



## The Islamia university of Bahawalpur

Department of Geography

M. Sc. Geography 4<sup>th</sup> Semester: Population Geography (GEO-21404)

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### **Course Outline/Topics**

1. Introduction: Origin and development and scope of population geography
2. Sources of population data: Census, population data sheets, vital registration and sample surveys
3. Population growth: past and present growth trends, future possibilities
4. Dynamics of population: fertility, mortality and migration
5. Measures, determinants and differentials of fertility
6. Measures, determinants and differentials of mortality
7. Types and causes of migration
8. Population composition
9. Population distribution over the globe in the light of geographic conditions
10. Types of population density
11. Population theories
12. Population problems: environmental, economic, social, political and demographic
13. Population policies; pro-natalist and anti-natalist policies

### **Books Recommended:**

1. Chandna, R. C., 2006, Geography of Population: Concepts, Determinants and Patterns, Sixth Edition, Kalyani Publishers, New Delhi.
2. Clarke, J. I., 1972, Population Geography, Second Edition, Pergamon Press, Oxford.
3. Gosh, B. N., 1985, Fundamentals of Population Geography, Sterling Publishers, New Delhi.
4. Jones, Huw R., 1990, Population Geography, Second Edition, Paul Chapman Publishing Ltd. London.
5. Khan, Asad Ali, 2010, Fertility pattern in Punjab: Measures, Determinants and Differentials, Germany, VDM.
6. Newbold, K. B., 2014, Population Geography: Tools and Issues, 2<sup>nd</sup> Ed., 2014 by Rowman & Littlefield, UK.
7. Newell, Colin, 1988, Methods and Models in Demography, Belhaven Press, London.
8. Newman, J. L. and G.E. Matzke, 1984, Population: Patterns, Dynamics and Prospects, Prentice Hall, Inc. Englewood Cliffs, New Jersey.
9. Weeks, John R., 2010, Population: An Introduction to Concepts and Issues, Third Edition, Wadsworth Publishing Company, California.
10. World Population Data Sheets, 2018 & 2019, Population Reference Bureau, New York.

## **1. Origin, development, scope and subject matter of population geography**

Spatial study of population is called as population geography. Population Geography is mainly concerned with the spatial analysis of population. It involves not only the magnitude of the human population but also its different characteristics, growth and mobility. It is related to other allied areas like demography, sociology, economics, and related disciplines. Population geography is the spatial study of human population. It is mainly concerned with one aspect of the study of population -its spatial distribution and arrangements. In fact, population provides the essential background for all geography.

### **Origin and development of Population Geography**

Population serves as the point of reference from which all other geographic elements are observed, and from which they all, singly and collectively, derive significance and meaning. This view of G.T. Trewartha has been accepted by all geographers in modern times. In population geography, the main focus of study is the human population. Trewartha pointed out that the essence of population geography lay in understanding the regional differences in the people covering the earth. The central theme of the science of population geography is area differentiation. It is essential to understand the process of spatial organization. Population constitutes the most dynamic and the central element in such a process. Clarke observed that the main task -of population geography is to study areal variations in population and their relations with the physical, cultural and economic phenomena. Clarke lays stress on the spatial aspect of population and distinguishes population geography from demography. In his book, Population Geography published in 1965, J. I. Clarke observes that population geography is concerned with 'demonstrating how spatial variations in distribution, composition, migration and growth are related to the spatial variations in the nature of places'.

Demko does not agree with the definition of population geography as given by G.T. Trewartha. According to Demko, in spite of statements pleading for a study of dynamics, the dynamics are stressed only for understanding areal differences.

However, the definition of population geography has to be formulated with reference to the nature of geography as a distinct discipline where population is the main stock-in-trade. The fact that population provides the focal point in geography, and man is not only the utilizer of physical earth but also the creator of the cultural earth, has led Trewartha to place man at the centre of the theme and thinking of geography. Trewartha's case for population geography has been accepted favourably by all geographers of the world by and large. The outcome of Trewartha's proposal is the emergence of population geography as a distinct branch of geography since the fifties of this century. With this, the emphasis has shifted considerably from the traditional regional geography to systematic geography, particularly the study of man and his relationship with the surface of the earth. However, population geography is still regarded in the USSR as a part of economic geography. But the concept of population geography in the USSR has a much wider meaning than in the West. In western countries, the concept of population geography is rather narrow; in the USSR, the concept of population geography includes study of rural and urban settlements, history of settlement, labour sources, occupation, and distribution of population and so on.

