and 15 to 60 in the developing countries. This adult age group is biologically the most reproductive, economically the most productive and demographically the most mobile. This group gives support the bulk of the other two groups. In advanced countries with low fertility and mortality, there has been little increase in the proportion of adults because the growing proportion of old persons is largely compensated by the diminishing proportion of children. From the point of view of proportion, the ratio of this age group to the rest of the population should be high, as in Europe and immigrant countries. The adult age group is sometime divided for further analysis into young adults (e.g. 15-34) and older adults (e.g. 35-64). This first sub-group of young adults is considered economically more active than the second sub-group of older adults.

(c) The Aged (60 or over, or 65 or over): The age group includes the people who have achieved the age of 60 years in developing countries and 65 or above in the developed countries. Such people are called as the senior citizens. Except in some developing countries, this group includes a marked majority of females, who are mostly non-productive and include a high proportion of widows. Old men are usually more productive and may be reproductive. This group is largely an economic burden upon the adult age group as it is to be provided with food, clothing and adequate health care under the social security system.

The social and economic implications of these three age-groups and the geographical variations in their distribution are worthy of serious consideration. The first and third groups are more or less dependent on the second, and so close attention should be given to any measures which may affect the length of active life, especially delays in the commencement of active life due to prolonged education and changes in the age of retirement. The proportion of the adult population does not vary greatly from country to country, but is generally inversely related to the levels of fertility and mortality, except where migration causes distortion. The main regional differences are in the proportions of children and old people, which tend to be in inverse relationship.

Age-Pyramids

A graphic presentation of the percentage distribution of population by sex and age is known as age pyramid. More detailed analysis of age structure is possible by the construction of age pyramids. The vertical axis is graduated in years or groups of years from 0 upwards, and the horizontal axes show either the numbers or percentages of males and females within these groups; in practice, the percentage method is better for comparison of pyramids, but sometimes percentages are calculated of sexes separately and sometimes of the total population, and these result in differing pyramids. Naturally, pyramids are most revealing when the vertical steps are in years, but frequently they are presented in 5-year groups.

In particular, the age pyramid is valuable in demonstrating the sex differential in age structure, although this may be seen more clearly when both sexes are plotted on the same axis in the form of two profiles. An age pyramid is rarely symmetrical because the sex ratio differs from age to age. The word pyramid is only really appropriate for graphs of populations with a high proportion in the younger age groups, but this still applies to the majority of world populations. In advanced communities age pyramids have more varied and more complex forms. Certain basic types of pyramid may be distinguished. First, if a population has unchanging fertility and mortality rates over a long period of time and resulting it is a stationary population, produces a regular tapering pyramid and each step in the pyramid will differ from the one below only by the number of deaths at that age or age group. Second one is a progressive population with an increasing birth rate high mortality, produces a wide based and rapidly tapering pyramid: next one is known as regressive population, with a decline birth rate and low mortality, produces a narrow based pyramid. Many intermediate types may also be noted. The Figure below shows examples of stationary, progressive, regressive and intermediate types of population pyramid. In this respect, Brazil is a perfect example of progressive type; Japan is belonging to the stationary type,

Sweden's nature of pyramid like regressive type, even if the shape of pyramid is subject to change with time.

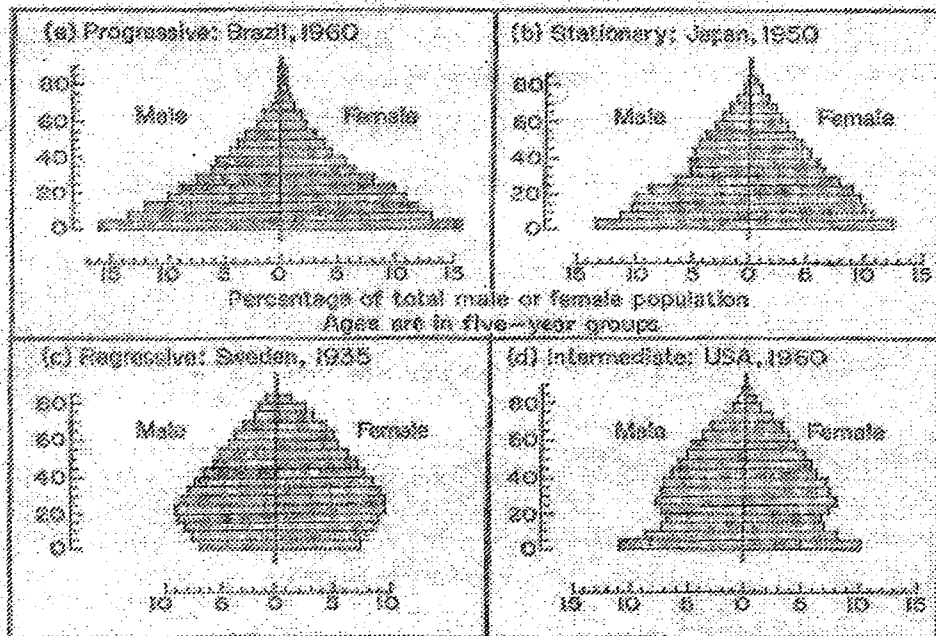


Fig. 7.2. Progressive, stationary, regressive and intermediate types of population pyramid.

Source: Clarke, John I. (1972): Population Geography, Pergamon Press, Oxford, New York

Age pyramids not only reflect long term trends in fertility and mortality, they are also sensitive to the short-term effects of wars, migration, epidemics, baby boom, population policies and other phenomena. On occasions age pyramids can be usefully mapped to show regional differences. Unfortunately, it is not easy to compare a mass of age pyramids, and faced with this difficulty Coulson devised an age structure index, which is the angle of slope of generalized age structure histogram. Like other age indices, it obscures the details of age sex structure but may be mapped and used for further statistical analysis; unlike them, it is not immediately comprehensible.

Age Indices

A clearer picture of the relationships of the three age groups may sometimes be gained by calculating and mapping age indices, each of which is expressed as a percentage. The calculations of such ratios hold significance for the purposes of manpower planning, growth of population analysis, migration analysis, etc. Such ratios are calculated namely, between the aged and the adults, between the aged and the young,

between the young and the adults, between the young and the aged, between the young and the aged plus adults, between the age and the young plus adults and between the adults and the young plus aged. The last ratio between the adults, on the one hand and young plus aged, on the other hand, is known as dependency ratio. This dependency ratio is an index of age-produced drain on a country's manpower potential. Unfortunately, the dependency ratio is high in case of the poor and less developed nations due to large number of young people. Unlike age pyramids the age indices can be cartographically represented on map and this, help the geographers in understanding the regional variation in these ratios.

Age Structure of India's Population

India's population is characterized by a typical age structure prevailing in the developing countries. The table is made to present the distribution of India's population in broad age groups as the 2001 census.

Percentage distribution of population in broad age groups in India, 2001

| Age Groups | Percentage of Population | | |
|------------------|--------------------------|--------|--------|
| | Total | Rural | Urban |
| 0-9 | 23.21 | 24.72 | 19.29 |
| 0-14 | 35.35 | 37.17 | 30.64 |
| 15-59 | 56.93 | 54.84 | 62.36 |
| 60+ | 7.45 | 7.74 | 6.70 |
| Age not stated | 0.27 | 0.26 | 0.29 |
| All ages | 100.00 | 100.00 | 100.00 |
| Dependency ratio | 75.17 | 81.87 | 59.88 |

Source: Office of the Director, Census Operations

■ 6.2.3.2 Sex Composition

This type of population composition is more significant over other. Although the numbers of the two sexes are not widely divergent, their disparity is of interest to geographers because of the contrasting roles of the two sexes in economy and society. The separate information for males and females are important for various types of planning and for the analysis of other demographic characteristics. The balance between the two sexes affects the social and economic relationship within a community. Since the two

sexes play partly contrasting and partly complementary roles in the economy and society, the study of sex composition assumes added significance for population geographers. Population geographer Franklin in 1956, pointed out that sex ratio was in index of economy prevailing in an area and was useful tool for regional analysis. The intense result of the proportion of the two sexes upon the other demographic elements like population growth, marriage rates, occupational structure, has also been well recognized. Trewartha in 1953 rightly stated remarked that the proportion of the two sexes is fundamental to the geographic analysis of an area because it is not only an important feature of the landscape but it also influences the other demographic elements significantly and as such provides an additional means for analysing the regional landscape. The ratio between two sexes is influenced by three main factors: the preponderance of male births, the different mortality of sexes, and migrations.

The numerical expression of sex composition of a population is often expressed in terms of sex ratio. This ratio is calculated differently in different countries. In some countries it is measured in terms of percentage of male or female population, namely Russia. But most of the countries of the world, the sex ratio is generally calculated in terms of number of female per thousand of male. In India, the sex ratio is calculated in same way.

In most populations the overall sex ratio is favourable to females although males outnumber females at younger ages due to slightly more males being born than females but, this disadvantage of females gets neutralized by about the age of 20 due to higher male mortality from birth onward. From here onward females outnumber males. In India, and a few other countries of South Asia, and West Asia, the situation is different due to neglect of females not only in the childhood but also at almost all ages. This makes the study of sex composition an important part of our study.

Type of sex ratio

On the basis of the nature of sex ratio in various times, it may be of three types, these are

- a) **Primary sex ratio**- It denotes the ratio between two sexes at the time of conception.
- b) **Secondary sex ratio**- It implies the ratio of two sexes at the time of birth.
- c) **Tertiary sex ratio**- It refers to the ratio of the two sexes at the time of enumeration.

Primary sex ratio and its determinants: Speed, weight and longevity of sperms, psychological factors, survival rate of sperms, nutritional factors, environmental factors, timing of the coitus etc.

Secondary sex ratio and its determinants: Rate of production of X and Y carrying sperms, performance of X and Y sperms, it makes the person stronger or weaker, age of the parents etc.

Tertiary sex ratio and its determinants: Religious group, nature of countries, stages of development, standard of living, and status granted to women, type of economy, degree of participation in work by females etc.

Sex ratio (female per 1000 males) in India, 1901-2001

Sex ratio (female per 1000 males) of some states in India, 1981-2001

| State | 1981 | 1991 | 2001 |
|----------------|------|------|------|
| Kerala | 1032 | 1036 | 1058 |
| Andhra Pradesh | 975 | 972 | 978 |
| Manipur | 971 | 958 | 978 |
| Tripura | 946 | 945 | 950 |
| Maharashtra | 937 | 934 | 922 |
| West Bengal | 911 | 917 | 934 |

| | |
|------|-----|
| 1901 | 972 |
| 1911 | 964 |
| 1921 | 955 |
| 1931 | 950 |
| 1941 | 945 |
| 1951 | 946 |
| 1961 | 941 |
| 1971 | 930 |
| 1981 | 934 |
| 1991 | 927 |
| 2001 | 933 |

Source: Office of the director, census operation, India

■ 6.2.3.3 Marital Status

The marital status of a population refers to the proportion of single, married, widowed and divorced persons. Both the age structure and the sex ratio directly influence these proportions, but so do social institutions and economic conditions. Therefore the marital status of a population is never constant. Unfortunately, there have been few studies of geographical variations in marital status.

The Single Population

The single population may be divided into three groups: persons below the legal age of marriage, unmarried adults desiring marriage at some time or other, and celibates vowed to a single life. The number in these three groups vary greatly throughout the world, according to the stable influences of legal requirements, religious customs and social traditions as well as to the unstable influence of economic conditions.

Marriage

Marriage is a legal fact, not a biological one like birth and death, and as its legality may be established by civil, religious or other means, marriage statistics of different countries are not easily comparable. There are three forms of marriage:

- a) Monogamy, the marriage of one man to one woman;

- b) Polygyny, the marriage of one man to two or more women;
- c) Polyandry, the marriage of one woman to two more men

Polygyny and polyandry are two separate forms of polygamy, compound marriage; these forms of marriage may have profound influence upon fertility and population growth. Monogamy is the most wide spread form of marriage. Nevertheless, the absolute monogamy enforced in the Western World today is fairly recent, for polygyny was legally accepted by Church and State as late as the middle of the seventeenth century.

The number of marriages varies from year to year according to the number of people who reach marriageable age- a reflection of previous fertility and mortality- as well as to a host of other factors such as the state of the harvest, the level of prices, the period of military service, the rate of income tax and the political atmosphere. The number of marriages in any one-year is also influenced by the number in the preceding year, so it is wise never to consider that number in isolation but to consider the number of marriages in generation. The Indian census categories the marital status of its population into four categories- never married, married, widowed and divorced and separated. Persons married more than once and spouse living are classified as married unless decreed living separated or divorced.

Marriage rates are useful, however, as measures of fluctuation in the frequency of marriage. The two most frequent methods used are:

- (1) $(M/P) \times 1000$ or $10,000$, where M equals the number of marriages during the year, and P the total population at the mid-point the year;
- (2) $(2M/P) \times 1000$ or $10,000$, i.e. the proportion of persons married during the year.

Both are crude marriage rates, because they are not related to the number of marriageable persons. Perhaps surprisingly, it is difficult to detect a major world pattern of age at marriage.

Widowhood

A particular phase of life of man or woman, generally he or she is to pass time alone mainly without spouse till death. Widows are more common than widowers, because men marry later, have a higher mortality and re-marry more often than women. But nature or condition of widow and widower is not same everywhere among the societies.

Divorce

As the social and economic ties of the family may become weakened in modern societies. Affection, children and religion come to be the only remaining bonds, and so relaxation in divorce legislation

inevitably leads to an increase in the number of divorces. The divorce rates may be measured in three ways; (a) as the number of divorces per 1000 or 10,000 inhabitants, (b) as the ratio of the number of divorces to the number of married couples, or (c) as the ratio of the number of divorces to the average annual number of marriages in the preceding decade.

Age at Marriage

One of the important aspects of the study of marital status of any given population is to know the average age of the bridegroom and the bride at their first marriage. This aspect becomes important in human societies because reproduction basically takes place in wedlock. Moreover, in societies where early marriages are prevalent, one finds that, on an average, a woman bears a greater number of children during her reproductive span as compared to those where late marriages are prevalent. It is noteworthy that the marriage age of bride and bridegroom, in this decade, has been increased in comparison with the previous decades. National Population Policy (NPP) 2000, also strictly highlights some norms regarding marriage age, which are supposed to be accepted by the Indian citizen. There are both regional and religious differences in the average age at marriage. Thus, states like Kerala, Assam, Punjab and Tamil Nadu, have shown that the average ages of their bridegrooms and the brides are much above the national average, whereas states like Bihar, Orissa, Madhya Pradesh, Andhra Pradesh, Rajasthan and Uttar Pradesh have ages at marriage much below the national averages for both males and females.

■ 6.2.3.4 Families and Households

Let us know first the meaning of two terms family and household. The family is a social group based on marriage and united by ties of kinship, with a common culture and a common household. It is a small unit at the base of the social structure, but it is the most widespread of social groups. The household, on the other hand, is not necessarily a family, for it merely means a group of people living together. The number and size of families and households greatly influence the character of settlement, and that is of considerable geographical significance.

The Forms and Sizes of Families

The simplest form of family is the nuclear, elementary, primary or conjugal family, which comprises father, mother and children. For statistical purposes, a husband and wife without children also constitute a family, and often widowed and divorced persons as well; all other relatives are excluded. This is the definition generally used by demographers, except in fertility studies when only the children are

considered. In many societies, however, the family includes of much wider group. These extended families may result from a) polygamy b) the common residence of primary families, forming a joint family, or c) the common residence and kinship of primary families, forming a clan. The last two types of extended family are linked either through paternal or maternal lines, and descent may be patrilineal or matrilineal. Moreover, amongst many preliterate people the husband may go to live with the family of his wife, in which case the residence is termed matrilocal; on the other hand, when the wife lives with her husband's family, it is termed patrilocal. These types of residence depend considerably on the mode of life and the occupations of the sexes, and thus on the environment.

In fact, we may distinguish two broad types of family, the maternal and the patriarchal. Maternal families- it is doubtful whether absolute matriarchy ever existed in primitive society-are widespread among primitive peoples, but it may vary in civilized society. In India, maternal families are seen in some part of the hilly region among the tribal caste people. For instance, Khasi tribal people, living over the hilly region of Meghalaya state, the groom comes to the bride house after marriage. Generally that couple will be living permanently at bride's parents house. Sometime some brides also demand dowry from groom's family. This system is just reverse of patriarchal society. Govt. from different states is trying to stop dowry system from the society. On the other hand, the compact functional unit of the patriarchal family has been characteristics of most civilizations. The patriarchal family is an important economic unit found especially among rural communities and existing in many sizes, but in Europe it has foundered with industrialization, urbanization and family limitation, and has been replaced by the modern democratic family, which is smaller, less authoritarian, more romantic and with more freedom for the individual. Here the family is no longer a production unit; its economic functions have changed with the increased education of women and their grater economic independence. Moreover, the state, the church and social organizations are controlling and replacing the family in many ways, and so that social functions of the family are diminishing.

The fall in family size is most evident in commercial and residential towns, and less industrial, mining and agricultural areas. One must not infer, however, that the urban environment always encourages small families, although in industrialized countries the family compositions of urban and rural populations differ markedly, this contrast is not evident in many countries where towns have been little affected by industry.

Classification of Household

The term household involves great difficulties of definition. Most countries distinguish between private households and institutional households. Private household should be considered as persons who jointly occupy the whole or part of a housing unit, usually share the principal meals and have common provisions for basic living needs; a person living alone or occupying a separate room in a part of housing unit, but who does not join with any of other occupants of the housing unit to form part of a multi person household, is considered to constitute a separate household. This definition of a private household is fairly widely accepted and is known as the housekeeping unit concept. The institutional households comprise a group of persons living in schools, hospitals, hotels, military installations and other institutions.

Within households it is possible to identify families, who are persons related by blood, marriage or adoption, although in many cases the family and the household would be the same. For census purposes the primary unit is the family nucleus, which is the family in the narrow sense, namely a married couple with or without children, or a lone parent, married, widowed or divorced, if accompanied by one or more children. Obviously, private households may then be classified into

- a) Non-family households, which may be one person or multi person (related or unrelated);
- b) One family households
- c) Multi-family households, which may be subdivided according to the number of family nuclei they contain and to whether they are related or not.

Families and households may be analyzed in a wide variety of ways, but it is important to remember distinction between them, the former being essentially of biological significance and the latter an economic concept.

■ 6.2.3.5 Religious Composition

Among the various social characteristics of a population, religion is important, in the sense that it influences various types of demographic behaviour. First of all, we should know the concept of religion. Religion has been defined differently by various scholars. Friedrich Scheleirmarcher defined religion as "feeling of absolute dependence". William James called religion as "the enthusiastic temper of expousal". According to Otto, the essence of religious awareness as awe, a unique blend of fear and fascination before the divine. Zelinsky has noted that ' among the multiple definitions of religion we must include: a mental complex...; a highly diversified body of customs...; a formal institution, i.e. church or house of

worship ; and a group of persons sharing some degree of religious identity by virtue of tradition or common observance.”

Religion, like language, is a symbol of group identity and a cultural meeting point. All societies have value systems –common beliefs, understandings, expectations, and controls-that unit their members and set them off from other different cultural groups. Such a value system is termed as a religion when it involves system of formal or informal worship and faith in the sacred and divine. The experts have studied religion from various angles. Population geographers and demographers treat it as a variable when studying marriage, fertility, mortality, migration, etc. studies which emphasize the relationship between religious affiliations and fertility behaviour are numerous. Even the societies that are officially atheistic, however, are strongly influenced by traditional values and customs set by predecessor religions in days of work and rest. Thus, beliefs mould the mode of life of people, their exploitation and management of resources, consumer behaviour and their interaction with natural environment. The food habits, clothing, shelter and higher needs of peoples are also closely influenced by religious beliefs.

But where geographers are concerned, some aspects of religion may be specially discussed. The main aspect is to discuss the interaction between religion and the landscape. As one of the most important characteristics of culture, religion- the recognition of God as an object of worship, love and obedience leaves a strong imprint on the natural environment. Religion may be studied as a geographic process, with a point of origin, pattern of diffusion, and current distribution across the earth’s surface.

Classification of Religion

Religion may be classified in a number of ways. Taking the belief in God as the criterion, religion may be monotheistic and polytheistic. The supporters of monotheism believe in a single deity, while the followers of polytheism believe in many gods. Since, geographers are mainly concerned with the patterns and processes of diffusion and the spatial distribution of religions, so geographers generally classify religions into following:

a) Universalizing Religions (Christianity, Islam and Buddhism), b) Ethnic Religions (Hinduism, Shintoism, Chinese etc.) c) Tribal or Traditional Religions (Animism, Shamanism, etc.).

Distribution of Religion in India

India shows multiplicity of religious faiths. But Hindus have outrun other religion of the land. Hinduism displays interesting regional forms. The early pre-vedic Hindu religion, which inherited

elements of tribal religious faith got modified in the vedic period towards the middle of second millennium B.C. India has also witnessed the successive penetration by other religious people say Islam, Christianity, Judaism etc. But Christians were the earliest one to arrive on the west coast of India in the very first century of Christian era. Arab traders carried the message of Islam to the Indian people living on the western part of the land much before the Muslim conquest of India. Sikhism is the last one to appear on this land. Now we will see the all religions separately

Hindus

According to 2001 census Hindu account for 80.5% of the total population. Hindus always remain the most numerous group everywhere in the country. They distributed in almost all parts of the country, except some peripheral areas and few pockets in the interior of the nation. In few pockets of Orissa, Madhya Pradesh, Sub-Himalayan district of Uttar Pradesh, Himachal Pradesh Hindus account for more than 95% of the total population. In the Eastern Madhya Pradesh, Eastern Gujarat, Southern Karnataka, Tamil Nadu and Coastal Andhra they are well above 90% of the population. But in some coastal district especially in Kerala their percentage fell below 50% due to high concentration of Muslims and Christians. Also in the districts of Ludhiana, Amritsar, Ferozepur, Kapurthala, Bhatinda etc. Hindus are less numerous due to high concentration of Sikh population. They are very minority in the districts of Kashmir Valley.