The most widely studied field has been that of the geography of settlement (and resettlement), in particular the geography of towns. A settlement, urban or rural, is the primary factor of observations in population geography. The mapping of population is a spatial field and has a leading place in both the technique and the practice of cartography. The analytical sections of population geography show the development and distribution patterns of populations in all their complex relations.

According to Melezin, population geography is the study of population distribution and productive relationships existing within various population groups, the settlement network and its fitness, usefulness and effectiveness for productive goals of society. The study of population geography is identified with the analysis of territorial groupings of settled places with emphasis upon their economic functionality. This is so because the pattern of distribution of population is basically represented by a network of settlement, and changes in the settlement patterns are influenced primarily by the production processes. The basic objective of the study of population geography in the USSR is the discovery and applications of laws governing the distribution and dynamics of population, the processes affecting the settlement network, and development of settlement and associated problems. The study of individual attributes is the main subject-matter of population geography, according to Wilson, Population geography is a systematic branch of pure geography. It lays emphasis upon regional differentiation of areas in terms of their populations. It does not study man as a phenomenon in or by itself, but as an area-characterizing and area-differentiating element. Population geography is concerned with the temporal-spatial analysis of population attributes. Population geography should develop theories, explain spatial pattern and processes and should make reasonable projections regarding the main attributes of population.

After all, population is the single most significant element in the study of the surface of the earth, Madame Beaujeu-Garnier, in her book *Geography of Population*, points out that population geography is concerned with 'describing the demographic factors in their present environmental context, studying also the causes, their original characteristics and possible consequences', Willbur Zelinsky, in his book *A Prologue to Population Geography*, defines population geography as 'the science that deals with the ways in which the geographic character of places is formed by, and in turn reacts upon, a set of population phenomena that vary within it through both space and time as they follow their own behavioural laws, interacting with each other and with numerous non-demographic phenomena'.

Population geography is, therefore, that branch of the discipline which treats the spatial variations in demographic and non-demographic qualities of human populations, and the economic and social consequences stemming from the interaction associated with a particular set of conditions existing in a given areal unit.

### **Subject-Matter and Scope of Population Geography**

Edward Ackerman indicates that the first set of problems in population geography involves the identification of generic relations, which includes the categorization, classification, and differentiation procedures. The next level of inquiry involves the establishment of genetic relationships, or dynamic aspects (processes) of spatial distributions in which the temporal

variable is highly significant. The last step is the determination of co-variant relations; that is, the search for understanding the space relations of spatial processes, which are expressed in terms of areal association and interaction between and among phenomena.

The main field of population geography is the areal differentiation which is helpful for solving the problems of static relationships between variables. Population study by geographers should lead to a better understanding of the processes creating areal distribution as expressed in the concepts inherent in, and by the study of spatial interaction. The study of population should consider the spatial system which arises from, or leads to the geographic character of population.

Thus, the subject-matter of geography is spatial distribution and the spatial interaction of population. This will be meaningful only when carried a step further to include inquiry into the processes which influence, indeed create, particular spatial distributions and interaction.

Population geography as a formal and systematic sub-field of the discipline of geography, places greater emphasis on man. Man is the main focus of study of population geography. In addition to the inclusion of man's culture, his economic activities, and his general distribution at present or in the past, there exists a need for better understanding of spatial aspects of population.

Zelinsky has stated that the scope of population geography should include a treatment of all the variables present in the census schedules of advanced nations. However, lack of uniformity among the censuses is essentially related to the composition of population, definition of workers, and definition of occupation and so on. The limits imposed on population geography are likely to be determined by the cultural and economic milieu in which population geographers have to work. The cultural context has been found to be relevant in its influence on the scope of population geography. According to Hettner, population must be treated dynamically. It involves the concepts, of regional birth rates, death rates, migration and so on. The geographers' focus should not be directed to the biological phenomena only. They should also consider the social qualities and the economic, political and social-psychological conditions of population. Geography should consider, on the one hand, the comparative dependence of population on natural, economic and social conditions, and, on the other hand, the contrasts in population numbers and densities in different parts of the earth. Hassinger proclaims that the dynamic element, man, is not of less importance in the cultural landscape than his works.