Muslim

Muslims account for 13.50% of the total population as of 2001. The Major areas of their concentration is Kashmir Valley, parts of upper Ganga plain especially in some district of Uttar Pradesh, a number of districts of West Bengal, the Muslim proportion varies between 20-40%. In the Murshidabad district of West Bengal their proportion is as high as 61%. In the Rohilkhand area of U.P their percentage is very high for example –in Rampur (48%), Moradabad (42%), Bijnor (40%). In the Kashmir Valley district their proportion is well above 90%.

Christians

According to 2001 census Christians constitute around 2.30% of the total Indian population. They are highly concentrated in Kerala, Goa, Tamil Nadu and some North Eastern states. In the Kottayam and Idukki districts of Kerala they account for 46% and 43% of the population respectively. All other districts of Kerala show 15-25% Christian population. In Goa their percentage is as high as 30% of the total state's

population. Several tribal districts of Bihar, Orissa and Madhya Pradesh have significant proportion of Christian population in the country. North-Eastern states like Meghalaya, Manipur, Nagaland and Mizoram have more than 50% Christian population. In Nagaland it is as high as 87% and in Mizoram it is around 86%.

Sikh

According to 2001 census they constitute around 1.90% of the total Indian population. The major concentrations are seen in the states of Punjab and neighbouring districts of Haryana. Sikhs have majority in Amritsar, Kapurthala, Ferozpur, Gurdaspur, Bhatinda, Patiala, Ludhiana, Sangrur districts. In Jalandhar and Ferozpur districts their percentage varies between 44-57%. Hoshiarpur district has 40% Sikh population. Minor pockets of their concentration is in the terai region of U.P., Ganganagar, Alwar and Bharatpur district of Rajasthan. In Delhi they account for 5% of the total population.

Religious communities of India, 2001

| Religious groups | 2001 | |
|------------------|-------------------------|------------|
| | Population (in Million) | % of total |
| Hindus | 827.6 | 80.5 |
| Muslims | 138.2 | 13.5 |
| Christians | 24.1 | 2.3 |
| Sikhs | 19.2 | 1.9 |
| Buddhists | 8.0 | 0.9 |
| Jains | 4.2 | 0.4 |
| Others | 6.6 | 0.6 |

Source: Registrar general of India

Buddhists

According to 2001 census Buddhist account for 0.90% of the Indian population. Around 80% of the Buddhist populations live in Maharashtra alone. These are mainly Neo-Buddhists who embraced this religion after large-scale conversion under the influence of Baba Saheb Ambedkar. They are also found in Ladakh, Himachal Pradesh, Sikkim, Arunachal Pradesh and Tripura areas.

Jains

Jains account for 0.40% of the total Indian population. Nearly 29% of the total Jain populations live in Maharashtra. Rajasthan has around 17% and Gujarat 15% of the total Jain population of the country.

Parsis

They are mostly concentrated in western parts of India mainly in Maharashtra and Gujarat. They are the smallest religious group found in India.

■ 6.2.3.6 Language

Language is one of the most significant elements of population composition. Many important aspects of day-to-day life of human beings are guided by language. Language is a great force of socialization. It is necessary for cultural accumulation and historical transmission. It is essential element in human geography which binds the members in any group through a network of interaction. Language, either in the written or oral form, is the most common type of communication. As the primary means of transmitting culture from one generation to the next, language is a critical cultural element. Language promotes the transmission of ideas and the functioning of political, economic, and social and religious systems. Thus, language is a system conventional spoken or written symbols by means of which human beings, as members of a social group and participants on its culture, communicate. Language may also be defined as an organized system of spoken words by which people communicate with to other with mutual comprehension. Language so defined is a peculiar possession of human beings. It is universal to mankind.

Nature and types of Indian Languages

India is a land of numerous culture and continuity. It is known to all that the residents of the nation are not her original people. Various cultural groups from different nations entered India in different spans of time and established permanent settlement here. Most of them belong to the Asian parts- Central, Eastern and Western. It is natural that differences and variations exist in their languages and dialects (regional form of language) owing to their coming into India from different parts of Asia. After coming into India, cultural integration has taken place among various races and it led to the mixing of their languages and dialects to a great extent. Despite all this, people of different races and classes live in different parts of the country and they speak variable languages and different dialects.

Indian people speak large number of languages, which are classified into broad four families:

- A. Indo-European Family (Arya)
- B. Dravidian Family (Dravida)
- C. Austric Family (Nishada)
- D. Sino-Tibetan Family (Kirata)

This categorization of languages is based upon the number of Indian people speaking each family of languages. Aryan languages are numerically and culturally the most important. According to information, more than 73% of the total population speaks this group of languages. Next comes to the Dravidian languages which are spoken by about 20% of the Indian population. The Austric and the Sino-Tibetan languages are spoken by the small percentage of people.

A. The Aryan Languages

The Aryan languages are most important among the others families languages in India. Out of total, about little less than three fourths people exchange views by these family's languages. Except south and some parts of the India, Aryan languages are widely spoken language of the nation. Taking the variation of spatial distribution and variety, the Aryan languages have been divided into following two main branches:

- i) The Dardic Aryan Languages
- ii) The Indo Aryan Languages

i) The Dardic Aryan Languages: This group encompasses a number of speeches which are confined among very small mountain communities in Kashmir. The Dardic speeches are of three types. (a) shina including Kashmiri, Sinha proper and Kohistani; (b) Khowar of Chatrari or Chitrali and (c) Kafiristan dialects.

ii) The Indo-Aryan Languages: This is the second sub-group of the Aryan languages includes Hindi, Bengali, Punjabi, Rajasthani, Gujarati, Sidhi, Kachchi, Marathi, Oriya, Sanskrit, Assamese and Urdu. Based upon the regional distribution of the people speaking these languages, they are again grouped as under:

- (a) Northern Aryan Languages: This group consists of Nepali, Central Pahari, and Western Pahari Aryan languages.
- (b) North-Western Aryan Languages: This group includes Khanda, Kachchi and Sindhi languages, which are spoken by the people living in the north western part of the country.

- (c) Southern Aryan Languages: Marathi and Konkani are the languages included in the southern group of Aryan languages.
- (d) Eastern Aryan Languages: This group comprises Bengali, Bihari, Oriya and Assamese languages. These languages are mainly confined within language related states.
- (e) East Central Aryan Languages: Avadh, Bundelkhand and Chhattisgarh regions include these languages as the languages of the people living there. Avadh, Bundelkhand and Chhattisgarh constitute this group of Aryan languages.
- (f) Central Aryan Languages: Central part of the nation is the region of these groups of languages. The main languages of the area are Hindi, Punjabi, Rajastani, and Alawari.

Hindi is most important language of Aryan languages. Large percentage of people shares their views by Hindi language. Almost in all states of the country Hindi speaking people are found. Even illiterate person can speak and understand Hindi language. That is why; Hindi got status as a national language.

B. Dravidian Languages

Dravidian languages are older than the Aryan languages. According to an estimate, Dravidians entered India much before the Aryans. They are original inhabitants of the country, who were driven away towards southern part of the country by the Aryans at a later stage. Dravidian languages fall into several groups. Two major groups are as follows:

- (i) The North Dravidian Languages: The important languages of this group are Telugu and a number of other speeches, namely Gondi dialects, Kuruth or Oraon, Maler or Malpahariya, Kui, Parji and so on. Telugu is numerically the most important of all the Dravidian languages and has a very rich literature. This language has also spread out side India.
- (ii) South Dravidian Languages: This group of languages covers Tamil, Kannada and Malayalam. A number of speeches like Tulu, Kota and Toda are also included in this group. Inhabitants of Tamil Nadu are spoken Tamil language. It is also spoken by large number of people in Sri Lanka. Tamil literature goes back to many centuries before Christ. Malayalam is currently the language of Kerala and Lakshadweep. It had its origin in the old Tamil. The Old Tamil speech started showing simplifications as early as 10th century A.D. The speech of Kerala developed independently and became transformed into Malayalam. Sanskrit has influenced Malayalam more than any other language of India. Kannada is the main language of the present Karnataka state. The literary cultivation of this language began from the middle of the first millennium A.D.

C. Austric Languages:

The Austric languages of India belong to the Austro-Asiatic sub family. This category is further sub-divided into Munda and Mon-Khmer.

(i) Munda or Kol Languages: Munda languages are the largest of the Austric group of languages. They include many tribal languages. Those are the major languages in eastern India such as Chota Nagpur, Orissa, Madhya Pradesh and West Bengal and include Santhali, Mundari, Ho, Birhor, Bhuiej, Korwa and Korku. Santhali, Mundari, and Ho languages have a noteworthy literature preserved orally, consisting of songs and mythological romantic stories. Santhal language is known as Alichiki, which is one of the recognised national languages of the Indian Union.

(ii) Mon-Khmer Languages: Mon-Khmer group of Austric languages has two sub-groups- Khasi and Nicobari. Khasi tribal people of Meghalaya speak this language. And Nicobari languages are spoken by the tribal people of the Nicobar Islands.

D. Sino-Tibetan Languages

The Sino-Tibetan languages are spoken by a variety of people. People of these languages are divided into several groups and sub-groups in relation to their region of settlement. The major sub-divisions of Sino-Tibetan languages are as under:

- (i) The Tibet—Himalayan
- (ii) The North- Assam
- (iii) The Assam-Myanmari

(i) The Tibet-Himalayan Languages: This sub-division of the Sino-Tibetan group of languages is further sub-divided as the Himalayan group and the Bhutia group.

(a) The Mimalayan Group: The Himalayan group consists of four languages. They are Chamba, Lahauli, Kanauri and Lepcha. Khuri is the broadly spoken language of the Himalayan group.

(b) The Bhutia Group: Tibetan, Balti, Ladakhi, Sherpa and Sikkim Bhutia are included in the Bhutia group of Sino-Tibetan languages.

(i) North Assam Languages: the North Assam branch of languages of the Sino-Tibetan group is also called the Arunachal branch. It comprises six languages, such as Aka, Dafita, Abor, Miri, Mishnil and Mishing. Largest number of people speaks Miri language

(ii) The Assam Myanmari languages: this group of languages includes Boro or Bodo, Naga, Chohin, Kurchin and Myanmar group. Naga is the largest speaking language of this group.

■ 6.2.4 Population related problems in developed and developing countries

We know that there are three important elements of resource creating factor, namely nature, man and culture. Mainly man among these three is playing the vital role in resource creation, modification, alternate using, and further utilization of resource and so on from the past to the present. But excessive and burgeoning population pressure chiefly in developing countries is generating many severe problems. Because the growing pressure of population on resource base, primarily on agricultural land has been creating many social, economic, cultural, ecological, political and environmental problems. The population problems would differ in space and time. Nature of these problems is different in development and developing countries. In the first section, the problems of developing countries are being discussed.

● Problems of Developing Countries

Most of the world population lives in the developing countries. China and India hold more than 21 per cent and about 17 per cent of the total world population respectively. Taking together over three-fourth of the total world population is living in the developing countries. The technological development in these countries is low which is affecting the agricultural efficiency and coming in the way of industrial development. India, Pakistan, China, Brazil, Myanmar, Bangladesh, Nepal, Indonesia, Malaysia, some other countries including most of the African countries are such of the developing countries. There are many countries which are underdeveloped because they have small and inadequate population to utilize their abundant resources. Such countries include Brazil, Columbia, Peru, Zaire, Saudi Arabia, Kazakhstan, Uzbekistan, Turkmenistan, Kirgyztan and Tajkistan. These countries have remarkable resources which cannot be developed because lack of population. Their problems are often accentuated by adverse climate conditions. Rapid growth of population, unemployment, inadequacy of housing and health, underutilization of resources and slow growth of industries are their main problems. Some of the important population problems of the developing countries have been briefly examined. These problems are as follows

1. Fast Growth of Population: In most of the developing countries, the birth rate is comparatively high, as the death rate has been checked because of the development and extension of medical

facilities. Furthermore, family planning to reduce the population, but in most of these countries does not practice sincerely on a large scale. This situation has resulted in large proportion of young people who are dependent on relatively small number of working adult people. Say for example, in India and Pakistan, about 33 and 42 per cent of their population respectively is below 15 years of age as of 2001. This large proportion of young population puts great pressure on the available medical, educational and other social amenities.

2. Large Number of Unemployment: In most of the developing countries, the huge number of population is largely dependent on agricultural sector. The secondary and tertiary sectors are relatively less developed. There are very limited opportunities for the semi skilled, unskilled and highly educated people. The rural areas are the places wherefrom large number of unskilled workers faces the problem of unemployment. The educated and skilled personnel also have very limited opportunities of employment. Consequently, both the educated and uneducated, skilled and unskilled workers try to emigrate to other countries in search of employment. Those who find it difficult, migrate to big towns where it is often even more difficult to find employment. Moreover, the towns become overcrowded, making living conditions poorer, and resulting into socio-economic and environmental problems.
3. Poor standard of Living and Malnutrition: There is shortage of nourishment, especially that of balanced diet in the developing countries. The standard of living is low and housing conditions are often poor. The standard of hygiene and quality of nutrition are also low, which lead to health problems such as deficiency diseases. The ignorance of people, the inadequacies of medical facilities, and the lack of financial resources come in the way of improving the housing and health conditions.
4. Mismanagement of Agricultural Resources: Generally, most of the developing the underdeveloped countries has agrarian economy. The agriculture is mostly done by traditional methods, obsolete equipments and inadequate financial resources. Owing to the lack of funds and finances, the farmers are unable to apply chemical fertilizers and other inputs in required quantities. Consequently, the production per unit area is low. The fragmentation and small size of holdings and land tenancy systems are also some of the serious barriers in the modernizations of agriculture. In such countries. Land, their ultimate asset, is thus either

underutilized or misutilized. Many of the farmers, being tradition bound, do not accept the innovations and new ideas. As a result, their agricultural techniques remain traditional and production much below than their potential.

5. Slow Growth of Industrial Sector: In most of the underdeveloped and developing countries, the industrial sector is generally not very strong. There is lack of local capital which makes the actual exploitation of the sources or setting of factories. The workforce, though large in number, is generally unskilled and has no background of industrial development. Similarly, although the large population should provide a good market for the finished goods, the majorities of the people are poor and cannot afford to buy the products. The poor industrial base, lack of capital and poverty of people create a vicious circle and the growth of industries is hampered. The pressure on agricultural resources continuously increases.
6. Orthodoxy: The people in the developing countries are tradition bound and less exposed to the outside world. Moreover, they are religious in their attitudes due to the believing in tradition, custom, and values. So they generally do not accept easily new ideas and modern style of life. Being religious, family planning for controlling population is not taken by them massively. Birth control is forbidden by the Catholic Church and heads various institutions. In India, caste restrictions on occupation also help to slow down transformation of society and process of development. For the removal of such attitudes and for the eradication of blind faith and orthodoxy, large-scale literacy and mass education are needed.
7. Problems of Underpopulation: Some of the developing countries are underpopulated. The population of such countries is different from those of the densely populated countries. In the sparsely populated countries, the growth of population, despite high birth rates, is slow. Immigration is an important source of population but it is usually toward towns. At the same time, the towns with their better social amenities attract people from the already sparsely settled countryside. Imbalance between town and countryside is a major problem of underpopulated countries.
 - a) So the areas of isolation and relative isolation, it is difficult to increase settlement in sparsely populated areas because people are generally unwilling to forego the amenities of the town. The

government of the former Soviet Union provided lucrative incentives in the form of heavy amounts for the construction of houses in Siberia but people remained reluctant. In areas of sparse population, it is expensive and uneconomic to provide elaborate communications, health, education and other social amenities.

b) In the sparsely populated areas, a judicious utilization of resources is not possible. Agricultural resources are more difficult to develop because they require more and harder work over a long period of years before they show a good return. The sparsely populated countries also have slow growth of industries. There is generally a shortage of skilled labour as in case of African, Latin American and many of the Southwest, Central and Southeast Asian countries. Where skilled labour is to be brought from other countries, the cost of the production of industrial goods goes up. Besides, the small population does not supply a good market even where the standard of living is high.

c) Many underpopulated countries have unfriendly climate or terrain and topographical conditions. These hostile conditions make settlement difficult or dangerous for immigrants. Such conditions obstruct development. To open up underpopulated areas is both difficult and very expensive. A sound immigration policy, however, can help in the rational utilization of resources of underpopulated regions.

● Population Related Problems in Developed Countries

The developed countries are highly industrialized and urbanized. In these countries, the per capita income is not only high, most of their population is dependent either on secondary or tertiary sector. These countries, despite high degree of development, efficient agriculture and large-scale industrial production, are also confronted with many of the population problems.

1. Long Span of Life: In the developed countries, the birth and death rates are low. Also the proportion of younger people in the population is relatively small and the low death rate and high life expectancy mean that there is an ever-increasing proportion of older people in the population. For example in Germany, Italy, U.K. and Belgium about 18 per cent of their population is over 65 years of age. These retired people largely remain dependent on the working population.
2. Small Workforce: Since standard of education improves, children remain longer at school and join the workforce late. This combined with low birth rate, means that the labour force expands only

slowly while industrial and other employment opportunities continue to multiply. Despite a high degree of mechanization in most industries many countries are short of workers. In Europe for, Germany, France, Netherlands, Switzerland and Former Russia are short of workers. Another problem is that workforce is generally well educated and skilled and there is a serious shortage of unskilled workers. Because the majority of workers are skilled and the workforce is relative small, wages of unskilled workers are very high. For example, a coal miner in U.K. and Germany gets high a salary as that of a university professor. Moreover, the coal miners have to work only three days or 24 hours per week.

3. Rural Population: There are more social amenities like universities, colleges, hospitals, banks and places of recreation in the urban areas. For this reason, the rural youth out-migrate comes to the urban areas from their villages and start their career in towns and cities. The fewer, especially the old people, live in village. The agricultural sector suffers adversely because of the non-availability of workforce. The rural areas get depopulated and consequently, less social amenities are provided in the countryside. The standard of living of the villages suffers a decline.
4. Urbanization: Like town expands, the pressure on transport, water supplies, sewage and refuse disposal grows and creates problems. Smoke and chemical effluents from factories produce air and water pollution. Traffic congestion and noise are other problems. Tension created by urban life lead to a far higher incidence of mental illness, heart troubles, breathing problems and madness in developed countries than that in underdeveloped ones. Urban sprawl and slums expansion in some of the developed countries that is U.S.A., are the other major issues which create many social and environmental problems. The highly productive agricultural land is encroached by urban houses, roads and industries, resulting into a decline in arable land.

Hence, the underdeveloped, developing and developed countries have some problems in common. Most of the developed countries have areas where agriculture or industry could be improved or where the population is too large and dense. Similarly, the developing countries have large towns where the problems are similar to those of urbanized societies everywhere. It is also important to bear in mind the difference between developing countries. Some have a much better resource base or a smaller population, such as Argentina, Brazil, Mexico and Malaysia. They are much more likely to be able to overcome their problems than those countries with weak resource base and a large population with rigid traditional ideas and orthodoxy, e.g., Ethiopia, Sudan, Somalia, Niger, Nigeria, Bangladesh and Pakistan.

■ 6.2.5 Self Assessment Questions

1. How does the element of population structure and composition differ population characteristics?
2. What are the important types of population structure?
3. How do fertility, mortality and migration affect the age composition?
4. What are the important determinants of sex composition?
5. "Different types of age pyramid show the stages of development of a country" – Explain it with suitable example.
6. Give an account of the religious composition of India's population.
7. Define language? Classify India into different linguistic regions.
8. What are the important methods of age analysis?
9. Mention the major problems associated with population explosion in developing countries.
10. Describe the problems connected with population growth in developed countries.
11. Write a short note on marital status.
12. What is the importance of sex ratio in population composition?
13. What do you understand by dependency ratio?
14. What is meant by urbanization?
15. "Percentage of urban population is gradually increasing in developing countries" - is it true? Explain it with example.
16. Write a note on the rural-urban population composition of India.

■ 6.2.6 Key Definitions:

Age composition: The percentage of population in each age category. The age structure of a population is the cumulative result of the past trends in mortality, fertility and migration. Graphically represented by a population pyramid, age structure reveals the entire demographic history of a population. Populations growing rapidly due to high birth rates are marked with a greater proportion of children, while populations growing slowly, or stationary populations, are marked with a greater proportion of adult and aged persons.

Life expectancy: The average number of additional years a person is likely to survive if existing age specific mortality conditions continue to prevail. Life expectancy of a newly born baby is known as life expectancy at birth.

Dependency ratio: The ratio of the number of people under 15 and over 60 years to those between 15 and 60 years of age.

Ageing of population: A rise in the median age of a population. It occurs when fertility declines while life expectancy remains constant or increases.

Sex Ratio: The number of females per 1000 males in a population.

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Module Structure

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■ **6.3.0 Introduction**

The study of different phenomenon of population dynamics has special significance. All components of population change are the index of a region's development, social awakening, historical and cultural background and political ideology. Directly and indirectly population change affects the all other characteristics of population. Hence the understanding of population dynamism in an area holds the key to the understanding of the entire demographic structure of the area. In recent decades, all social scientists are showing their interest for discussing the matter of population change. Because the recent excessive increase of population resulting in a great demand for food stuff and other resources mainly in developing countries, increasing environmental damage, widening gap of standard of living in developed and developing countries, growing economic and social disparities among the people etc. The nature and pattern of fertility, mortality and migration have been changed over time period with the gradual development of other aspects of life. Different phases of demographic transition (reflects the gradual history of pattern of fertility and mortality) show correlation between stages of development and the rate of fertility and mortality over time. Migration holds a place of prominence in a geographical analysis of population change in any area. It can not be considered a only shift of people from one place of residence to another, as it is most fundamental to the understanding of continuously changing space-content and space-relationship of an area and considers a movement of people as an instrument of cultural diffusion and social integration that results into more meaningful distribution of people.

■ **6.3.1 Objectives**

Every study has some specific objective. Similarly some items of this unit should have a number of firm goals. It is universal that the rate of fertility and mortality is not same everywhere. Some part of the world mainly in developed countries, the rates of both are very low, whereas this situation is very worse in developing countries. On the other hand, migration always tends to attract people of developing areas. So people in developed area generally do not change their place of origin. But this situation is reverse in developing areas, where rate of international migration means immigration is rather high. Different scholars have mentioned number of reasons for migration. Some specific objectives are

- To measure, what are the changes that are taking place in the rate of population growth?

- To know, how are these changes brought about?
- What is the significance of these changes from the standpoint of human welfare?
- To identify the stages of development through which a nation is passing.
- To assess the importance of fertility and mortality in population growth.
- To find out the reasons, why do people migrate from place of origin to place of destination?
- What are the social and cultural consequences of migration?

■ **Key words:**

Fertility, mortality, migration, push factor, pull factor, cultural hearth, cultural diffusion, infant mortality, population growth, industrialization, modernization

■ **6.3.2 Dynamics of population change:**

The study of the change in the number of inhabitants of a territory during a specific period of time, irrespective of the fact whether change is negative or positive. Recent decades have been witnessed the huge increasing of population over the world. Many scholars in different discipline are showing interest to discuss the matter of abrupt population change mainly in the less developing countries. For a population geographer, the phenomenon of population change or growth has special significance. He values it as a vital index of a region's economic development, social awakening, historical and cultural background and political ideology. Population growth is a pivotal to the region's demographic dynamism. It is this attribute with which all other characteristics of population are intimately related and from which they derive their significance. Thus, the understanding of population growth in areas holds the key to the understanding to the entire demographic structure of the area. Mainly different kind of changes can be measured both in terms of absolute numbers and in terms of percentage. While it is easy to determine the change in absolute numbers by subtracting the number of inhabitants at an earlier point in time from that of at a later point in time, the measurement of percentage change poses a little problem. The growth of population in terms of percentage is generally calculated by dividing the absolute change by the population at an earlier date and multiplying it by hundred. Logically, the denominator, should be mid-period population will have to be estimated, therefore the growth rate is normally calculated by using the actual population size at the beginning point of the period under review.

Generally the population geographer calculates growth of population for period of ten year. A growth rate calculated with the help of actual population counts is known as actual rate of population growth.

Population geographers have often made use of the natural rate of growth of population. This natural rate of growth of population is obtained by dividing the difference between the births and deaths of population at the beginning of the period and multiplying it with hundred. It implies that while in case of natural growth rate only the births and deaths are taken into account, in case of actual growth rate the factor of migration is also taken into consideration. The population geographers have subjected both actual and natural rates of population growth to spatial portrayal and interpretation.

Fertility, mortality and migration together constitute the three basic components of population change or growth. In order to calculate the degree of magnitude of population change in any area, it is essential to measure fertility, mortality and migration precisely.

■ 6.3.3 Concept of Fertility

We must first define terms for there is undoubtedly confusion over meanings. Even the word birth has come some ambiguity, owing to the distinction between live births and still births. Fertility is the occurrence of live births, and must not be confused with fecundity, by which we normally mean reproductive capacity or the ability to have children. The term reproduction is the degree of replacement of individuals by others of the same age in the following generation; it is sometimes confounded with the word natality.

Fertility is one of the main aspects of population study, not only because it usually exceeds mortality and migration and is therefore the main determinant of population growth and a principal influence upon population distribution, but also because it is more difficult to understand than mortality. While mortality is essentially individual, inevitable and involuntary, fertility is none of these things, and is far less constant and predictable. Fertility can be more controlled, and may be more influenced by many social, economic, political and psychological factors. Moreover, unlike death, which may occur at any age, women give birth to children only during a comparatively short period of their lives, and so a large number will probably not follow a large number of births during one year in the following year. Consequently, fertility is often subject to more short-term fluctuations than mortality.

Unfortunately, many apparent fluctuations in fertility result mainly from shortcomings in the data. Data on fertility are available mainly from vital registration system or civil registration system. Besides, the periodic census counts and sample surveys also provide data on fertility. The data from vital registration system relate to each calendar year. In the national periodic census, a direct question on the number of

children ever born to ever-married women is included in the schedule. This forms an important source of data on the aspect. In countries where vital or civil registration is not accurate, a question on the number of birth to ever-married women during the preceding twelve months is asked during census enumeration. In India, such a question was asked in the 1971 census, and the same has continued in the subsequent censuses also. There are various demographic sample surveys such as National Family Health survey (NFHS), which provide data on fertility related aspects that are not ordinarily available in civil registration or periodic census counts.

■ 6.3.4 Measures of Fertility Analysis

Fertility measures are devices to quantify the fertility performance of a population over a period of time. These measures are used to compare fertility behaviour of different population, and to examine the trends in fertility of a population over a period of time. These measures can be grouped into two categories, that is the direct measures and indirect measures. While in the earlier, data on live births are directly used in the latter an estimate is indirectly arrived at using some other demographic characteristics such as distribution of population. The latter is resource when direct data on number of live births are either inaccurate or unavailable.

■ Direct measures

Crude Birth Rate (CBR) is not only the simplest one but also the most used and common measures of human fertility. It is the ratio between the total registered live births in a geographical area in a population during a calendar year and the mid year population. CBR is calculated as under:

$$CBR = (B/P) \times 1000$$

Where B stands for the live births during calendar years, P is the mid-year population. The crude birth rate is thus the number of live births per 1000 persons in a calendar year. It is an important measure of fertility as it directly points to the contribution of fertility to the growth rate of population. But this type of measures is not free from some drawbacks. It uses the total population as denominator including a large mass of male and female children and older adults; generally they do not have any involvement with the process of reproduction. That apart, it does not take into account the age and sex-composition and marital status to the population concerned (Clarke, 1972). Basically, the crude birth rate shows only a general

idea about the fertility. That is why, this is correctly known as crude, means not right one. So some polished and logically more practical measures of fertility behaviour of population are needed.

According to the convention, we multiply the ratio by 1000 for the simple reason that, in any population the maximum number of births per 1000 persons in a calendar year does not exceed 60 and has not been less than 10. If we take the multiplier as 100 instead of 1000 the rates would become one-tenth and use of decimal places would become essential. Consequently, the demographers have developed the conventional of multiplying the ratios by 1000 to get CRB and other fertility and mortality measures.

General Fertility Rate (GFR), an improvement one over CBR, therefore it takes into account only woman population in the reproductive age groups or childbearing age (i.e., 15 to 44, although it is extended up to 49). GFR is defined a ratio between the total live births and number of women in the reproductive age span. It is calculated as under:

$$\text{GFR} = (B / W_{15-44}) \times 1000$$

Where, W_{15-44} is the mid-year population of women in the reproductive ages. Necessary modification can be made where the upper limit of reproductive span is taken as 49 years.

The GFR helps in elimination distortions that might arise because of differences in sex and age distributions in total populations of different countries. Thus, GFR is more indicative of changes in fertility behaviour than is CBR. Whereas this measure is quite good for general purposes, but as the female age structure even in 15-49 age group many a times differs, we have more refined fertility measures.

Apart from age, marital status is also a very important differential factor in fertility. In almost all the societies of the world, birth is allowed only in a marital bond. It would, therefore, be more appropriate to consider only the currently married women, and not all, in the reproductive ages. The measure calculated in this manner is termed as *general marital fertility rate* (GMFR), and can be mathematically expressed as:

$$\text{GMFR} = (B / W^m_{15-44}) \times 1000$$

Where W^m_{15-44} is the mid-year number of married women in the reproductive ages. But CBR and GFR also have some problem because all women in reproductive age are considered as uniform group, but in real situation, the reproduction ability of all women in this duration is not same in every stage. In order to

understand the differential in fertility performance of women in different reproductive age groups, we calculate *Age Specific Fertility Rate* (ASFR) in five-yearly age intervals. It is calculated in the following way:

$$\text{ASFR} = (\text{}_{n}\text{B}_x / \text{}_{n}\text{W}_x) \times 1000$$

Where $\text{}_{n}\text{B}_x$ is the number of live births to women in the age group x to $x+n$, and $\text{}_{n}\text{W}_x$ is the mid-years number of women in the age group x to $x+n$. This is a refined fertility measure since it gives the actual reproduction by women in different age groups. This, however, requires tabulation of live births by age of the mother. The ASFR for women in 15-19 age group is generally low even if a country has the practice of early marriages (in countries with late marriage, it is very low to almost zero) but in the age groups 20-24 and 25-29 it becomes very high, after which it starts tapering off becoming almost zero in the 45-49 reveals the pattern of ASFRs for a few selected countries.

If the ASFRs are computer of each single quinary age group as mentioned earlier, we get seven different pictures for seven age groups, which make both the spatial and temporal comparison difficult. For this reason, we summaries these figures into one figure called *Total Fertility Rate (TFR)*. It sums up in a single number the fertility of all women at a given point in time. It is a pure measure of fertility, as it is not affected by variation in age structure of different populations. This measure is very helpful in comparing fertility performance of different population or social groups.

$$\text{TFR} = \text{Summation of ASFRs} \times \text{width of the age interval} / 1000$$

For still more refined work demographers have defined gross reproduction rate and net reproduction rate. *Gross reproduction rate (GRR)* specifies the average number of daughters that are born to a woman during her childbearing span conforming to the age specific fertility rates of given year. Thus, GRR is also a cross sectional measure of fertility like TFR, the only difference is that here we are referring only to daughters while we take both sons and daughters in computing TFR. Reproduction here implies that a woman is reproducing herself by having (daughter(s) in the next generation, The *net reproduction rate (NRR)* is the average number of daughters that would be born to a woman if she passed through her lifetime from birth conforming to age specific fertility and mortality rates of a given year. This rate is similar to GRR but is always lower than the GRR because it takes into account the fact that some women will die before completing their childbearing years.

We frequently talk of NRR of one in our population policy of planning documents. This actually means that in the next generation a woman will be replaced by only one daughter and, then, population will ultimately become stationary. If the NRR is greater than one, the population is still growing: if however,

NRR is less than unity, the population has got below replacement level fertility and will ultimately start declining. Several countries in the world, especially in Europe are presently having below replacement level fertility.

To overcome the effect of regional or urban-rural variation in the age composition within a country for the purpose of comparing birth rates, that is called *standardized birth rate*. This standardized birth rate can be calculated with the help of age specific birth rate. By using age specific birth rate, the number of expected births for each specific age group can first be calculated. The sum of expected births for all age groups is to be divided by total population and multiplied by one thousand so as to yield standardized birth rate. In other words, the standardized birth rate is the number of expected births per thousand of population, where the number of expected births is obtained with the help of age specific birth rates. Another measure that reduces the effects of age structure to its minimum, and hence facilitates comparison of fertility levels of two or more populations, is *sex age adjusted birth rate (SAABR)*. The United Nations has defined it as "the number of births per 1000 of weighted sum of the number of women in various five year age groups from 15 to 44 years. The UN has recommended a standard set of weights (1,7,7,6,4 and 1) corresponding to the six five years age groups in the reproductive age to the typical relative fertility rates of various age groups. These weights were derived on the basis of a study of 52 nations with varying levels of fertility. The SAABR is calculated as under:

$$SAABR = B / [(1 \times W1) + (7 \times W2) + (7 \times W3) + (6 \times W4) + (4 \times W5) + (1 \times W6)]$$

Where B is the live births in a calendar year and W1, W2,.....W6 are the number of women in the six five-year age groups in the reproductive age span.

■ Indirect Measures

In addition to the direct measures discussed above, there are several indirect measures of fertility, which are useful particularly when data on live births are not readily available, or are not reliable. These measures arrive at estimates of fertility indirectly using data on age sex structure, and marital status cross-classified by age and sex. *Child women ratio* and *female mean age at marriage* is most commonly used indirect measures.

Child women ratio (CWR) is defined as the number of children less than five years of age, per 1000 women in the reproductive ages. It is expressed in the following fashion:

$$\text{CWR} = \frac{\text{Number of children under 5 years of age}}{\text{Number of woman aged 15-44 or 49}} \times 1000$$

The data for computing CWR can be obtained from a single census if the population is classified by sex and age. This measure helps in comparing fertility performance of different groups of people purely on the basis of census data. These comparisons are, however, valid only under the assumption that the infant and child mortality is the same in different groups. CWR can also be computed from data from sample surveys if the age distribution in required age groups is available.

Age at marriage is said to have significant bearings on the fertility performance of women in a population. If age at marriage is low, women start bearing children at an early age. But, when the age at marriage is raised, the reproductive span is reduced, and overall fertility level is low. Mean age at marriage, therefore, is taken as a proximate indicator of fertility levels. Mean age at marriage for women is worked out in the following manner using Hajnal's method:

Mean Age at Marriage for Women =

$$\frac{\sum_{x=0}^k (n \cdot nSk - Sk \cdot K) / 1 - Sk}{1 - Sk}$$

Where, nSk is the proportion of single women in the age x to $x + n$, Sk is the proportion of single women at age K (i.e., 50 years) and n is the age interval.

■ 6.3.5 World patterns of fertility:

Fertility varies greatly in time and space. Birth rates range from about 10 to 60 per thousand, and fertility rates from 40 to 259 per thousand (for women aged 10-49). The highest levels of fertility, with birth rates of 40 per thousand and over and fertility rates of 120 and over, are found in Latin America (excluding Argentina, Chile), Africa and in south-west and south east Asia. Unfortunately, most of the countries with high fertility have inadequate data, and we must estimate rates. They are particularly high for some tropical African countries, but their reliability is low; nevertheless, in a major region of very high fertility there are considerable differences between countries, some arising from variations in adult and infant mortality which are both high. More significant in terms of world population increase are the high levels

fertility in the more populous continent of Asia. Indeed, probably well over two-thirds of world's population, mostly in hot countries designated as underdeveloped or developing, experience birth rate of 40 per thousand and over. The contrast between developed and less developed countries is more marked than in the case of mortality. At the other end of the scale, low fertility, with birth rates of less than 25 per thousand, is common to nearly all developed countries of Europe, North America, Oceania as well as former U.S.S.R.

The world pattern of fertility is therefore strongly bimodal, with the bulk of the world's population experiencing high fertility, so that fertility is one of the best socio-economic criteria for distinguishing between developed and underdeveloped countries. So far only a few underdeveloped countries, mostly small, have made a major transition from high to low fertility.

■ **Birth rate in India:**

Birth rate in India since the beginning of the last century presented in the table below, which have been collected by indirect methods. The birth rate in India has long remained at a high level and continued to remain so till the 1971-81 decade. The sudden decline in Birth rate for the 1941-51 decade has been due to difference in methodology adopted for its computation. A clear decline in birth rate is, however, observed since 1981.

India : Natural Rates of Increase, 1911-2001

| <i>Year</i> | <i>Birth Rate per Thousand</i> | <i>Death Rate per Thousand</i> | <i>Natural Rate of Increase</i> |
|-------------|--------------------------------|--------------------------------|---------------------------------|
| 1911 | 49 | 43 | 6 |
| 1921 | 48 | 47 | 1 |
| 1931 | 46 | 36 | 10 |
| 1941 | 45 | 31 | 14 |
| 1951 | 40 | 27 | 13 |
| 1961 | 42 | 23 | 19 |
| 1971 | 37 | 15 | 23 |
| 1981 | 34 | 12 | 22 |
| 1991 | 31 | 11 | 20 |
| 2001 | 26 | 08 | 18 |

Source : Census of India, *Handbook of Population Statistics (1988)*, Table 35, 99

Note : Birth and Death rates have been rounded off.

■ Fertility differential

A wide range of social, demographic and economic factors determine the fertility level of a population. These dominants of fertility, however, do not operate independent of each other. They are closely interrelated with each other, and the fertility level in a population is the net result of the interplay between them. These differentials can be viewed in terms of ecological factors like rural-urban residence, social factors like levels of literacy and educational attainment, religion, caste and race; and economic factors like occupation and economic status of the individuals or groups.

Average decadal birth rate in India 1901-2001

| Decade | Birth Rate |
|-----------|------------|
| 1901-11 | 49.2 |
| 1911-21 | 48.1 |
| 1921-31 | 46.2 |
| 1931-41 | 45.2 |
| 1941-51 | 39.9 |
| 1951-61 | 41.7 |
| 1961-71 | 41.1 |
| 1971-81 | 37.3 |
| 1981-91 | 32.5 |
| 1991-2001 | 27.8 |

Source: Premi, Mahendra K India's Population

Fertility levels by background characteristics of women in India, 1996-98

| Background Characteristics | | TFR* | Mean Number of Children** |
|----------------------------|------------------------------------|------|---------------------------|
| Residence | Urban | 2.27 | 3.78 |
| | Rural | 3.07 | 4.73 |
| Educational | Illiterate | 3.47 | 4.98 |
| | Literate (<middle school complete) | 2.64 | 4.06 |
| | Middle school complete | 2.26 | 3.41 |
| | High school complete | 1.99 | 2.66 |
| Religion | Hindus | 2.78 | 4.34 |
| | Muslims | 3.59 | 5.72 |
| | Christian | 2.44 | 3.47 |
| | Sikh | 2.66 | 3.59 |
| | Jain | 1.90 | 3.32 |
| | Buddhist/ Neo Buddhist | 2.13 | 4.05 |
| | Other | 2.33 | 4.33 |
| | No religion | 3.91 | 5.62 |

| | | | |
|--------------------------|----------------------|------|------|
| Caste / Tribe | Scheduled castes | 3.15 | 4.81 |
| | Scheduled Tribes | 3.06 | 4.74 |
| | Other backward class | 2.83 | 4.43 |
| | Others | 2.66 | 4.2 |
| Standard of living index | Low | 3.37 | 4.81 |
| | Medium | 2.85 | 4.67 |
| | High school complete | 2.10 | 3.61 |

* 1996-98, for women aged 15-49 years.

**Ever born to ever married women (15-49 years)

Source: NFHS-2, IIPS, Mumbai

● **Determinants of Fertility**

Many factors that affect the population change in any area. The nature of factors, which determine the population change, may vary with the change time and space. Although very few experts in population geography have attempted to analyze the factors influencing fertility. The gamut of factors determining fertility is significantly wide and the range may vary from the basic biological factor of race to such social constraints as political ideology. The important determinants of fertility covers fecundity, age at marriage, duration of marriage, marriage systems, sexual habit and so on. There is so a long list of other factors. For our convenience of discussion, we would classify these determinants into four broad categories of biological, demographic, socio-cultural and economic determinants.

● **Biological Determinants:**

There are many biological determinants which affect enormously in varying the fertility rate over space. Among them most important are race means racial group, fecundity, means fertility potential of women, reproductive span, general health conditions means hygienic condition includes physical and mental health, nutrition status, sanitation condition and so on.

Biologically, race is found to be the basic factor generating fertile differences. Different racial groups have been found to exhibit varying birth rates. Say for example, Brazil has been quoted as one such case where different racial groups like the whites, the coloured, the yellow and the blacks are studied together

and have been found to exhibit different average fertility. How far these differences in their fertility are related with their racial differences is not very easy to establish because not all the racial groups living in similar environment may be at the same stage of their demographic evolution. General health conditions have been outlined as one of the important biological controls of human fertility. Even though, this is a complex thing to present a direct relation between the health of an individual and his fertility potential. But one would expect that those enjoying good physical and mental health would be more prolific. General health conditions have an indirect impact upon the fertility patterns of the area. Poor health and sanitation conditions result in high incidence of mortality. When there is an advance in medical facilities, the mortality rate goes down, the general physical and mental health of the people improves and people start adapting small family norm. It implies low fertility rate in areas having good medical and health facilities.

Fecundity is the fertility potential of a woman, is another important biological factor which affects fertility. Similarly, genetic fertility of men is also an undisputedly most important biological factor. The reproductive span of women would generally vary from individual to individual. But in broad-spectrum, it ranges between 14 years to 44 years with slight variations at both ends.

● *Demographic Determinants:*

Among the demographic factors that control fertility, age composition, sex composition, degree of urbanization, duration of marriage and working, no-working status of females are prominent.

The age structure a population is one of the basic determinants of human fertility, because the proportion of population in reproductive age group will have a direct bearing upon birth rates. World's leading population growth countries have more youth population. These countries are of Africa, Asia, and Latin America. Another associated thing is that the duration of marriage. Longer duration of marriage, greater is the fertility rate. Always positive correlation has been identified between duration of effective marriage and fertility.