Geography is basically the study of regions. The concept of the region cannot be divorced from the fact that an area has reality only in terms of the specific groups of inter-related elements which comprise it, and that it can be studied only in terms of these elements which are the topical or systematic specializations of geography. Among the various groups of elements which cause the earth regions to differ, population is important. Population is the central element around which all other elements revolve. It is from population only that other elements derive geographical significance. Thus, the study of population is the single most important approach to geography and one in which the regional concept has its broadest application. Geography of population is not the science of man; but it does include within its purview the study of man in his reciprocal relationship to the earth. The objective of population geography is an understanding of the regional differences in the people covering the earth. Any comprehensive geographical analysis of a region should take into account the differential growth of population. According to Trewartha, numbers, densities, distributions and qualities of the population provide

the essential background for all geography. Ackerman pointed out that geography treats areal differentiations, and all significant areal differentiations have a time dimension. Demographic movement is at the heart of the forces which influence the change in time and space content.

The subject-matter and scope of population geography can be delineated briefly as follows;

1. Study of population distribution in all its aspects, i.e., size and spacing of settlement of units, continental and sub-continental population distribution patterns, gross patterns of distribution ecumenic and the non-ecumenic aspects, inter-temporal and inter-regional distribution.
2. Density of population, its various types, determinants and density over the regions, and world patterns.
3. Spatial movement of population {migration}, internal migration, inter-nation migration, determinants, types, causes, consequences and laws of migration and the migration of high quality manpower from LDCs (less developed countries) to DCs.
4. Growth of population, measurement of population growth, birth and death rates, components of population growth, determinants, trend, causes, theories, and population projection.
5. Population composition, ethnic composition, religious composition, linguistic composition, age and sex compositions, occupation structure, marital status, educational composition, economic composition, dependency ratio, work force, employment status, industrial classification, income and expenditure, income distribution and poverty.
6. Literacy and quality of population, literacy differentials, determinants, world pattern, quality of population, eugenic programme and practice, and methods for improving the quality of population.
7. Rural and urban population, rural-urban demographic differentials, urbanization process, degree determinants, world trends in urbanization.
8. Population-resources ratios, population growth and resource development, population pressure, resource-based theories of population, optimum population, under population and overpopulation, world resources-population patterns, resource-population ratios, population policy.
9. A geographical overview of world population, world population growth (trend), population projections, world migration, distribution of world population, age and sex ratios, median age of population, life-expectancy, and economic, social, cultural, health, climatic, and political indicators of world population.

The above scheme of study fits in well with the scope and subject-matter of population geography. Such a scheme is also in conformity with the one outlined by G.T. Trewartha. It should be noted that the various population attributes have to be studied in population geography both at a point of time, and also over a period of time. Thus, both inter-temporal and inter-regional analyses form part of population geography.

The discipline of population geography has to make a systematic study of various attributes of population, not in isolation but as a part of the process of the various demographic phenomena occurring spatially. Clarke focused mainly on following three aspects of population;

1. Physical, social, and economic characteristics
2. Absolute numbers
3. Population dynamics.

Zelinsky favours the study of those population features which are studied in censuses. Trewartha has suggested study of the past trend of population and also study of the present biological, social, cultural, and economic characteristics of population. He has suggested an exhaustive list of characteristics to be studied in population geography. The scope of population geography can be categorized simply as the study of;

1. Social and cultural features of population. These features include literacy, migration, ethnic composition, caste, religion, marital status and so on.
2. Economic characteristics such as labour force occupation, income, income distribution, standard of living, poverty (relative and absolute), surplus labour, employment status, labour absorption, labour use, efficiency and so on.
3. Biological attributes of population, such as fertility, mortality, age, sex, race, absolute number and the like.