In the same way, sex composition is another essential demographic determinant of fertility. Where Sex ratio is balanced, in this case, average birth rate is quite common. For example, in developing countries, the urban centres always attract male in migrants than thus suffer from small number of females, show low birth rates.

Degree of urbanization is the leading components in determining the fertility rate. It is seen that rural people have more number of children than urban dwellers, means fertility rate is low at urban centres. A range of socio-economic factors creates an ethos for low birth rates in urban areas.

The working status of female is found to have its bearing upon the human fertility. A negative relation between fecundity index and degree of participation of females in economically gainful activities has been often talked about. Even the type of occupation they are engaged in may influence their fertility behaviour.

● *Social Determinants:*

This is very important in case of social determinants of fertility. While the desire to have sex may be a biological necessity the desire to have a child is more a social necessity. It is in this context that the social determinants of human fertility become very significant. That is why the list of social determinants is much longer than that of biological and demographic determinants. But prominent social and cultural determinants are religious background, ethnic structure, educational level, age at marriage, traditions and customs relating to marital and sexual life, primacy of individuals, the attitude of people towards family size restrictions, desire to have a son and government policies.

Religion is another important determinant of fertility in any population. However, it is important to note that religion has more significant influence on fertility behaviour in the less developed or developing countries than developed countries. A high fertility level in some cases is attributed to religious prohibition of birth control and values about the importance of children. There exists a remarkable difference in fertility levels in different religious groups in India also. The Muslim, for example, report a higher fertility than any other religious community.

Another important aspect of fertility differentials relates to the educational attainment of couple and levels of fertility. The level of literacy and educational attainment, particularly among females, is one of the most important determinants of fertility behaviour. Several studies have confirmed a negative association between the educational attainment of women and fertility rate. This is true for both rural and urban areas, as the NFHS data show, there is a progressive decline in the total fertility rate with rise in the educational status of women in India. An illiterate woman in the childbearing age group gives birth to 1.48 children more than that a woman who has completed at least her high school. This reflects upon the value of education of women in the planning process. Educational attainment of women reduces fertility rate in two ways. One, their involvement in educational pursuits delays marriages reducing the period of

exposure to childbearing process. Second, with high level of educational attainment, their attitude towards family size undergoes changes resulting in a greater acceptance of family planning methods. The figure above is showing the variation of total fertility rate among the various places, level of education etc.

The age of marriage is another basic social determinant of human fertility. The societies that are characterized by a low age at marriage reflect high fertility rate, implying an inverse correlation between birth rate and the age at marriage. It is said that if marriage age is delayed at least at the age of 19, where birth rate can be reduced.

The customs, rituals, traditions relating to marital and sexual life also influences fertility patterns. The societies having the marriage systems connecting loose marital ties and liberal sexual behaviour often, low fertility level has been identified owing to greater incidence of venereal diseases. Similarly, customs like prolonged breast feeding, restrictions on cohabitation during the sucking period, segregation of spouses after child birth for purification, restrictions on sexual activity in one form or the other also reduce the conception rate.

Some time various factors of family planning affect the fertility rate. A large number of preventive, corrective and parallel means to limit the family size have been made accessible in different parts of the world. Some preventive measures like delayed marriages, polyandry, restricting widow remarriage, celibacy have been more common. The corrective measures like infanticides, abortions have been also common in some societies. The communities where different sections of society respond differently to the various family planning measures show different birth rate patterns for different sections. The typical example in this connection is that the scheduled castes, the scheduled tribes, the Hindus, the Muslims and other religious groups have shown fertility differentials in India.

In spite of everything, the role of government policies in the fertility patterns of their respective countries is also vital. For instance, one child population policy of China in the last phase of twentieth century has arrested the rapid population growth. Some specific norms were introduced to hold the huge population growth. While the legalization of abortions in Japan immediately after the Second World War is the typical example of the impact of government policies on fertility. In contrast, the Indian experience shows that the unenthusiastic approach yields not fruitful results even in the presence of a definite population policy of the government. India needs to have more comprehensive population policy and better determination to implement the same.

● *Economic Determinants*

Among the economic determinants of fertility, the most commonly referred to are economic well-being of the couples or group, occupation of the husband, involvement of women in the gainful employment etc. An inverse relationship between economic status of the couple and fertility level is a universal phenomenon. It is said that the middle-income group which normally is almost ambitious section of society, applies the strictest control over family size. In the lower income group, where the children are considered as the potential source of augmenting the family income, the restrictions on the family size are the minimum. In the higher income group where the supporting capacity of the family is unlimited, the family size is also kept low but not the lowest. The NFHS data on fertility differentials of women belonging to different economic status group also reveal a decline in fertility levels with rise in the economic status. A woman from low-income group produces on an average 1.27 children more than the one in the high-income group. Mean number of children ever born to a woman at the end of the childbearing age span also follows the same pattern.

Finally, fertility behaviours of a population are determined by the combined effect of biological, demographic, socio-cultural and economic factors. It may neither be possible nor advisable to separate the role of any single factor because birth rate is the product of all these factors in unison.

■ 6.3.6 Concept of Mortality:

Mortality or the occurrence of death is another components of population change. Mortality contrasts with fertility by being more stable and predictable, and less prone to mysterious fluctuations. We are interested in mortality not only for its effects upon population change, but also for its effects upon population composition, especially age composition, since mortality and longevity are closely linked. Death control is more acceptable than birth control. The decline of mortality now taking place in so many of the underdeveloped countries has been in great measure due to medical progress, which was initiated in few parts of the world but has been rapidly applied to large sections of humanity, even those living at low technical levels. The decline of mortality has consequently been more widespread than the decline of fertility, and it is the increasing longevity of most of the world's inhabitants which is particularly responsible for the much-feared population explosion. Indeed, it is one of the most important features of the recent history of mankind. In view of the demographic significance of mortality and its manifold social and economic effects, geographers must be interested in its distributional patterns. As "human beings are mortal" they have to die at some age or the other. Death means permanent extinction of all

sings of life from a human body after a birth has taken place. According to United Nations, 1953, and WHO mortality means permanent disappearance of all evidence of life at any time after birth has taken place. The process of death keeps the population of a given area in some sort of balance.

▲ Measures of Mortality:

There are several measures employed in the analysis of mortality in any population. As in case of births, we have several measures of mortality and use them as per the requirement of accuracy on the one and limitations of data availability on the other hand. CDR is the number of deaths occurred during a calendar year per thousand persons. *Crude Death Rate* (CDR) is the most commonly used measure as it can be easily calculated.

$$CDR = (D / P) \times 1000$$

Where D is the number of deaths registered in a calendar year, P is the mid year population. The term 'crude' has rightly been used as it suffers from a number of deficiencies. The difference between the CBR and CDR gives the rate of natural increase, which tells us the rate at which the population of any particular areas is growing purely as a result of births and deaths or in a natural manner. The second one measures is mortality rate by age and sex. Which yields a more critical measurement of mortality. The *age and sex specific mortality rates* can be expressed in terms of number of deaths during a year of persons of given age and sex per thousand of that age sex. Basically it is know as age and sex specific death rate. These can be measured as under:

$$DasR = (Das / Pas) \times 1000$$

Where Das stands for number of deaths of specific age and specific sex during a year and Pas stands for total population of specific age and sex.

Another very precise measure of mortality is what is known as *Maternal Mortality Rate* (MMR). MMR refers to the occurrence of death of women during childbearing process. MMR is defined as the number of maternal deaths per 1,00,000 live births in a calendar year. Numerically, it is expressed in the following manner:

$$MMR = (Dm / B) \times K$$

Where Dm is the number of maternal deaths, B is the number of live births and K is a constant. In developing countries, where MMR is generally very high due to poverty, lack of adequate health care facility, ignorance etc. But in the developed countries, this rate is very low.

Much of the analysis of mortality by age and sex has centered on life tables, which are based on observed mortality conditions. They were first compiled for actuarial purposes to analyse the effects of present mortality rate on future age and sex composition, in order to calculate for each group the number of deaths, the number of survivors and the average expectation of life of the latter. Their accuracy is closely dependant upon the validity of the censuses and vital registration, and they are therefore only possible in advanced countries. There are five common coefficients.

1. **The life table mortality rate** is the basic function of the life table, and represents the probability of dying during a given age interval, usually one year. In graphic form, life table mortality rates give a J-shaped curve, with the lowest point about the age of 10. The curve is much the same for developed and developing countries, but mortality rates at all ages are lower in the former.
2. **The survival table** depicts the numbers of survivors at each age, starting with a round number like 100000, the deductions being made from the above rates.
3. **Death tables** merely comprise the number of deaths at each age and for both sexes. The maximum number of deaths in any age group is said to coincide with 'normal life'.
4. **Average expectation of life**, or average life, at each age is the number of years of life expected to each of the survivors at any given age, assuming that the total number of years was equally shared between them. Average expectation of life at birth is less than after the first year, because of infant mortality, but thereafter the decline is usually steady. Expectation of life at birth is a better measure of mortality than the crude death; rate, as it is not affected by the age structure of the population.
5. **Probable or median life** is the duration necessary to reduce the population to one-half. The index is much less common than expectation of life.

The significance of age in mortality is most evident with infants. **Infant motility rates** are the number of deaths of infants under one year old per thousand live births. It is calculated as under

$$\text{Infant Mortality Rate (IMR)} = \frac{\text{No of deaths of infants before attaining the age of one yera during the calendar year}}{\text{Total live births in the calendar year}} \times 1000$$

IMR is one of the most sensitive indicators of medical and health care facilities in a population. In fact, it is a very good indicator the levels of social and economic development of a population. Infant deaths attributable to some external factors like accidents or infections are called exogenous infant mortality. Likewise, the occurrence of deaths among infants due to some congenial malformation and birth trauma called endogenous infant mortality. Some other types of infant mortality are a) Prenatal mortality, which occurs during 'the period of prenatal existence after viability is reached, the duration of labour, and the early part of extra-uterine life'; b) Neo-natal mortality, occurring during the first four weeks of life; and c) Post-natal mortality, occurring within the remainder of the first year. All are expressed per thousand live births. Another important measure is **Cause specific death rates**. Analysis of mortality by causes of death holds a very important place in any health-related programme. One important aspect of the study of mortality, therefore, covers the causes of death. Based on the manual of WHO several broad groups of cases of deaths have been identified and used for computing cause specific death rate. This is calculated as under

$$\text{Cause Specific Death Rate} = \frac{\text{Total number of deaths assigned to that cause in a year in a given geographical area}}{\text{Midyear population of that area}} \times 100000$$

▲ Death rates in India

Now we examine the trend in the death rates in India from 1901 onward, which are given in the table below.

Estimated annual death rates in India 1901-2000

▲ Mortality Differential:

The causes of mortality vary both in space and time. Spatially different regions are at different stages of socio-economic development and technological advancement. Since causes of death are intimately related with socio-economic and technological background, therefore, the causes of mortality vary from one part of the world to another.

So these differentials can be viewed in terms of rural-urban residence, social factors like levels of literacy and educational attainment, religion, caste and race; and economic factors like occupation and economic status of the individuals or groups.

| Decade | Death rate (per thousand persons) |
|-----------|-----------------------------------|
| 1901-11 | 42.6 |
| 1911-21 | 48.6 |
| 1921-31 | 36.3 |
| 1931-41 | 31.2 |
| 1941-51 | 27.4 |
| 1951-61 | 22.8 |
| 1961-71 | 18.9 |
| 1971-81 | 14.9 |
| 1981-91 | 11.4 |
| 1991-2000 | 9.2 |

▲ **Determinants of Mortality:**

There are a large variety of factors that determine the mortality patterns in the world. Basically, all factors are divided into two types, namely endogenetic (biological) and exogenetic (Environmental). The endogenetic factors are essentially biological in nature which cause death due to rapid alterations in the functioning of human body. The exogenetic factors that are environmental in nature comprise of environmental influences giving rise to infectious pulmonary and digestive diseases. The environmental conditions, which have their link largely with climate, have been found to have adverse effect on the human body. The mortality rates and other related thing of mortality in any geographical area can be governed by its demographic structure, social advancement and economic development. So the determinants of mortality would suitably be categorized into three basic types of demographic, social and economic factors. The Role of these determinants is being discussed below.

● *Demographic Determinants:*

There are many demographic determinants, which influence very much in varying the mortality rate over space. Among them most important are the age structures of the people, sex composition, degree of urbanization, place of living, rate of migration, awareness of people about health etc.

Age structure of a population has been mentioned as the most prominent demographic factor governing the incidence of mortality in a population. It is believed that the mortality risk declines as the child matures but begins to increase in middle age. It may not be out of place to mention that certain diseases get associated with different age groups. For instance, diseases namely cancer, heart-stroke are associated with older adulthood and thus have become dominant causes of death in developed countries where the age structures are relatively old.

The degree of urban development also has its own contribution to make as far as the patterns of mortality are concerned. The degree of urban development and mortality are so intimately related that at different stages of urban development, the mortality responds differently. For instance, in the first stage, urban areas are recipients of large scale in-migrants, who are less adaptable to urban way of living and dietary habits, the towns show high death rate than the countryside. The next phase, when the in-migrants get adapted, the medical facilities become more adequate and the mortality shows a decline. In the third stage, the urban mortality rises marginally while the rural mortality declines because of improvement in the medical facilities in rural areas. All places become homogeneous from the point of view of conditions of general sanitation and hygiene. In this stage, the mortality in urban areas is comparatively high because

of a number of factors. First of all, the urban areas are more prone to the spread of infectious diseases due to over congestion of population. Secondly, the urban society cannot provide maternal care to the extent the rural society can, because the structure of rural family is more solid in comparison to that of urban family. Thirdly, the general environment of the countryside is more conducive to the good health due to its open-air life and great physical activity. Lastly, the rural folk live a more carefree life due to almost complete freedom from vice.

● *Social Determinants:*

Important social determinates are incidence of infanticide, restrictions on widow remarriage, adequacy of medical facilities, general conditions of nutrition, housing and sanitation, literary standards, religious beliefs and so on.

Socially, occurrence of infanticide in a society influences the mortality rates. Many societies in the past adopted infanticide as a common measure of arresting their numbers. In India, female infanticide had been practiced due to the relatively low status granted to women. Here girl child is treated a liability, while boy child is considered as an asset. Although, this practice now a days has been controlled by different initiatives.

One more factors, the restrictions of widow remarriage have been typical of Indian society. Such norms also sometime control the mortality rate. The availability of adequate medical facilities is another factor determining mortality. The positive correlation between the number of persons per physician and the mortality rate is observed. The differences in the mortality rates of the developed and the less developed realms are largely the product of this factor.

The general conditions of nutrition, housing and sanitation are also important. People in developing countries, are suffering from these problems and shows high average mortality rate.

Lack of consciousness, low literacy standard and general indifference creates health hazards. Most of the illiterate societies suffer a general indifference and apathy to insanitation and hence, are characterized by high rates of sickness.

Among the social determinates, religion is another vital factors which has more effect in determining of mortality rate. Due to this, different religious groups living within the same country have sometimes exhibited varying degree of mortality, though their differences may not entirely be due to their religious differences.

● *Economic Determinants:*

It is very difficult to differentiate the economic determinants from social. To some extent, some economic determinants can be social determinants in terms of their nature. But some of them are prominent. These are per capita income, standard of living, type of economy, economic growth etc.

The income of individual would be considered as the most significant. It is the income of an individual, which not only determines the richness of his diet but also his capacity of avail himself of medical facilities. But it is not true that the rich people can keep away from death. It is only to signify that the income of a person can help in burying him medical care. Such differences in the mortality rates of the rich and the poor occur only when there are wide inequalities in incomes and the medical facilities are not universally available. Generally, there exists a negative correlation between death rate and standard of living / per capital income.

Apart from these above-mentioned determinants, **some factors** like natural calamities, food shortages, wars, epidemics also play vital role on a large scale when these situation come.

■ 6.3.7 Concept of Migration:

Migration is the third important component of population dynamics, and other two are fertility and mortality. The nature of migration as a component of population change is different from other two. The migratory movement movements are basically a product of social, cultural, economic and political and physical circumstances in which individuals or groups find themselves. The dictionary meaning of the term Migration is 'a change of abode' and is used in the context of spatial mobility of living beings. According to standing, "human species is not a migratory species, but it is a restless one, moving as part of process of adaptation to its social, economic, cultural and ecological environment" (Standing, 1984).

Migration is the act or process of moving from the one geographically well-defined area to another with the intent of staying at the destination permanently or for a relatively long period of time. Or the movement of people across a specified boundary, national or international, to establish a new permanent place of residence. One might say that migration is a spontaneous effort to achieve a better balance between population and resources. As we can say migration means a movement of population involving a change of permanent residence of substantial duration. The United Nations Multilingual Demographic Dictionary defines migration as "a form of geographical or spatial mobility between one geographic unit and another, generally involving a change in residence from the place of origin or departure, to the place of destination or arrival". Therefore, migration is different from other forms of mobility such as

temporary movement of tourists, or frequent trips of people in business for the purpose of studies, or daily movement of commuters to place of work. These moments do not involve any permanent or semi-permanent change in the place of residence to qualify as migration. Migration has several significance not only in population change but also in areas of departure and destination. That is why, Woods in 1979, rightly mentioned that population geographers have since long been concerned with the relationships between movement of people, distance and interacting areas. Along with it various demographical, social and economic effects, population geographers have also been concerned with the environmental influences upon migration streams and consequences in areas of leaving and destination (Clarke, 1972).

▲ Migration: General Terms

As mentioned above, migration refers to permanent or semi-permanent change in the place of residence of an individual or a group of individuals from one location to another. Hence, it is different from the more general term mobility, which defines all types of movements of people. Thus, the term mobility includes both permanent (and semi-permanent) and temporary movements of people over the earth. With regard to temporary movements, the examples of which have already been cited above, a distinction is generally made between a cyclic and a periodic movement. A cyclic movement includes short duration trips to place of work, or frequent business trips of people in business, or movement of nomads, which is comparatively irregular in timings. A periodic movement, on the other hand, involves a longer period of residence away from home base than that in the cyclic movement. Periodic movement includes the movement of students away to other locations for the purpose of studies, or the movements of military personnel to military base, training schools or combat zones. The movements of migrant labourers and their families are also periodic movements, although they are more cyclic than that of students or military personnel. Still another form of periodic movement is what is commonly known as transhumance- a system of pastoral farming in the mountainous area wherein people keep changing their abodes along with their livestock between high slopes in the summer and lower valleys in the winter. Migration, a permanent move, involves crossing over of the boundary of an administrative unit. When the national boundary of a country is involved such movements are called international migration. Similarly, if migration happens within the national boundary of a country, it is termed as internal migration. In the case of international migration the departure of an individual or a group from country is termed as emigration, while arrival or entry into a country is known as immigration.

Gross migration refers to the total number of migrants moving into and moving out of a place, region or country, while net migration is the balance between the number of migrants coming into and moving out of a place, region or country. In other words, net migration is the gain or loss in the total population of an area as a result of migration. A variety of factors can cause migration of individuals. While the factors leading to migration can be classified into several categories, in general term people take decisions to migrate based on push and pull factors. Push factors are events and conditions that force individuals to move to other locations. They include a variety of motives from the idiosyncratic, such as individual's dissatisfaction with the facilities at home, to the dramatic such as war, economic dislocation or ecological deterioration. On the other hand, pull factors are those conditions that attract people to move to a particular new location. It is, however, important to note that both push and pull factors operate simultaneously in any migration, though with varying magnitude.

Further, migration can be either voluntary or forced. While voluntary migration involves the choice of an individual or a group, forced migration involves a perception of compulsion against the will or choice of concerned individuals. People forced to move are usually compelled by political factors, whereas voluntary migration is usually for economic reasons.

▲ Methods of Measuring Migration:

The volume of migration in any country or state is generally measured during any two time-point if the information on births and deaths between those time points is available. One simple example can be cited to make it clear, if P_b and P_e represent the total population at the beginning and at the end of the interval and if B and D represent the total births and deaths respectively, so we estimate net migration (M), as

$$M = (P_e - P_b) - (B - D)$$

▲ Migration Rates

As in the case of birth and death rates, we explain the net migration rate by the following manner:

$$m = \frac{M}{P} \times 100$$

Where m = Migration rate during a specified migration interval,

M = Number of net migrants

P = Average population of the area during migration interval

In the same manner we can find out:

Immigration rate = $I \times 1000 / P$

Out migration rate = $O \times 1000 / P$

Gross Migration rate = $T \times 1000 / P$

Where I = Immigration during the interval and

O = Out migration during the interval

As we have sex-age specific death rates, we can have migration rates specific of certain characteristics of the population if the relevant data to determine the number of migrants possessing those characteristics are available. Thus,

$m_1 = M_1 \times 1000 / P_1$

Where m_1 = Migration rate for population of a specified geographical area characterized by trait 1 (e.g. sex, age, marital status, etc.)

M_1 = Number of migrants characterized by same trait 1

P_1 = Total population of the area possessing the same traits 1

When data on population movement are not available from population registers, nor are they available from a population census, demographers use indirect methods of measuring the quantum of net migration either by using the information on size of population at two time points and on births and deaths during the interval (by building the population equation) or by using the age distribution of the population at two successive censuses and the sex age specific survival rates.

▲ Migration Types:

Although there is enormous diversity of types of migration in respect of cause, motivation, distance, duration, volume, direction and organization. On the basis of the above parameters migration again is divided into different types. Chandna and Singh (1980) suggested that since geography is a spatial science, the parameter of space is sacred to any geographic classification of migration. All those migrations that happen within an area lying within the territorial jurisdiction of a country are, thus distinguished as internal migrations. On the other hand, where the migrants move across the international

boundary, the migration is known as external migration. The terms emigration and immigration are used to connote out-migration and in-migration across the international border, respectively. Migration may be of different types say,

- A) *Basis of the area or internal migration-Rural to Urban, Urban to rural, rural to rural and urban to rural.*
- B) *Based on the scale of migration- International and Internal*
- C) *Direction of movement of migration-Emigration and Immigration*
- D) *Based on the duration- Long term, short term and daily migration*
- E) *Based on Economic characteristics- Nomadism, semi- nomadism, seasonal etc.*
- F) *Nature of compulsion- Voluntary, forced migration*
- G) *Nature of cultural pattern-political and social migration.*
- H) *Based on economic development-Migration to the developed nations, migration to the developing countries.*

▲ Streams of migration:

Before knowing the concept of streams of migration, some terms associated with migration are to be known. Not only essential for streams of migration, but also important for discussion of migration. The place, which the migrant leaves, is called **place of origin** and for that place, the person is known as **out-migrant**. The place where the migrant arrives is known as **place of destination** and the person is called **in-migrant**. Thus, the same person is out-migrants for the place of origin and in-migrant in the place of destination. When the migration happens across international boundaries, the terms used are emigration and immigration to describe migration phenomenon, and emigrant and immigrant to define a person.

As the process of in- and out migration is a continuous process, the net change in population of any geographical area over a period of time is the net balance of in- and out-migration and is called net migration. When we say that West Bengal had a net addition in its population through migration, it means that the number of immigrants over a specified time period in West Bengal exceeded the number of outmigrants from the state. In certain parts of the world and, in certain parts of our country, net immigration has continued over a fairly long period of time leading to a much faster population growth.

In order to analyse migration, it is necessary to break down the total time period into a series of intervals and assemble the data separately for each interval. Such intervals are known as **Migration Intervals**. Time intervals of one year, 5 years and 10 years have generally been used in migration analysis.

Migration stream is a term used for spatial mobility in which the migrants have a common place of origin and common place of destination. We can say this thing another way, a body of migrants that departs from a particular area of origin and arrives at a specific area of destination during a specified time interval is known as **Migration Stream**. For example, people moving from Kolkata in West Bengal to Mumbai in Maharashtra in a decade form such a migration stream.

▲ Nature of Streams and Counter Streams of Migration:

Nature of streams and counter streams of migration can be of different in pattern. These are, a) migration tends to take place largely within well- defined streams, b) For every major migration stream, a counter-stream also develops, c) The efficiency of the stream (ratio of stream to counter- stream of the net redistribution of population affected by the opposite flow) is high if the major factors in the development of a migration streams are minus factors at origin, d) The efficiency of the stream and the counter-stream of migration tends to be low if the place of origin and the place of destination are similar, e) The efficiency of migration streams will be high if the intervening obstacles are great, f) The deficiency of the migration stream varies with economic conditions, being high in prosperous times and low in times of depression.

▲ Type of Migration Streams

Based on birthplace means last residence and place of enumeration, migrants can be classified into four migration streams which are roughly indicate of migration distance:

1. **Intradistrict migrants:** Persons born (or with last residence) outside the place of enumeration but within the same district.
2. **Interdistrict Migrants:** Persons born (or with last residence) outside the district of enumeration but within the same state.
3. **Interstate migrants:** persons born (or with last residence) outside the state of enumeration but within the India.

4. **Immigrants:** Persons born (of with last residence) out side the country.

▲ **Determinants of Migration**

Migration is a complex phenomenon an enquiry about the motives behind it is the most difficult part of the analysis of the process of migration. Some factors control migrations in various ways, the performance of factors not only vary from area to area but also the implication of the same factor varies person to person. With regard to the determinants of population, distinction has been made between push factors and pull factors. Push factors are those that operate in areas of out migration and compel to the to people to move to other areas. Pull factors are those that operate in areas of in-migration and attract the people to these areas. But it is common that push and pull factors take place simultaneously in a same area. No any case, only push or pull factor takes place alone separately. However, sometime it becomes difficult to discriminate push and pull factors.

It is in this context that a scheme other than the push-pull syndrome has to be recommended for a detailed inventory of determinants of migration. All migrants in the modern context are borne out of growing process of industrialization, technological advancement and other changes that are happening in the social and demonic fields. Apart from that, wars, political events, regional disparities in natural increase, in employment potentials, in wages and in availability of agricultural land are other stimuli for population movements. There are several factors in an area that hold the people of the area to it or attract more people to it and there are countless factors that repel the people from it. Lee points out that there are always certain indifferent factors in all areas. He suggests each place of origin as well as of destination has its own set of positive, negative and indifferent factors for each potential migrant. Thus, a factor would be positive for a particular person, can be negative for the other and indifferent for still another. The determinants of migration for the convenience of understanding may be classified into three broad categories of economic, social and demographic determinants.

● *Social Determinants*

Equally significant are the socially rooted determinants of migration. In this respect, the well-known social factors which have been controlling population migration, these may be socioeconomic status, information network, cultural contact, desire for social upliftment, government policies and so on.

Some traditions, rituals, customs that generate specific type of migration. Simple example may be cited; females move from the place of their parents residence to the place of residence of their spouses at the

time of marriage. This is a type of migration. Due to this factor that in India the number of female migrants is considerably high, although people of India are considered as least mobile.

Likewise, another social determinants are religious freedom. The large-scale migration can take place for the fulfilling of religious faith. Every year many people with religious faith have to go at their respective sacred places for having fulfilled the inner desire. Some of them generally come back to the original place. Rest of them selects that sacred place as a permanent residence. Basically they are treated as migrants.

Socio-economic status, information network, cultural contact, desire to have social upliftment and government policies are another controlling social factors of migration. There are evidences to prove that in India also the people with low social economic status are more mobile than affluent group because they have no landed property to bind them in their native places.

The availability of information through education, cultural contact and spatial interaction also increases the chances of population migration. Higher status people have the ability, the training and the information and thus become more mobile. Some specific higher status groups have high rate of spatial mobility.

Similarly, it is also widely considered that migration potential is functionally related to the migration experience. That is to say that in-migrants to an area are more likely to further in comparison to the long-term residents of the areas. So migration generates further migration signifying the role of information network and spatial interaction in stimulating more of migration.

The government policy of the particular country also favourably or adversely affected the pattern of population migration. The British, French, German, American New Zealand, Canada governments have specific population policies and most of them discourage immigrants. Similarly, the political totalitarianism in Russia resulted in the migration of people from their homeland at the time of Bolshevik Revolution, also known as the Great October Revolution (1917).

● *Economic Determinants*

Among the a variety of economic determinants which govern the magnitude and direction of migration are the general economic conditions of the area, the availability of good agricultural land, size of landholdings, the rate of growth of employment opportunities, development of means of transportation and communication etc.

One of the prime motives of emigration seems to be economic. Man's need to have virgin land to till has inspired him to migrate to distant areas. It was because of this reason that the slaves were transported to the plantations in tropical America. These Negroes subsequently got settled in the United States of America.

Similarly, heavy pressure on the agricultural resources in the motherland also forced the people to outmigrate and to settle in areas where economic benefits may be achieved. The pastoral people and nomads of central Asia invaded the territories of the sedentary people.

Non-availability of proper jobs and unemployment are also important determinants of migration. Which compel to youth to leave their home for the places, areas, region and countries where employment may be found. The invention of spinning machine and the establishment of large-scale cotton factories made many of the weavers of the subcontinent of India unemployed. The agricultural labourers, if unemployed, also leave their native places. In very age, the labourers immigrated to neighbouring or distant fertile tracts.

Thus the economic poverty, unemployment and attraction for better economic opportunities always motivated and forced the people to move their native places. The poverty and attraction for job are quite significant determinants. For example, poverty of agricultural labourers in West Bengal, Orissa, Jharkhand and Bihar resulted into the emigration waves towards the metropolitan cities and the productive plains and agriculturally developed parts of the country. The regions and districts of marginal farmers and small farmers also emigrate with the agricultural labourers, as the tiny size of their holdings is unable to provide them adequate sustenance.

● *Demographic Determinants*

A number of demographic factors also play a determining role in the migration propensity spectrum. For instance, these are nature of age group, gender ratio, population growth rate, degree of population pressure etc

A number of demographic factors also play a vital role in the migration pattern. For example, age has been recognized as one of the important demographic factors controlling the degree of desire to move among the potential migrants. It is not surprising that adults are more migratory than other age groups. It is the rate of growth of population that determines the extent of population pressure in an area. In India, the large-scale out migration from the densely populated parts of Orissa, West Bengal, Kerala, Bihar and Uttar Pradesh is largely due to poor population resource ratio in these areas.

The preceding discussion on the determinants of migration reveals that the factors involved in the process of migration are not easy to outline. The earlier inventory of factors consists of only such factors that may operate at micro level. The micro level studies may expose still wider range of factors operating at local level.

▲ Consequences of Migration

Migration may have both positive and negative effects on both the sources as well as the destination area. In this perspective, Beaujeu-Garnier in 1966, rightly remarks that each migrants, by nature, seeks to recreate something of the original milieu in the midst of the new environment and consequently, enriches the civilisatio. It leads to redistribution of population, thereby reducing the population in one area and increasing it in another. Geographical importance of migration is depending on the place and time. So the consequences of migration may be economic, socio-psychological, demographic and cultural. It is being discussed briefly,

1. Impact on source or origin area of the migrants (Demographic and economic effects)

- a) Employment, wages and income
- b) Rural income distribution
- c) Rural capital formation, modes of production and technological change.
- d) Fertility and demographic structure (mortality, sex ratio, percentage of literates)

Impact on destination area of the migrants (Demographic and economic effects)

- a) Employment and wages
- b) Urban income distribution
- c) Urban amenities and economics of scale
- d) Fertility and demographic structure of the population

2. Migration creates different types of small geographical place within a fixed geographical place, generally four types of geographical place are to be formed, and these are

- a) Indirect contact space
- b) Aspiration space
- c) Activity space
- d) Search space

3. Cultural diffusion

4. Population density may be affected due to migration
5. There are some possibilities to accustom with the new type of culture
6. Different types of superstitions, orthodoxy may be removed.
7. Social contacts among the people could be increased.

■ 6.3.8 Lee and Ravenstein Law's of migration.

Much attention has been directed towards the formulation of theories to explain patterns of migration. As early as the 1880s E.G. Ravenstein made a detailed study of migration statistics and formulated what he called '**Laws of Migration**'. He pointed out several characteristics of migration, which have been discussed in details later on. In this respect, some other contributors have highlighted a number of attempts. For example, **the inverse distance law**, which was expounded by G.K. Zipf (1949) stated that the volume of migration is inversely proportional to the distance traveled by the migrants. Generally, geographers have traditionally paid considerable attention to distance decay relationships in migration pattern. Although, this distance decay is considered as an important general spatial phenomenon of geographical studies. Most studies show the volume of migration to be inversely related to distance and Hagerstrand and others have used regression techniques to describe the relationship, the basis of the idea of the mean information field. S.A. Stouffer (1940) refined this further by showing that migration was determined by opportunities at origin and destination and by intervening opportunities between the two. Wilbur Zelinsky (1971), who was the most well known contributor to develop the specific theory of migration. He developed the idea of the '**Mobility Transition**', related to the general model of the demographic transition, in which he hypothesized a relationship between different types of movement and general processes of **URBANIZATION, INDUSTRIALIZATION and DOMERNIZATION** in space and time. A more general theory of migration was propounded by Lee (1966), who refined the idea of migration between two places as a response to various '**pushes**' at origin and '**pulls**' at destination. Let's concentrate on only two theory of migration, proposed by Ravenstein and Lee.

■ 6.3.8.1 E.G. Ravenstein's theory of Migration

The first scholar to formulate laws of migration was E.G. Ravenstein, who based his generalizations on empirical studies of population movements in Britain, the United States and some of the countries of Northwest Europe. He observed the migration data between 1885 and 1889 and arrived at certain very

important conclusions, which may be taken as the laws of migration. The laws of migration, advocated by Ravenstein, are as under:

a) The majority of migrants go only a short distance (distance decay effect)

This law seems to have been operational at least since the medieval times and is still operative today. With the advent of modern transport, the average distance traveled by migrants may have increased, but relatively short moves are still the most common. For example, the first major concentrations of the American black population in northern cities were in Washington, Philadelphia and Baltimore, all of which are relatively close to the source areas of migrants who left the south in large number after 1910.

There is a tendency that most of the migrants move short distance whereas few go long distances. This tendency is known as long distances. This tendency is known as distance decay. This expression applies to most of human activities. In fact, there is a decline in the amount of some phenomena with increasing distance from the focal place. In other words, many human activities and features tend to cluster near accessible places, so their frequency, volume of value usually declines with distance from the point attraction. This tendency applies to the land values around a market, population densities ranging an urban centre, number of migrants to a place of attraction, and numerous other phenomena that are affected by spatial interaction. As an example, consider the number of migrants to city K who came from district A-G. When the amounts of migration are plotted on the vertical axis and the corresponding distances are displayed on the horizontal axis, the graphed trend indicates that migration declines as distance increases.

b) Migration proceeds step by step

Ravenstein's second law of migration is that the inhabitants of the country (countryside) immediately surrounding a town of rapid growth flock into it; the gaps thus left in the rural population are filled up by migrants from more remote districts, until the attractive (gravitation) force of one of our rapidly growing cities makes its influence felt, step by step, to the most remote corner of the region.

Accordingly, sequential moves extend the effects of migration spatially. Such a series of moves was an important feature of migration to the American frontier in the 19th century when farmers who wanted to move on to new lands would often sell out to later migrants. On a different scale, a series of step by step residential shifts is usually generated in urban areas today when a family

moves into a newly built house and thus vacates an older house, which is then reoccupied by another family (which leaves another residential gap and so on)

c) **Migrants going long distances generally go by preference to one of the great centres of commerce of industry**

This tendency of moving towards the great centres of commerce and industry has been operative since medieval times, when London attracted population from all parts of England. The pull of large cities is apparent in the developing countries. The pull of large cities is apparent in the developing countries. The industrial and commercial centres of Tokyo, Mumbai, Kolkata, Delhi, Lagos, Sao Paulo, Cairo, Dhaka, Hyderabad, Bangalore, Kanpur and Pune. The effect of a large place on the size of the migration field is expressed by a Gravity Model. This mathematical model states that the number of migrants to a place is directly related to the population size of that place but inversely related to the migratory distance.

d) **Each Migration current produces a compensating counter-current**

This law of migration seems to be universal and applicable in almost all the developed and developing countries. Even in the extreme case of slave trade (15th –19th centuries) produced a tiny counter flow back to Africa of people who, in one way or another, were able to regain their freedom and to return to their homes. Migrants who choose to move long distances to new places often move back. For example, of the 13 million emigrants to use the United States from 1900 to 1914, an estimated four million returned to Europe during the same period. In recent years, the proportion of emigrants from the United States has increased relative to the number of immigrants into the country, with the largest numbers returning to Mexico, Germany, Canada and the United Kingdom.

e) **The natives of towns are less migratory than those of rural areas**

This observation was related to a stage of economic development in Europe in the 19th century when rural to urban migration was predominant. In most of the developed and developing countries today, movement is still mainly from rural to urban places.

At present time, most of the developed countries have large urban majorities and relatively small rural populations. Therefore, most migration is inter urban or intra urban (within urban). In these developed countries, there is an increasing trend of outflow from urban centres to rural areas. This

migration is associated with the decentralization of industrial jobs and the willingness of commuters to travel long distances to their urban places of work.

f) **Females migrate more frequently than males within the country of birth, but males frequently venture beyond**

This law of migration was related partly to a stage of economic development and partly to its particular cultural context. Since women had few employment opportunities in rural areas, they tended to migrate to cities.

At present, the gender of the majority of migrants depends on cultural conditions as well as on economic and employment opportunities. In India, for example, many more males migrate from rural areas to cities than do females. During the British period, Kolkata and Mumbai were the main centres of commerce, trade and industries and attracted the people from distant places of Bihar and Uttar Pradesh. Nowadays, all the million cities of India, particularly Mumbai, Delhi, Kolkata, Chennai, Hyderabad etc., are attracting male migrants from all corners of the country. Migration between rural Indian villages, however, is commonly made by females because brides traditionally move at the time of marriage to the village of bridegrooms.

Men are more active in international migration than women. In the Gulf countries and Saudi Arabia, there are large numbers of immigrants from India, Pakistan, Bangladesh, Sri Lanka, Indonesia, Philippines and South Korea and over 85 per cent of them are male workers.

g) **Most migrants are adults; families rarely migrate out of their country of birth**

This law contains two observations. The observation concerning adults is universal and indisputable. In voluntary migrations, the majority of people are adults. The second part of the law is more problematic. It is certainly true that families find it more difficult to move than unmarried adults, but owing to the cultural, religious and political factors, families migrated from one country to another country. Many refugees migrated from India to Pakistan and Pakistan to India in 1947, and from Bangladesh to India in 1971. Similarly, families migrated from Ireland to Canada; from Uganda and Kenya to U.K and U.S.A.; from Somalia and Ethiopia to Yemen, Egypt and Saudi Arabia; and from Palestine to Syria, Lebanon, Libya, Kuwait and Saudi Arabia.

h) **Large towns grow more by migration than by natural increase**

It is universally accepted that large cities grow faster because of immigrants and population influx. For example, over 60 per cent of the total population of Delhi, Mumbai and Kolkata belongs to

people who came in these cities from the distant parts of the country in search of employments and got settled.

Most of the large towns and cities in the developing countries today are growing very rapidly by the immigration of people from the rural areas. In addition to, job opportunities (which have always attracted migrants to large cities), today's major cities of the developing countries offer more medical, educational facilities and social entertainment.

i) **The main causes of migration are economic**

This law is also universally accepted. It has been argued that international migrants tend to be influenced more by conditions in the area of destination than by the pressure of population at home. The movement of Indian labourers to Saudi Arabia and the Gulf countries is mainly because of unemployment in rural India and better job opportunities in the Southwest Asian countries.

It is, however, difficult to verify that the major reason for migration is economic. Human motivation, decisions and behaviour are so complex that it is very difficult to compare the relative importance of economic factors with other considerations. For example, moving at the time of marriage is not regarded as primarily an economic move in those societies having love marriages. Also many persons with wealth or large pensions enjoy the flexibility of choosing their residence in areas having an attractive physical and or social environment.

Most of the above-discussed laws of migration, advocated by Ravenstein are universally accepted. There are, however many question which Ravenstein did not address. For example, the non-economic, cultural, social, political, psychological and religious causes of migration have not been examined by him. Since the time of Ravenstein several other theories and generalizations have been propounded by other scholars to explain the process of migration.

■ **6.3.8.2 Lee's theory of Migration**

The famous sociologist Everett Lee broadly considers that migration as a permanent or semi permanent change of residence with no restrictions on the distance involved in the movement. Such a broad connotation of the term migration may give rise to more complications. In 1966, Lee proposed widespread theory of migration. He starts his formulations with factors, which lead to spatial mobility of population in any area and influence the decision of emigrant. These factors are as follows:

- i) Factors connected with the place of origin.
- ii) Factors associated with the place of destination
- iii) Factors that act as intervening obstacles, and
- iv) Personal factors that are specific to individual

According to Lee, each place having a set of favourable and unfavourable factors. While favourable factors are circumstance that act hold people within it, or attract people from other areas, unfavourable factors tend to drive back them. That apart, these are factors, with remain neutral, and to which people are essentially indifferent. While some of these factors affect most of the people in the area, others tend to have differential effects. Migration in any area is the net result of the interplay between these factors. Lee suggests that individuals involved in migration have near perfect assessment of factors in the place of origin due to their long association. However, the same is not necessarily true for that of the area of destination. There is always some element of ignorance and uncertainty with regard to reception of migrants in the new area. Another important point is that the perceived difference between the areas of origin and destination is related to the stage of the lifecycle of an individual. A long association of an individual with a place may result in an over evaluation of favourable factors and under evaluation of unfavourable factors in the area of origin. At the same time, the perceived difficulties may lead to inaccurate evaluation of favourable and unfavourable factors in the area of destination.

The final decision to move does not depend merely upon the balance of favourable and unfavourable factors at the places of origin and destination. The balance in favour of the move must be enough to overcome the natural inertia and intervening obstacles. Distance separating the places of origin and destination has been more frequently referred to in this context by authors, but according to Lee, distance while omnipresent, is by no means the most important factor. Furthermore, the effect of these intervening obstacles varies from individual to individual.

Apart from the factors associated with places of origin and destination, and the intervening obstacles, there are many personal factors, which promote or retard migration in any area. Some of these are more or less constant throughout the life span of an individual, while others tend to vary in effect with the stages in life cycle. It may be noted that the real situation prevailing at the places of origin and destination are not as important in affecting migration as individual's perception of these factors. The process of

perception depends, to a large extent, on the personal factors like awareness, intelligence, contacts and the cultural milieu of the individual.

The decision to migrate is the net result of the interplay among all these factors, Lee pointed out that the decision to migrate is, however, never completely rational. Also important to note here is the fact that not all persons who migrate do so on their own decision. Children and wives move with the family where their decisions are not necessarily involved.

After outlining the factors at origin and destination, and the intervening obstacles and personal factors, Lee moves on to formulate a set of hypotheses concerning the volume of migration, streams and counter-streams, and the characteristics of migrants. He gave the following six hypotheses relating to the volume of migration.

1. The volume of migration within a given territory varies with the diversity of area included in that. High degree of diversity among areas should result in high levels of migration.
2. The volume of migration varies with diversity of people, where there is homogeneity of people in terms of race, ethnic origin, education, income, tradition, the migration level shall be low in comparison to an area characterized by heterogeneity.
3. The volume of migration is related to the difficulty of surmounting the intervening obstacles. The migration level has a direct relationship with the amount of intervening obstacles. Thus, greater the obstacles lesser are the migration.
4. The volume of migration varies with fluctuations in economy. During the periods of economic expansion,, the migration curve moves upward and during depressions, it suffers a downward trends.
5. Unless severe checks are imposed both volume and rate of migration tend to increase with time. Migration is, thus, like sinning if once done it is easier to do again.
6. The volume and rate of migration vary with the state of progress in a country or area. The magnitude of migration is high in case of developed areas/ country. On the contrary, less developed countries have least mobile population.

Likewise, with respect to the developed of streams and counter-streams of migration, Lee suggested the following six hypotheses:

1. Migration tends to take place largely within well-defined streams.

2. For every major migration stream a counter stream develops.
3. The efficiency of a stream (calculated in terms of a ratio between stream and counter, or the net redistribution of population effected by opposite flows) is high if negative factors at the place of origin were more prominent in the development of stream.
4. The efficiency of a stream and counter stream tends to be low if the origin and destination are similar.
5. The efficiency of migration stream will be high if the intervening obstacles are great.
6. The efficiency of migration stream varies with the economic conditions. In other words, it is high in the time of prosperity and vice versa.

And finally, Lee outline the following seven hypotheses relating to the characteristics of the migration:

1. Migration is highly selective. Migration tends to attract more adult population, not people of all age can move. It is termed as positive when the selection is for high quality migrants. It is termed as negative when the case is opposite.
2. Migrants responding primarily to plus factors (pull) at destination tend to be positively selective. These persons are not under any compulsion to move. They do so because they perceive better opportunities.
3. Migrants responding primarily to minus factors (push) at place of origin tend to be negatively selective; or where the minus factors are overwhelming to entire population groups, they may not be selective at all. On the whole, factors at origin operate most stringently against persons who have failed economically and socially. Generally, uneducated unskilled population is more likely to be forced to migrate.
4. Taking all migrants together, selection tends to be bi-modal. For any given origin, some of the migrants who leave are responding primarily to the plus factors at the destination, while others are responding to the minus factors at the place of origin.
5. The degree of positive selection increases with difficulty of intervening obstacles. Intervening obstacles weed out some of the weak and incapable migrants.
6. The propensity to migrate is high at certain stages of the life cycle. Thus, the migrants are age specific. People of certain ages have greater propensity to move in comparison to the people in other ages.

7. The characteristics of migrants tend to be intermediate between the characteristics of the population at the place of origin and the population at the place of destination. It is because the migrants are already to some degree like the population at destination that they find certain positive factors there. It is also because the migrants are unlike the population at the place of origin and certain minus factors warrant their movements.

■ 6.3.9 Glossary

- Fecundity:** The physiological capacity of a woman or couple to produce children. It is different from fertility, which refers to the actual reproductive performance.
- Fertility:** The childbearing performance of individuals, couple, groups or population. It is different from fecundity, which refers to the biological capacity to reproduce that may or may not lead to fertility. Sometimes, the term natality is used in the analysis of childbearing process.
- Gross Migration:** The total migration into and out of a specified territorial unit during a certain period.
- Life expectancy:** The average number of additional years a person is likely to survive if existing age-specific mortality conditions continue to prevail. Life expectancy of a newly born baby is known as life expectancy at birth.
- Life table:** A detailed description of mortality conditions in a population in the form of probability of dying and various other statistics at each age. The values of life expectancy at each age in a population are derived from life table.
- Migration:** Movement of individual or individuals from one place to another with either permanent or semi-permanent change in the place of usual residence.
- Natality:** A word used as an approximate synonym to fertility.
- Natural increase in population:** Change in population size brought about by fertility and mortality alone.
- Population pyramid:** A graph showing the distribution of population by age and sex.
- Population projections:** Forecast of the future number of people based on recent trends in the crude birth and death rates of males and females in each of a set of age classes.
- Sex ratio:** The distribution of a population between males and females.

Zero Population growth: The ending of population growth when birth and death rates are equal. This would require an average number of 2.3 children per family. Or a condition in which the rate of natural increase of a society is nil: attained when the crude birth and death rates are the same.

■ 6.3.10 Self Assessment Questions

1. What do you mean by Population Dynamics?
2. How do you prove fertility, mortality and migration are important components of population change?
3. Define the terms fertility, mortality and migration.
4. What are the important measures of fertility and mortality?
5. Discuss the role of determinants in changing the nature of fertility, mortality and migration.
6. Specify the types of migration: Explain the impact of migration in the respective area of source and destination.
7. What is meant by streams of migration? Highlight the various types of migration streams.
8. How do you calculate the net migration?
9. Discuss in detail the theory of Migration as expounded by Ravenstein.
10. Bring out the important aspects of migration highlighted by Lee.
11. What are the basic differences between the theories of Ravenstein and Lee?
12. Highlight the temporal change of fertility and mortality rates during various decades of India.
13. Distinguish between push and pull factors in migration?
14. "Fertility and mortality rates are the important indicators of development of nation" - Explain.

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PART – I
Paper - III : Module – VI
Unit – 04

Module Structure

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- 6.4.2 Objective
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 - 6.4.3.1 Malthusian Theory of Population Growth
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PART – I
Paper - III ; Module - VI
Unit – 04

■ **6.4.1 Introduction:**

Already over 6 billion people living in the world as per latest estimation. But the billion of humanity are not distributed evenly over the globe. Somewhere density and number of population is remarkably high whereas in others places the population density is very low. This kind of unevenness and disparity in distribution of population depends on different factors generally, which control the distribution. Any sort of development of an area is directed by number of parameters, among them, population is one of the central aspect that is well known to all. That is why, sparsely distributed areas always have been remained underdeveloped, although some exception is there in some part of the world. Another important aspect of this unit is population growth. In common sense, population growth means increase number of population over time period. Population growth has some specific trends pattern and norms, which have been identified and discussed by many experts of different disciplines. Theories of population are not same. Many philosophers and thinkers expressed politico-economic view and some others formulated it with the given emphasis on social views. Malthus' formulation on population was a landmark in the history of population theories, and, therefore, for all times to come, population theories and generalizations began to be categorized with reference to Malthusian theory. Another prominent contributor is Karl Marx, who has given different view in it. By a theory of population is generally understood an attempt to explain the major factor or factors determining growth in population. Apart from these matters, some other different aspects are being discussed in this unit. Morbidity, famine and nutrition are important subject matter to the geographers. Of late, spatial distribution pattern, types, and changing pattern of morbidity over time are getting importance to know the stages of development in terms of technological advancement, improvement of medical facility etc. Famine, this particular event is not frequent in modern world in compare to earlier situation. In practical, when any region or state does face any event like earthquake, drought, flood, cyclone with huge loss of foodstuff, in this situation, this area is expected to get helped from other nations.

Food is a basic necessity for human survival and shapes people's lives in profound cultural, ideological and economic ways. Still, rapid population growth, especially in the least developed countries, creates a major challenge for the production of food on a global scale. Rising from just one billion people in 1800 to four billion in 1975 and a projected seven billion by 2010, population growth is having a major impact.

on levels of food self-sufficiency around the world. Despite major technological advances in food production and the emergence of global agri-food systems, the reality is that the developed world has too much food whilst many parts of the developing world have too little.

■ 6.4.2 Objectives:

We have to study here different types of matter and every topic might be significant from different point of view. Some topic began to emerge as a subject matter within geography during last decade. So boundaries of this discipline are becoming increasingly visible. Some geographers, who are showing interest having discussion on epidemiological transition in order to obtain the shifting nature of diseases and causes of death over time. The study of cause, consequence and spatial distribution of diseases and famine is also important matter of discussion. To know the variation on distribution and density of population over the earth surface is another goal to geographers. Population growth with its trends from the beginning of civilization to till today has been changed. Sometimes man, the rational being, has changed the rate of population growth in order that the huge increase of population could be control. Some people in different countries could not restrict the faster rate of population growth, that is why; they have been remaining in same position of demographic transition. So some specific objectives could be outlined here, these are as below

- a) To know the growth rate of population over different time period?
- b) To know, what is the diverse nature of population growth according to Malthus and Marl Marx?
- c) Are these theories (Malthus and Marx) relevant in present context?
- d) To know, why people are distributed unevenly over the surface.
- e) Why does morbidity situation vary place to place?
- f) To know, what are the important reasons of famine?

■ 6.4.3 Theories of Population Growth

Population size and change therein play such an important role that they have been the subjects of theorizing since time immemorial. Most of the religious doctrines, either directly or indirectly, have something or the other to say on population issues. Right from the rise of human civilization, the scholars did not agree on the concept of population growth. Many of the ancient philosophers and thinkers expressed concern over size, growth and quality of population. In modern time, population related issues

have occupied a central position in the politico-economic theories of mercantilism and physiocrats; in the formulation of classical economists like Adam Smith, David Ricardo and others; in the romantic and utopian ideas; in the Malthusian and neo Malthusian formulations; and in Marxists and socialist views. However, in the true sense a scientific theory of population is said to have emerged only towards the end of the eighteenth century, when Thomas Robert Malthus published his much debated and controversial Essay on Population in 1798. Malthus' formulation on population was a landmark in the history of population theories, and, therefore, for all times to come, population theories and generalizations began to be categorized with reference to Malthusian theory.

According to Coontz in 1979, 'A theory of population is generally understood as an attempt to explain the major factor or factors determining growth in population.' Although, all the three components of population change, viz., fertility, mortality and migration, determine the dynamics of population, the first of the three has been accorded a central position in most of the theories. All scholars are not in same opinion. Some of them argued a continuous increase in population for the survival of human species, races and nations. The believers of this opinion, population will find its own level naturally. This called populationist camp also has heterogeneous elements: many communists, idealists and some socialists. Some believe that population is the wealth of the state. The others believe that the fast growth of population had been the cause of disappearance of many civilizations from the earth. They fear overpopulation and the population explosion and predict standing room only. Many hold that there is an optimum population above which there should be no increase, for fear of impoverishment. Unemployment and low wages are attributed to surplus population. In this group, sometime called the pessimists, are many Protestants, Americans, Individualists, and conservatives. However, alarm about the population growth is not new, for overpopulation has long been the norm. So it is better to discuss a historical general idea of population growth in brief. Although the nature of population growth has been changed from time to time and place to place. In antique Greece, the earliest thinkers supported the expansion of population, but Plato was a restrictionist who advocated an absolute limit of population. Aristotle and Polybius ascribed the fall of Hellenic civilization to the decline in population growth. The Chinese philosopher Confucius argued that a numerical balance be maintained between population and environment. Thus, he was not in favour of unchecked growth of population. In fact, he was the first who gave the concept of optimum population level. Early Rome was characterized by a fertility cult. Growth of population they believed was necessary for military and political expansion. They were in opinion that

the primary function of marriage was to provide citizens and soldiers for the state. It was in this background that Augustus introduced legislation to encourage population growth.

Population growth was necessary to survive and protect the nation or province from different invasions, wars, battle, etc. This kind of concept and goal got importance in medieval period. Which gave rise to the feeling the population growth. Most of the orthodox thinkers in the eighteenth century were of the opinion that people and beasts must be multiplied. The German scholars also described the power of states mainly to population.

● Types of Population Theories

On the basis of the variety of population growth, Coontz has classified the theory into three categories: biological, cultural and economic. *Biological theories* stress that the influences on human population growth are essentially the same as those regulating the growth in numbers of plants and animals. It has been argued, for example, that fertility diminishes and is regulated by increasing population density. Cultural theories, on the other hand, regard demographic growth as unique and emphasize the importance of man's reason and intellect in influencing his growth in numbers. The declining birth rates of the economically advanced nations are seen as evidence of man's ability to control his growth in numbers. Economic theories, especially those of Marxist-Leninist economists, emphasise the importance of economic factors, notably the demand for labour, as being the essential influences on growth rates, patterns of migration and population distribution.

■ 6.4.3.1 Malthusian Theory of Population Growth

Malthus Thomas Robert, the English economist and demographer, is famous for his theory of population growth. In 1798, he expounded his first essay on population. The title of this essay read as "An essay on the principle of population" as it affects the future improvement of society, with remarks on the speculations of Mr. Godwin, M. Condorcet and other writers." Malthus' first essay was very poorly drafted without any support of empirical evidences, he soon revised his arguments and published the second edition in 1803. subsequently, another four editions of his essay appeared in his lifetime. The seventh editions were more meticulously drafted and were based on extensive study of works on related topics. However, the essence of his arguments remained same in all the editions. His general views that population generally likely to increase faster than the means of substance. The quick increase in population absorbs all economic gains, unless controlled by what he termed preventive and positive checks. He highlighted that if population is unchecked, population tends to increase at a **geometric**

progression (i.e., 1,2,4,8,16,32....) while subsistence is increased at an **arithmetic progression** (1,2,3,4,5,6...). The population will double after every twenty-five years, and in two centuries the population would be to the means of subsistence as 256 to 9, in the three centuries as 4096 to 13 and in two thousand years the difference would be almost incalculable. He mentioned some principles

- a. Means of subsistence always controls the population growth.
- b. Population invariably increases where the means of subsistence increased, unless prevented by some very powerful and obvious checks.
- c. These checks, and the checks which repress the superior power of population and keep its effects on a level with the means of subsistence, all are resolvable into moral restraint, vice and misery.

Malthus believed that two of man's attitudes essential to the maintenance of life were immutable, were laws, and were antagonistic: i) the need for food, and ii) the passion between the sexes. It was second which led people to marry at a relative early age and would result in such a large number of births that the population would double itself in few years of unchecked by misery and vice.

The widening gap between population and subsistence will increase a man's tendency to press upon the man's of subsistence. With the result, the society is divided into two sets of people, first one is the rich (haves) and second one poor (haves not), and this two types of people give raise the capitalistic set-up. The rich who are the owners of the means of production earn profit and accumulate capital. With the increased capital, they enhance their consumption but do not increase their population for fear of decline in their standard of living. Malthus defends the capitalistic set up of society on the ground that if the capital was to be distributed among poor, it will not be available for investment on the mode of production. Thus, the rich will continue to grow richer and the poor constituting the labour class poorer. In his opinion, the increasing gap between the population and resources shall ultimately lead to the point where misery and poverty shall become inevitable. According to him, postponement of marriage was and would continue to be the chief preventive. He did believe that the preventive checks, such as delayed marriage, moral restraint, etc., would so reduce man's rate of production that the positive checks would not operate continuously. He believed that change in society and social institutions would mitigate the positive checks for a short while, until man's number would again grow more under his new institutions, and that man would then suffer from such positive checks like vicious customs about women, pestilence, war, hunger, disease, etc.

The positive and preventive checks, which occur in human populations to prevent excessive growth, relate to practices affecting mortality and fertility respectively. So his positive checks included wars, disease, poverty, and mainly lack of food. His preventive check consists of principally moral restraint or the postponement of marriage, and vice in which he included adultery, birth control and abortion. He saw the tension between population and resources as a major cause of the misery of much of the humanity. But he did not support contraceptive methods. The Malthusian theory has been criticized on several counts. His thesis that population was growing quickly and that man was a biological as well as social being, depending on sexual drive and food. Yet, he confused moralist and scientific approaches. Marx was one of the most powerful critics of Malthus, asserting that poverty is the result of unjust social institution of capitalism rather than of population growth. No country of Europe or North America except possibly Ireland conformed to the Malthusian prediction. It has also been argued that Malthus' reactionary views impeded the development of demography as a science.

The main points of criticism of Malthusian theory have been given as under:

- a) The basic assumption of Malthus on passion between the sexes has been questioned on the ground that the desire to have children cannot be mixed up with passion and desire for sex. The desire to have sex is a biological need, whereas desire to have children is a social instinct.
- b) His critics also disagreed to the two sets of ratios between population increase rate and means of subsistence. Population has rarely increased in geometrical progression and means of production have rarely increased in arithmetic progression.
- c) The span of twenty five years assumed by Malthus to allow population to double itself also does not seem to be anywhere near reality. The doubling period for a population varies from country to country and from region to region, depending upon the stage of its economy, and scientific and technological advancement.
- d) Malthus overemphasized the positive checks and did not visualize the role of preventive check like contraceptives and family planning.
- e) Beside, natural calamities have occurred in underpopulated areas also and thus there was no causal relationship between positive checks and overpopulation.
- f) Malthus also failed to realize even the biological limitations that a population cannot grow beyond a certain limit.
- g) Malthus has been severely criticized for ignoring the role of changing technology and the consequent transformation in socio-economic set-up of a society.

Having many criticisms from different corner, Malthusian principle of population has been successful in pointing the importance to maintaining a balanced relationship between population and means of subsistence. The critics of Malthus failed to realize that it was because of a large measure of truth in Malthusian principle of population that men of today feel the need of resorting to contraception to keep their families within reasonable limits. Above all, the Malthusian opinion of population initiated theory building and for this reason, his work is of great value.

■ 6.4.3.2 Marxian Theory of Population Growth

Karl Marx, the man is well known to the world for his contribution almost in all spheres. He was a creative thinker, who made a scientific explanation of human history. In the opinion of Marx, like scientific and universal laws in physical sciences, there are universal laws of social processes, according to him, the essence of history is change in modes of production in any society; and this change is always progressive. For example, start from the pastoral nomads, mankind turned to the stage of settled living. Hunting, fruit gathering and sheep rearing gave way to domesticating animals and private agriculture. Then came urban culture and rich diversity of vocations. Population increased, inhibiting factors weakened, private property emerged, and a stage was reached when private means of production could also be refined in a hundred ways. This led to formation of economic classes, and there occurred a social hierarchy, codes of behaviour, rules of punishment for crime and misconduct. Consequently, the capitalism has come into account on account of the Industrial Revolution. In that way, two types of classes got establish in the society namely the classes of haves and haves not. According to Marx, the division of people into classes had the effect of initiation of class struggle, as the class interests were mutually hostile and irreconcilable. In brief, there was a class of employees and another of the employed. In familiar Marx terminology, this would be called as exploiters versus exploited.

It was in this background that Karl Marx, while postulating his general theory of communism and scientific interpretation of history, gave some ideas about population growth. As a strong believer in dialectical materialism, he considers that society, especially the feudal and capitalist society, has two major economic classes, viz., the rich and the poor. The rich were those who posses the modes of production mainly land and environment. The owner of modes of production has the freedom to offer employment and the workers, being too poor, cannot resist the terms the employer offers. Thus, the workers by contract sell their energy, skill and will to work in return for agreed wages. Under this system, the owner of means of production retains the right to terminate the contract of employment at his sole discretion. He hires and fires at will in most cases, the law is on his side. Where this is not so, law court

can be induced to prove helpful to this cause. Moreover, the owner is the sole judge of the utility and performance of his workers.

This has been the situation ever since man started employing other men for the production of goods in the field, the shop, the household and the factory. The employer earns profit by exploiting the workers as they are underpaid in the form of wages. This profit was termed as 'surplus value' by Marx. Surplus value was the positive difference between the exchange value and subsistence value. The profit earned by the rich led to the process of capital accumulation. In consequence to this, the poor workers try to accumulate labour, the only commodity they possess, through rapid population growth. Improvements in the technology of production and rapid growth of population among the poor workers lead to surplus labour and unemployment. This is the main cause of misery, unemployment, undernourishment and poverty in the society. The population of the poor grows at a faster rate as compared to that of the small proportion of population who possess the modes of production.

Fundamental change in history, according to Marx, is on account of class struggle in human societies. This is also the crucial key to basic understanding of population growth. Judged in this light, not only can the past pattern of growth of population can be interpreted, but even the future trends of population growth can also be reasonably projected. Marx again pointed out that it is the working population which, while affecting the accumulation of capital, also produced the means whereby itself is rendered relative superfluous, which is turned into a relatively surplus population. This process leads to unemployment and poverty in the society. With the passage of time there occur new innovations in the methods of production, the improved technology renders the growing population of poor people unemployed, which sharpen and intensify class struggle. For this reason, class struggle and poverty are seen as the main driving forces of rapid population growth among poor workers.

Marxian theory of population is based on as a reaction to the capitalistic mode of production and governance. According to him, poverty and misery were not natural inevitabilities but unpleasant gifts of capitalism. Misery, poverty, unemployment and fast growth of population can disappear if capitalistic form of social order is replaced by communism. He had a convinced opinion that poverty and misery are the outcomes of unemployment and underemployment arising out of inability of the capitalistic social order to provide jobs to all, regardless of the speed with which the population increased. Marx was not in agreement with Malthus who put forwarded that population tends to increase faster than the means of subsistence, thus absorbing all economic gains, unless controlled by what he termed preventive and positive checks.

Marx places the workers means masses at the centre of main historic processes on which depend the growth of population and the course of history. He also asserted that on the top is, and has been, the ruling class, small in numbers but unchallenged in authority and power; and sown below is that large body of the masses which lives in utter misery and is content to be exploited and driven like dumb creatures. In the opinion of Marx, there could be no one-universal law of population growth. The growth pattern and dynamics of population change with the change in mode of production. Mode of production is a specific set of forces of production for instance labour, capital, material, machinery etc. patterned into a specific set of relations of production developed as a result of agreement between the employer and the workers.

According to Marx, each mode of production had its own economic and demographic laws. As mentioned earlier, the demographic characteristics and growth patterns of population change with the change in mode of production. In other words, the growth pattern of population of a nomadic society will be different from that of settled cultivators and the demographic attributes of an industrial urban society will be different from that of an agrarian rural society.

Therefore, in the view of Marx, economic classes and private property are the principal twin evils which lead to poverty, unemployment and fast growth of population. The private property huts the general good of the community at large. In particular, property that qualifies as primary means of production such as mines, land, agricultural fields, orchards, mills etc., cannot be permitted to be owned privately. These resources should be owned by the community at large, if the rapid growth of population is to be checked and poverty and miseries are to be eliminated from the society. Marx had full faith in the ability of communist method of production to give full employment and a better living to all able bodied workers regardless of the rate of increase in their number.

One basic postulate of Marx about the growth of population was that in the capitalistic form of society the supply of labourer increases much faster than the opportunities of employment. This surplus population becomes an industrial reserve army of unemployment and underemployed hands. The movement of wage levels is determined by the magnitude of working population among this industrial reserve army. This critical proportion of workers among reserve army is controlled by expansion or contraction of capital. The birth and death rates as well as size of family in turn have inverse correlation with the level of wages, that is, means of subsistence at the disposal of different categories of workers. Such a class of workers which is more prone to become a part of reserve army or surplus populations shall have lower wage level and hence high birth and death rates, a situation found in most of the underdeveloped and developing countries of Africa and Asia.

Marx, in his theory of population, tried to establish a relationship between capital accumulation, labour demand, surplus population mainly unemployed and underemployed, wage levels, standard of living, poverty and rates of fertility and mortality and growth of population. In his opinion all these are closely related in the capitalistic form of society in which means of production are owned by a small proportion of population and the rest are the workers who are being exploited by the employers. Marx supposition about population exposes the weakness of the capitalistic form of social order in which individuals have the right to accumulate huge amount of wealth and in which labourers are exploited by giving them low wages, making them poor and helping them increasing population at a faster pace. In spite of that, this theory of population growth has been criticized from several counts, as under:

- a) The extraordinary increase of population in the world is not due to the lower wages, unemployment and underemployment but mainly due to the extension in the medical facilities and health care services which substantially reduced the death rates without arresting the birth rates.
- b) The increase in the population does not automatically lead to the decline in real wages as has been argued by Marx. There are numerous socio-political and economic factors which determine the wage levels and employment opportunities in a society.
- c) Marx tried to establish a positive negative correlation between the levels of wages and the birth rate of population growth, i.e., higher the wages, lower the birth rate. The faith and religion of the population has, however, not been taken into consideration by Marx in his postulate. There are numerous affluent ethnic and religious groups in the developed and developing countries in which the rate of birth is significantly high.
- d) He considered private property as the main cause of all evils including poverty, misery, unemployment and fast growth of population. The social norms, education level, technological advancements and attitude towards family are all vital determinates of population growth. This private property may not be blame as the sole factor for population increase.
- e) This population growth related theory is not applicable in feudalistic, socialistic, primitive hunting and food gathering societies. It can be relevant only in capitalistic society.

Notwithstanding all these criticisms, it can be said that after Malthus, Marx endeavored to give a scientific explanation of the growth of population which was based largely on the information available from the capitalist countries. Growth of population in a region is, however controlled by the physical,

socio-economic and economic conditions. It is because of these factors that a universal model of population growth cannot be postulated.

■ 6.4.4 Concept of Morbidity:

Morbidity refers to the level and type of sickness and disability within a population. Disease may involve a temporary or permanent impairment in the functioning of any single component, or of the relationships between the components making up the individual. The notion of the body as machine, disease as the consequence of breakdown of the machine, and the doctor's task as repair of the machine. Historically morbidity has been an area of study for both clinicians and population-oriented scientists such as epidemiologists. For the geographers, this involves identifying both the static and dynamic aspects of sickness, spatial distribution and variation, types, indicators of diseases and health care facilities as well as the ways in which those patterns affect mortality. Static dimensions include not only a profile of diseases within a population, but information on the distribution of these conditions. The dynamic condition focuses on the connection between population change (in terms of size, composition, and distribution) and the morbidity profile. Spatial distribution and variation of diseases covers the area specific nature and type of diseases, why those variations are happened. Indicators of it mean which kinds of factors control diseases and health care facilities refer to as a programme of services that should make available all facilities of health and allied services necessary to promote and maintain the health of mind and body. The programme should take account the physical, social and family environment in the view of presentation of diseases and restoration of health. Although hospital based medical services involving advanced technology automatically come to mind when the issue is raised.

● Classification of diseases:

Classification of diseases is one of the most problematic task. One of the major concepts underlying science is the notion of categories. The classification of objects, whether natural or manmade, is a prerequisite for the rational development of any conceptual categories and ultimately the development of science. Medical sciences, especially the contemporary all nations is highly dependent on classification systems of disease. The emphasis placed on the diagnostic process and the obsession with causation mandate to concise and accurate classification system. In spite of that, the presumed objectivity of medical science, the development of a workable disease classification system has been difficult. The use of modern diagnostic techniques and sophisticated biomedical testing equipment notwithstanding, no real consensus exist with regard to the classification of disease. Part of the problem stems from controversy over exactly how to define disease. Even if this were not an issue, the reality is that disease patterns

always cannot be recognized, even diagnostic test, are far from precise, and conventional standards for defining diseases tend to shift in accordance with new research findings, new treatment modalities and even non-clinical developments. All these problems and the concomitant criticisms are exacerbated when attempts are made at classifying mental disorders. So, the systems that have been developed, although used widely are not without their critics. After this discussion many experts in concerned field have taken initiative for classifying the diseases. The most widely recognized and utilized disease classification system is the International Classification of Diseases. World Health Organization has officially accepted the ICD system and major categories of diseases are shown below.

Major categories of Diseases and Injuries ICD

1. Infectious and parasitic diseases
 2. Neoplasm
 3. Endocrine, nutritional, and metabolic diseases and immunity disorders
 4. Diseases of the blood and blood forming organs
 5. Mental Diseases
 6. Diseases of the nervous system and sense organs
 7. Diseases of the circulatory system
 8. Diseases of the respiratory system
 9. Diseases of the digestive system
 10. Diseases of the genitourinary system
 11. Complications of pregnancy, childbirth, and the puerperium
 12. Diseases of the skin and subcutaneous tissue
 13. Diseases of the musculoskeletal system and connective tissues
 14. Congenital anomalies
 15. Certain conditions originating in the prenatal period
 16. Symptoms, signs, and ill defined conditions
 17. Injury and poisoning
- V Classification of factors influencing health status and contact with health service
- E Classification of external causes of injury and poisoning

The ICD system is designed for the calcification of morbidity and mortality information and for the indexing of diseases and procedures that occur within the hospital setting. The present classification system includes two components: diagnoses and procedures. Two different sets of codes are assigned to

the respective components; the codes are assigned to the respective components; the codes are detailed enough that very fine distinctions can be made among specific diagnoses and procedures.

On the other hand, the basis for prospective payment is the diagnostic related group (DRG). Using the patient's primary diagnosis as the starting point. Health care financing agency in USA has developed a procedure for grouping all hospital patients into 470 DRGs. DRGs have been grouped into 23 major diagnostic categories (MDCs). These MDCs are based primarily on the different body systems; the lists of MDCs are presently used.

● **Major Diagnostic Categories used in the Prospective Payment System**

Major diagnostic category

- Diseases and disorders of the nervous system
- Diseases and disorders of the eye
- Diseases and disorders of the ear nose and throat
- Diseases and disorders of the respiratory system
- Diseases and disorders of the circulatory system
- Diseases and disorders of the digestive system
- Diseases and disorders of the hepatobiliary system and pancreas
- Diseases and disorders of the musculoskeletal system and connective tissues
- Diseases and disorders of the skin, subcutaneous tissue, and breast
- Endocrine, nutritional and metabolic diseases and disorders
- Diseases and disorders of the Kinney and urinary tract
- Diseases and disorders of the male reproductive tract
- Diseases and disorders of the female reproductive system
- Pregnancy, childbirth, and the puerperium
- Newborns and other neonates with conditions origination in the prenatal period
- Diseases and disorders of the blood, blood forming organs, and immunity
- Myeloproliferative diseases and poorly differentiated neoplasm
- Infectious and parasitic diseases
- Mental diseases and disorders
- Substance use and substance induced organic mental disorders
- Injury, poisoning, and toxic effects of drugs
- Burns

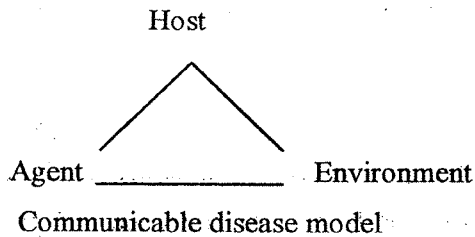
Factors influencing health status and other contacts with health services

But in general system diseases and health problems can be classified by organ or organ system, such as kidney disease, hear disease, respiratory infection, and so on. Another method of classification is by causative agent: viral disease, chemical poisoning, and physical injury. In this scheme, causative agents may be biological, chemical, or physical.

▲ Causative agents for diseases and injuries

| Biological Agents | Chemical Agents | Physical Agents |
|-------------------|----------------------|------------------|
| Viruses | Pesticides | Heat |
| Rickettsiae | Food additives | Light |
| Bacteria | Pharmacologics | Radiation |
| Fungi | Industrial chemicals | Noise |
| Protozoa | Air Pollutants | Vibration |
| Metazoa | Cigarette smoke | Speeding objects |

Another important classification system divides diseases into **communicable (infectious)** and **non-communicable (noninfectious)** diseases.



▲ Classification of Diseases

| Types of diseases | Examples |
|-----------------------|---|
| Acute Diseases | |
| Communicable | Common cold, pneumonia, mumps, measles, pertussis, typhoid fever, cholera |
| Non-communicable | Appendicitis, poisoning, trauma (due to automobile accidents, fire, etc.) |

| | |
|-------------------------|---|
| Chronic Diseases | |
| Communicable | AIDS, Lyme diseases, tuberculosis, syphilis, rheumatic fever following streptococcal infections |
| Non communicable | Diabetes, coronary heart disease, osteoarthritis, cirrhosis of the liver due to alcoholism |

▲ Morbidity Measures

Several measures are commonly used in morbidity analysis. The first involves the simple counting of officially recognizable conditions for the nation or sub national units of geography. Some of the indicators that are used include incidence statistics for specific conditions, symptom checklists, and various measures of disability. Notifiable conditions or reportable diseases are those important, which are generally collected from different sources to know the present situation of diseases in a particular area. Law to health authority must report those diseases. A **notifiable disease** is one for which regular, frequent, and timely information on individual cases is considered necessary for the prevention and controls that disease. Public health official are particularly interested in these conditions, since they have the potential to spread to epidemic proportions. Note that they are virtually all-acute conditions, at a time when the major health problems are attributable to chronic conditions. For this reason, reportable morbid conditions have become less useful as indicators of health status.

Different diseases have to be listed; mainly people of concerned area have been suffering from those diseases. All kinds of diseases are classified into two groups; say communicable diseases and non-communicable diseases. But some salient indicators of morbidity are incidence and prevalence rates, admission rate etc. An **incidence rate** refers to the number of new cases of a disease or condition over a certain time period expressed as a number per 1,000 or 10,000 population at risk. A **prevalence rates** divides the total number of persons with the disease or condition in question by the population at risk with respect to a specific point in time. Again, the population at risk is the number of persons who have some nonzero probability of contracting the condition in question. For example, the incidence rate for persons diagnosed as having AIDS in particular time in some area is:

No of persons diagnosed as having AIDS in certain time

Population at risk in that time period

On the other hand, prevalence rate, includes the total number of persons with AIDS in that time period say 1999 divided by the population at risk. In this instance the population at risk is the total population, minus those who already had AIDS in 1999, since this is a prevalence rate and the entire population has been theoretically at risk. The prevalence rate always exceeds the incidence rate, since the format is but a fraction of the latter. The only time the two rates are nearly comparable is when the condition is acute and of very short duration. For example, the incidence would almost equal the prevalence rate at the height of a 24-hour virus epidemic since victims cover almost as quickly as they are affected. Incidence and prevalence rates are both useful for planning purpose. Two additional rates utilized by demographers and useful to health planners are case rates and case fatality rates. A **case rate** is merely an expression of the reported incidence of a disease per 1000 or 10,000 persons and is not as finely tuned as a rate that is adjusted for the population at risk. The **case fatality rate** is generated by dividing the number of persons who die from a certain disease by the number of persons who contracted that disease.

Another group of health status measures might be generally referred to as disability measures. Like other aspects of morbidity, disability is extremely difficult to operationalize. While it would appear simple to enumerate the blind, deaf, or otherwise handicapped, the situation is actually quite complex. A wide variety of other conditions that are not so clear-cut could the picture. The question is there; does lower back pain that interferes with work constitute a disability? How is mental retardation classified and at what point? Even those disabilities that appear obvious defy easy categorization due to the subjective dimension of disability. There are many hearing-impaired individuals and amputees, for example, who would take exception to being classified as disabled. This definitional problem is partly resolved by the utilization of more objective and easily measured indicators as proxies for disability. Measures in this category include; work loss days, school-loss days, bed-restricted days, and limitation of activity indicators. The number of days missed from work or school, the number of days individuals are restricted to bed, and the extent to which individuals cannot carry out routine daily activities can all be calculated and used as proxy measures of morbidity. Moreover some important disability rates include Sullivan's rate, Disability Adjusted Life Years (DALY). But it is keeping in view; all these kinds of data are available only from sample survey.

Finally, there are health status measures related to ascertained medical outcomes. Medical outcomes measurement is a growing area of interest for both researchers and decision makers, with outcomes seen as indicators of service delivery efficiency and medical success. The short-form health survey is one

device used to measure outcomes. It includes one multi-item scale that assesses eight health concepts: 1) limitations in physical activities, 2) limitations in social activities, 3) limitations in usual role activities related to physical health problems, 4) pain, 5) general mental health, 6) limitations in usual role activities related to emotional problems, 7) validity, and 8) general health perceptions.

■ 6.4.5 Concept of Nutrition

Food is the chief essential materials which fulfill the body's requirement for its well-being. These essential materials are called nutrients. In general sense, adequate nutrition is critical to any body development, mainly in child development. Good food is indispensable for health at all stages of life and for satisfactory growth during infancy, childhood, adolescence and adulthood. Wholesome food in adequate quantities is no less important for pregnant and nursing women since they undergo a severe nutritional stress. One question can be raised here, why will we read nutrition in geography? and what is its utility in this study? Actually now a day, this particular subject has incorporated variety of topic to be its matter of discussion. Geography generally does explain the nature, magnitude of spatial variation or differentiation of different attributes or features on the earth surface. These features or attributes or matter of discussion could be spatial things or non-spatial thing. In this context, nutrition is concerned with the contents of geography because nutritional variation among the people over different part of the world gives diverse nature of picture in terms of development, education, efficiency, capability, length of life etc. This nutritional variation or different food habit divides the surface into number of regions. One example needs to be motioned here, as Africa is known as the nation of famine and starvation. Some important nutrition related matters have to be discussed here.

● Balance Diet

In order to get adequate amount of each of the different nutrients, the daily diet should include appropriate quantities of a variety of different foodstuff. A diet in which various foodstuff are mixed in suitable proportions to perform adequately. A list of food items as a general guide it would be practical and easy to follow. It also provides information as to which of the different foodstuff can be substituted for one that may be temporarily unavailable. Eating habits have changed with the times. The changes are faster now. The latest is fast food for fast life. Human diet is not restricted to any special category of food. Whereas most animals stick to a routine menu, man can and does eat a variety of foods, of both plant and animals origin. Variety is, for him, the spice of life, more so in foods than in anything else. This natural desire for variety is justified by the fact that no single food provides us with all the nutrients that we need. Cereals, like rice or wheat which make the staple food of mankind and provide us only with a fraction of

our nutritional requirements. We will have supplement cereals with other foods that provide plenty of fats and proteins and minor quantities of a number of vitamins and minerals. This means that the larger our diet list means the better our health can be. This will become evident if we explain what nutrients our foods contain and in what proportion.

The quality of foodstuffs varies stuffs to stuffs. Generally some important nutrients are found in foodstuffs which, in fact, are different in terms of their function or requirement to the body. These foodstuffs may be classified as a) Protein, b) fats, c) Carbohydrates, d) Minerals, e) Vitamins, and f) Water. Among these six elements, Protein, fats, and carbohydrate are called Macro Nutrients. We have to discuss all foodstuffs with respect to their sources, chief metabolic function to body, effects of deficiency etc.

● Proteins

Proteins are the most versatile elements in the body. They are the chief substances of the cells of the body. They form important constituents of muscles and other tissues and vital fluids like blood. Enzymes, which help in the digestion of food, and anti-bodies, which are the body's defences against infections are also mainly protein in nature. The composition of amino acid generally controls the nutritive value of protein. Amino acids are the bricks with which tissue protein is built and replaced. There are some 20 amino acids commonly found in dietary proteins. Out of these, 10 amino acids can be synthesized by the body itself, whether by mutual conversion among amino acids or from non-protein sources. But remaining 10 amino acids cannot be so synthesized and have to be supplied through diet. These are termed essential amino acids. Adults need 8 essential amino acids whereas children require 9 to 10.

● Fat

Like protein, fat is a necessary component in diet and is of value to the body in a number of ways. It is a concentrated source of energy and supplies per unit weight more than double the energy furnished by either protein or carbohydrates. Some fats, mainly vegetable oils, provide what are called essential fatty acids, linoleic and arachidonic acid to the body. Fats that circulate in the blood are of many types-triglycerides, phospholipids etc. The quantity and quality of fat consumed affects the level of cholesterol in the blood. Some fats like groundnut oil, sesame oil or sunflower oil which contain a high proportion of poly-unsaturated fatty acids do not increase blood cholesterol levels greatly. Other like butter, ghee and hydrogenated vegetable oils hold high amount of saturated fatty acids and greatly increase cholesterol

levels. It is seen that consumption of smaller amounts of fat at different times causes less increase of cholesterol than a large amount of fat taken at a time.

● Carbohydrate

Carbohydrates include every kind of starch and sugar. Grainfoods are largely composed of starch and foodstuffs like cane sugar and glucose are pure carbohydrates. They outline the main source of energy for the body. Being a cheap source of energy, carbohydrates form the bulk of Indian diet. A balanced diet simply means a diet that will supply all the nutrients necessary for the growth and development of the body. In our nation, a balanced diet has become an imperative since most Indian consume foods that provide more carbohydrates and fats than proteins.

● Vitamins and Minerals

Vitamins and minerals consists of micro nutrients as separated from proteins, fats and carbohydrates, they are called macro nutrients. Vitamins can be broadly divided into fat-soluble and water soluble vitamins. Vitamin A, D, E, and K are fat-soluble vitamins. Vitamin C and B (jointly vitamins, B₁, B₂ and other B-Group vitamins) are water-soluble. The vitamins are necessary auxiliary in metabolism. They combine with specific proteins, as parts of the various oxidative enzyme systems which are concerned with the breakdown of carbohydrates, proteins and fat in the body. Thus, they are intimately involved in the mechanism which releases energy, carbon dioxide and water as the end products metabolism.

▲ Foodstuff by Category

| Food Group-1 | Food Group-2 | Food Group-3 |
|---|--|---|
| a) <u>Cereals</u> : Rice, wheat, maize, jowar, baja, ragi and other millets. b) <u>Vegetables</u> : Yams, colocasis, tapioca, potato, sweet potato, tender jact-fruit, raw or green plantain. c) <u>Fats and Oils</u> : vegetable oil, butter ghee and other fats. d) <u>Sugar</u> : jaggery, can-sugar etc. | a) <u>Milk</u> : Milk, curds, butter-milk, panir, milk-power. b) <u>Pulses</u> : Dals, grams, dried peas and beans, groundnut and other nuts. | a) <u>Fruits</u> : Papaya, orange, tomato, melons, lime, mango, custard apple, amla, guava, sapota, grapes, ripe banana, apple etc. b) <u>Green leafy vegetables</u> : Sag orkeerai, tops of faddish, onion, carrot etc., drumstick leaves, mint lettuce, cabbage etc. c) <u>Other vegetables</u> ; Beans, brinjal, cucumber, carrot, drumstick, kovai, radish, onion, chillies, ladies-finger, pumpkin, bittergourd etc. |

■ 6.4.6 Population growth, food supply and nutritional status

This is another viewpoint of nutrition, in fact, food supply and nutrition status among the people on the earth many very place to place. Changing geographies, food supply and nutrition have come into account to know the present situation of different countries in terms of output of food per capita, food production etc. Food supply and nutrition related problems are common third world countries. Although food supply has increased in most major world region since 1950, to many of the world's population are still experiencing hunger. Defining hunger primarily in terms of under nutrition, and Food and Agriculture Organization (FAO) remarked that about 786 million people were undernourished in 1990. Similarly, the world's worst fed people are growing in numbers the fastest. The greatest number of undernourished people lives in Asia, but the region with the highest proportion is sub-Saharan Africa about 33 percent. Whilst heavily concentrated in the LDCs, it is important to emphasize that certain groups within society in developed countries also go hunger. In California, for example, up to 5 million people are short of food whilst others are consuming designer organic vegetables which have been shuttled around the world in sophisticated and refrigerated forms of transport. Population growth is the cause of hunger and food insecurity. The output of food per capita has been falling in the LDCs since the 1960s. In fact, they now account for approximately 25 per cent of world food imports by value, a significant increase on the 1970 figure. The falling levels of food self-sufficiency can be explained by three factors.

- a) Population growth has outpaced the rate of increase in food production in many LDCs, often combined with environmental disturbances, this has meant that imports have been necessary just to maintain per capita food consumption levels.
- b) Some countries like Brazil, Kenya etc. have expanded their agricultural exports whilst neglecting the domestic food staples. This has been necessary to earn foreign currency to repay debts acquired to fund development programmes.
- c) Many LDCs countries, for example, Saudi Arabia, Venezuela, and Libya have raised income by exporting oil. Thus, the wealthier sections of the population have increased their consumption of imported wheat, rice and livestock products.

Population growth and undernutrition, around 1990

| World Region | Population growth rate 1985-95 (% per year) | Crude birth rate, 1985-95 | Number under-nourished (Millions) 1990 | Percent population under-nourished |
|------------------------|---|---------------------------|--|------------------------------------|
| Sub-Saharan Africa | 3.0 | 45.6 | 168 | 33 |
| Middle East | 2.6 | 33.8 | 31 | 12 |
| South Asia | 2.2 | 32.7 | - | - |
| Far East | 1.4 | 21.6 | 528 | 18 |
| Latin America | 2.0 | 27.0 | 59 | 13 |
| Europe / FSU | 0.4 | 14.2 | - | - |
| North America/ Oceania | 1.1 | 15.8 | - | - |
| World | 1.7 | 26.0 | 786 | 15 |

FSU: Former Soviet Union

Source: Daniels, P. et.al (2003): Human Geography

Consequently, many LDCs have become net food importers, increasing their dependency on developed world exports. In the 1950s and 1960s, considerable proportions of these exports were in the form of food aid. Although falling significantly by the 1980s, food aid is still important to many low-income countries in sub-Saharan Africa and south Asia. For example, Egypt and Bangladesh are the largest recipients of cereal aid (mostly from USA), accounting for 25 per cent of the world figure in 1991. However, such aid has been criticized on numerous grounds, not least because it increases dependency, distorts local markets and stifles domestic production. By the 1990s, there had been a shift in emphasis, away from food aid and towards food trade. This has been encouraged by multinational organizations such as the World Trade Organization and the World Bank, and the increasing liberalization of world trade in agricultural products.

Considerable debate has developed since the 1960s over the extent of the world food problem. Pessimists from the neo-Malthusian school of thought predicted a 7 percent fall in per capita food production in the 1990s, leading to absolute global shortage of food and widespread starvation and famine in developing countries. In support of their claims, they point to the fall in the global output of cereals per person since the mid-1980s, the failure of the 1960s and 1970s green revolution to continue to develop new and higher

yielding varieties of wheat and rice into the 1980s and 1990s, and the real likelihood of future global harvest failures due to drought, leading to a repeat of the 1970-1974 world food crisis. Although accepting that global food prospects are mixed and that there remain too many undernourished people in sub-Saharan Africa, the more optimistic anti-Malthusian school of thought believes that the world food problem is not deteriorating. The number of undernourished people actually fell by 108 million between 1980 and 1990, despite an increase of 841 million people during that period. In fact, according to Dyson in 1996, the frequency and demographic impact of famines has declined greatly during recent decades. Modern food crises have had a diminishing and increasingly short-lived impact on population growth. The phenomenon of famine has become more and more restricted to sub-Saharan.

Whilst accepting the general decline in per capita cereal production, optimists argue that population growth has not outstripped cereal production in all world regions. Indeed, cereal yields are not leveling off, neither are the effects of the green revolution, which in any case was not a revolution in the sense of creating a major upsurge in global cereal. Any slowdown in cereal yields has occurred in developed rather than developing countries, in response to production control measures and prevailing international cereal prices. Finally, as will be demonstrated that food production and consumption patterns are becoming more diverse and so cereals may no longer be an adequate proxy for general food trends. This portion's aim is not to only explore the relationship between population growth, food supply and nutritional status, but to examine the continued globalization of the food supply system and its consequences for both developed and developing economies.

■ 6.4.7 Concept of Famine

The word famine means the complete absence of food. A relatively sudden flare-up of mass death by starvation, usually relatively localized, and usually associated with a sharp rise in food prices, the sale of household goods, begging, the consumption of wild foods, and out-migration. So it can be a social and economic crisis that is commonly accompanied by widespread malnutrition, Starvation epidemic and increased mortality. Famine and hunger are not new problems, nor are they confined to the third world. But it is very common in countries of the poor and developing world. Some countries of the world are known as third world countries namely Ethiopia, Bangladesh, Cambodia, Sudan etc. A lot of famine and starvation is in the third world countries because they don't have enough money and resources to keep their people well fed and healthy. Moreover, there are still people who are starving and homeless and they generally receive some kind of aid from the other countries. In which some people do not produce the food what they consume, the idea of food shortage has so far become a reality only in areas where an

economy is wholly isolated from its surroundings, where because of a lack of effective demand or inadequate systems of redistribution some people cannot obtain food. In the modern world, the first set of conditions is for all practical purposes confined to remote bands of forest Indians, cities under siege, and populations otherwise isolated by war. The second is a matter of poverty and the instability of free markets.

But in these days, means in the modern world, famine is a very rare phenomenon even in the 'famine continent' of Africa. Over the last three decades, it is possible to find perhaps some number of cases. Several of these cases were relatively local and small scale. It is not surprising that the rare famines of modern times have occurred in the few remaining economically isolated areas such as highland Ethiopia, or where people have been isolated physically, or their stock destroyed, or trade obstructed by war.

Although many famines coincide with national or regional shortages of food, famine has also occurred amid plenty or on account of acts of economic or military policy that have deprived certain populations of sufficient food to ensure survival. Historically, famines have occurred because of drought, crop failure and pestilence, and because of man-made causes such as war or misguided economic policies.

▲ Causes of Famine

Famine is caused by several factors. The causes of famine are partly natural and partly artificial.

Natural causes are generally created by the nature. Due to these factors, in several places mainly poor people or marginal farmer or low-income group people are affected. These important natural causes are as below

- a) Natural disasters (floods, drought, volcanic eruptions, earthquakes etc.)
- b) Crop failure due to natural factors
- c) Loss of arable land

Artificial reasons are such which sometime play a vital role in the creation of famine. Some important reasons of artificial famine are

- a) Overpopulated areas that are unable to feed masses of people
- b) Poor quality of health facilities
- c) The aid from other countries is very low
- d) Governments that have poor management of resources

e) War or political intervention

f) Food supply system and shortage of food

Apart from the above reasons, modern famines have often occurred in nations that were not initially suffering a shortage of food. The largest famine ever was the Irish Potato famine, which began in 1845 and occurred as food was being shipped from Ireland to England because the English could afford to pay higher prices. In the similar manner, famine in 1973 in Ethiopia was concentrated in the Wollo region, although food was being shipped out of Wollo to the capital city of Addis Ababa where it could command their prices. In contrast, at the same time that the citizens of the dictatorships of Ethiopia and Sudan had massive famines in the late-1970s and early-1980s, the democracies of Botswana and Zimbabwe avoided them, despite having worse drops in national food production. This was possible through the simple step of creating short-term employment for the worst affected groups, thus ensuring a minimal amount of income to buy food, for the duration of the localized food disruption and was taken under criticism from opposition political parties and intense media coverage.

As observed by the economist Amartya Sen, famine is usually a problem of food distribution and poverty, rather than an absolute lack of food. In many cases, such as the Great Leap Forward, North Korea in the mid-1990s, or Zimbabwe in the early-2000s, famine can be caused as an unintentional result of government policy. Famine is sometimes used as a tool of repressive governments as a means to eliminate opponents, as in the Ukrainian famine of the 1930s. In other cases, such as Somalia, famine is a result of civil disorder as food distribution systems break down.

Today, nitrogen fertilizers, new pesticides, desert farming, and other agricultural technologies are being used as weapons against famine. These have increased crop yields, but there are signs as early as 1995 that not only are these technologies reaching their peak of assistance, but they may now be contributing to the decline of arable land (e.g. persistence of pesticides leading to soil contamination and decline of acreage available for farming). Developed nations have shared these technologies with developing nations with a famine problem, but there are ethical limits to pushing such technologies on lesser-developed countries. This is often attributed to an association of inorganic fertilizers and pesticides with a lack of sustainability. In any case, these technological advances might not be influential in those famines, which are the result of war. Similarly so, increased yield may not be helpful with certain distribution problems, especially those arising from political intervention.

▲ Effects of Famine

Both kinds of famines have sharp impact on demographic, social, economic and cultural aspects. It can be said that these effects do not stay for long period. Here some important impact of famine is being mentioned. Famine consists of extremes and general scarcity of food, causing distress and deaths from starvation among the population of a district or state or nation. So mortality of certain number of people is common effect of famine and that mortality is concentrated among children and the elderly. A consistent demographic fact is that in all recorded famines, male mortality exceeds female, even in those populations (such as northern India and Pakistan) where there is a normal times male longevity advantage. Reasons for this may include greater female resilience under the pressure of malnutrition, and the fact that women are more skilled at gathering and processing wild foods and other fall-back famine foods. Famine is also accompanied by lower fertility. Famines therefore leave the reproductive core of a population—adult women—relatively untouched compared to other population categories, and post-famine periods are often characterized a "rebound" with increased births. Even though the theories of Thomas Malthus would predict that famines reduce the size of the population commensurate with available food resources, in fact even the most severe famines have rarely dented population growth for more than a few years. The mortality in China in 1958–61, Bengal in 1943, and Ethiopia in 1983–85 was all made up by a growing population over just a few years. One of the greater long-term demographic impact is emigration. During the famine period 1840 Ireland was chiefly depopulated by waves of emigration.

▲ Famine in India

Some Indian examples of famine should be discussed here. There were 14 famines in India between 11th and 17th century (Bhatia, 1985). B.M. Bhatia believes that the earlier famines were localised, and it was only after 1860, during the British rule, that famine came to signify general shortage of foodgrains in the country. There were approximately 25 major famines spread through states such as Tamil Nadu in the south, and Bihar and Bengal in the east during the latter phase of the 19th century. Romesh Dutt argued as early as 1900, and present-day scholars such as Amartya Sen agree, that the famines were a product of both uneven rainfall and British economic and administrative policies, which since 1857 had led to the seizure and conversion of local farmland to foreign-owned plantations, restrictions on internal trade, heavy taxation of Indian citizens to support unsuccessful British expeditions in Afghanistan, inflationary measures that increased the price of food, and substantial exports of staple crops from India to Britain. (Dutt, 1900 and 1902; Srivastava, 1968, Sen, 1982; Bhatia, 1985.) Some British citizens, such as William

Digby, agitated for policy reforms and famine relief, but Lord Lytton, the governing British viceroy in India, opposed such changes in the belief that they would stimulate shirking by Indian workers. The first, the Bengal famine of 1770, is estimated to have taken around 10 million lives — nearly one-third of Bengal's population at the time. The famines continued until independence in 1947, with the Bengal Famine of 1943–44—among the most devastating—killing 3 million to 4 million Indians during World War II.

▲ Chronology

- 1630-31: there was a famine in Ahmedabad, Gujarat.
- 1770: Indian territory ruled by the British East India Company experienced the first Bengal famine of 1770. An estimated 10 million people died.
- 1780-1790s: millions died of famine in Bengal, Benares, Jammu, Bombay and Madras.
- 1800-1825: 1 million Indians died of famine
- 1850-1875: 5 millions died of famine in Bengal, Orissa, Rajasthan and Bihar
- 1875-1902: 26 million Indians died of famine (1876-1878: 10 millions)
- 1905-1906: famine raged in areas with the population of 3,3 million.
- 1906-1907: famine captured areas with the population of 13 million
- 1907-1908: famine captured areas populated by 49,6 million Indians.
- In 1943, India experienced the second Bengal famine of 1943. Over 3 million people died.
- In 1966, there was a 'near miss' in Bihar. The USA allocated 900,000 tons of grain to fight the famine. A further 'near miss' food crisis occurred due to drought in Maharashtra in 1970-1973.
- 1974-1975: A famine in Bangladesh, formerly part of India and the area primarily affected by the above Bengal famines, caused more than 1 million deaths. (Dyson 1991, 7)

■ 6.4.8 Determinants of Population Growth

It is obvious that only two demographic variable, fertility and mortality, are responsible for world population growth, for migration is not relevant when the world situation is considered. When there is a positive difference between the number of births and the number of deaths, population grows, and this increase of births over deaths is know as the natural increase of population. While exploring the reasons for world population growth, it is, therefore, necessary to trace the course of mortality and fertility in various parts of the world. Like all other species of plants and animals, man is endowed with reproductive capacity, which, if unchecked, may result in a tremendous increase in numbers. Till recently, this

excessive fertility was checked by an almost equally high level of mortality. Man's ability to control famines and disease- two of the three important regulators of human numbers- is one of the most significant developments in the history of population growth.

It has already been seen that, prior to 1800, world population increased very quickly on the path of growth was marked by ups and downs because of the violent and recurring fluctuations in the chronic food shortages, widespread epidemics and wars. Normal times too, death rates were quite high as a consequence of poor diet primitive conditions of sanitation and absence of effective preventive and curative medical practices. A significant fall in mortality level began in Europe, North America and Oceania only in the nineteenth century. The main causes of this were related to the social and economic development resulting, first from the agricultural revolution and then from the industrial revolution and finally from advances in the medical sciences, public health and environmental sanitation, which may also be attributed to economic development. The declining death rates and the unchanged high birth rates resulted in an increase in the growth rate of the population of Europe. This growth may, however, be deemed to be modest, though steady, up to 1920. It was only after 1950 that world population increased at an accelerated rate and the increase in numbers was spectacular. This unprecedented rise was largely due to the accelerated growth rates of the population of developing countries in Asia, Latin America and Africa resulting from declines, in the death rates brought about by technological advances, the prevention and control of disease and the growth of and expansion on, medical and public health services. It is important to note that developing countries could bring down the death rates without achieving a certain level of socio-economic development till then considered as a precondition for lowering death rates, because the advances in medical and public health technology could be imported and easily adapted to suit local conditions, this decline in the death rate was rapid and spectacular.

The foregoing discussion clearly indicates that the principal determinants of population growth are increasing fertility rate or first rate, declining death rates, man's control over his environment, improvement of medical facility, sanitation system, consciousness about health, Govt. facilities etc.

▲ Factors influencing population distribution

The way that the population is spread out over a given area, from a small region to the earth as a whole, this is called distribution of population. The spatial spread of population in the world is not ubiquitous. There are wide regional contrasts in the degree of concentration of population giving highly variable densities to different parts of the world. According to 1995 population statistics of the United Nations on an average, there were 44 persons to the share of each km² in the world. But in case of Asia, there were

the density of population 112 persons in each km² and there were 32 persons per km² of Europe. These regional contrasts in the population distribution and density are governed by a variety of factors. All the factors affecting the population distribution and density may broadly be classified into three major categories of physical, socio- cultural and demographic factors. These are being discussed in some details

- 1) **Physical factors:** Various physical factors that affect the distribution and density of the population are the influences of latitude and altitude, climate (temperature and precipitation), landforms, soils, energy resources and mineral raw materials, and space-relationship (accessibility).
- 2) **Socio-cultural, Economic, Political and Historical factors:** Among the various cultural factors those controlling effects upon the population spread are history of settlement, type of economy, economic activities advancement in technology, political decisions, social organization, government policies, political events, historical processes, cycle of occupation etc.
- 3) **Demographic factors:** The changes in the distribution and density of population in the world take place through variations in the natural increase and also through the medium of migration between areas.

■ 6.4.9 Self-Assessment Questions

1. Critically explain the theory of population growth as proposed by Malthus.
2. What are the important shortcomings of Malthus' theory of population growth?
3. Distinguish between positive check and preventive check of population growth as mentioned by Malthus.
4. Give an account of Marxian theory of population growth.
5. How do you differentiate Marx's theory from theory of Malthus?
6. Mention the demerits of Marx's theory of population growth.
7. Is it possible to be increased the growth rate of population at geometric progression and means of subsistence at arithmetic progression- Explain?
8. Define morbidity.
9. Distinguish between morbidity and mortality.
10. Bring out some important measures of morbidity.
11. What do you mean by balance diet?
12. Describe in brief the role of functions of protein, fat and carbohydrate in human body.
13. Write a short note on famine.
14. Discuss the role of determinants in changing the spatial distribution of population.

■ 6.4.10 References

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“Learner’s Feed-back”

After going through the Modules/ Units please answer the following questionnaire.
Cut the portion and send the same to the Directorate.

To
The Director
Directorate of Distance Education,
Vidyasagar University,
Midnapore- 721 102.

1. The modules are : (give ✓ in appropriate box)

Easily understandable; very hard; partially understandable.

2. Write the number of the Modules/Units which are very difficult to understand :

.....
.....
.....

3. Write the number of Modules/ Units which according to you should be re-written :

.....
.....
.....

4. Which portion/page is not understandable to you? (Mention the page no. And Portion)

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5. Write a short comment about the study material as a learner.

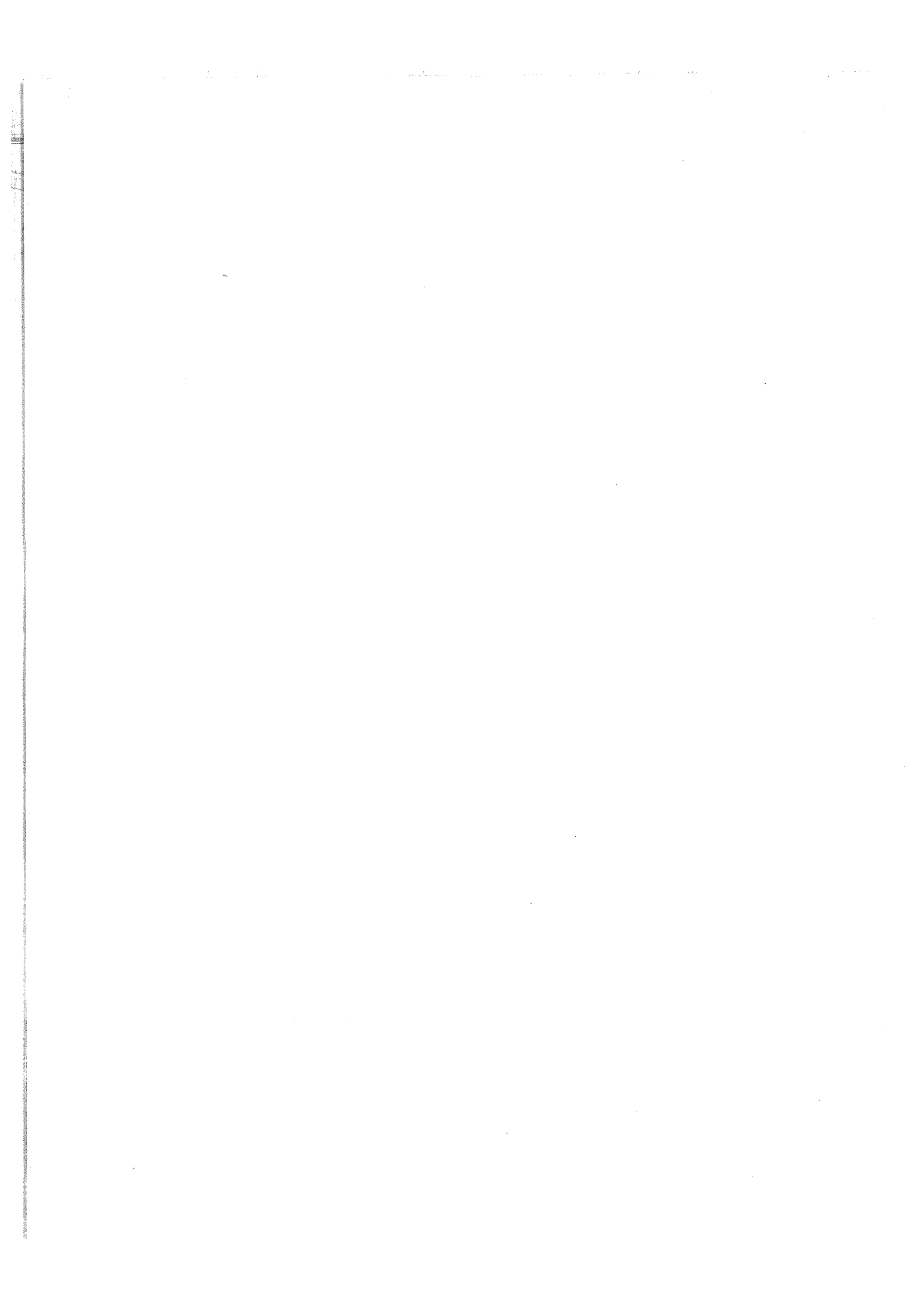
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(full Signature of the Learner)

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