### **Relationship of Population Geography with other disciplines**

Population geography belongs to that borderland of geography which opens on economics, sociology and demography. While demography is devoted to numbers and depends heavily upon statistical methods, population geography relates numbers to area and relies on mapping. Clarke pointed out that population geography should study areal variations in population and their relationship with the physical, cultural and economic phenomena. The analysis of numbers and demographic processes for political units belongs to the area of demography.

Population geography is concerned with spatial analysis of population. It also incorporates the economic attributes of population like income, expenditure, occupation, income distribution, poverty and so on. The science of economics is basically concerned with allocation and valuation problems. It allocates the scarce resources among the competing ends. It also studies the economic behaviour of components of population as producers as well as consumers. Whereas the subject matter of economics is the money-earning and money-spending activities of human beings, the main focus of population geography is man as an important element on the surface of the earth. Thus, both economics and population geography are inter-related and they have many common grounds of analysis. This is perhaps the reason why population geography is considered as a part of economic geography in the Soviet Union. In fact, population geography cannot remain aloof from the domain of economic analysis pertaining to population. Population geography is also related intimately to sociology. It studies the social attributes of population such as marriage, religion, caste, literacy, family, ethnicity, household system, and so on. Thus, these two branches of knowledge are inseparable. They have obviously many common interactions. Population geography is also related to biology. It studies the biological attributes of population, like age, sex, morbidity, health, intelligence, race and the like. A population geographer must have an intimate knowledge of biology. However, population geography imbibes from all the connected disciplines of sociology, economics and biology, but it does not wholly depend on any individual discipline in total. It has its special method of study and way of

analysis. It analyses population with respect to space and time. This is the differentiating character of population geography which distinguishes it from other disciplines. Sociologists, economists, physicists, and others have profitably turned their attention to distributional problems associated with depicting the structure of settlement, population agglomeration, and social function. The works of Isard in economics, of Bogue in sociology, and Stewart in physics are considered helpful contributions to the subjects which have engaged geographers for a long time. Geographers have drawn materials and insight from various related disciplines for understanding the complex problem of distribution structure of man's relation to the earth.

Even geographers of the landscape school have contributed studies of indirect importance to demography through their studies of settlement. While relatively few geographers have undertaken comprehensive studies of the geography of population per se, it is safe to point out that a majority of them today will recognize a significant relationship between geography and demography. This has been evident since the end of the Second World War when the demographer began to broaden his field of study by seeking answers to population dynamics. Whereas anthropology traces the evolution of population over time, classifies races, history and studies the trend of population; population geography emphasizes the spatial dimensions of population over time, or at a point of time.

### **Evolution of Population Geography and its Approach to Study**

Population geography was a neglected subject of study for a long time. In the past it was not a separate subject in the area of geography or spatial analysis. Population geography was completely omitted in the past. Hartshorne, in his *The Nature of Geography*, made no reference to population geography as a systematic discipline. In the index to this volume, it is indicated that the topic of population is referred to three times in the text, but the references are incidental. In the book *The Making of Geography*, Dickinson and Howarth have discussed the evolution of human geography without mentioning the place of population in the field. They have analyzed the social, economic, historical and political geography, but population is omitted. The index provided by them does not contain the word "population". Similarly, the book, *The Spirit and Purpose of Geography*, written by Wooldridge and East has neglected the analysis of population with reference to geography. This shows that in the past population geography could not properly recognize the importance of the population element. Hettner did not single out population as a prime element for geographical study, although he recognized many other related aspects. Hettner proceeds to elevate population geography to an important position because, as he says, population has a great influence on all other geographic elements. But, although Hettner specifically recognizes the field of population geography, he does not make any serious attempt to analyze its content or method. Camille Vallaux in his essay on Human Geography contained in the *Encyclopedia of the Social Sciences* avoids mentioning population. In Sauer's analysis, no mention is made of any special field of population geography. Similarly, Barrows in his essay *Geography as Human Ecology*, makes no reference to population. Although Bruhnes recognizes the geographical importance of population, he proposes to study it obliquely through the channel of habitation and settlement morphology and, as a consequence, makes little contribution to population geography. Hettner made some illuminating remarks about population but he did not

elaborate them sufficiently. Hassinger did not recognize population geography as a distinct branch of the subject as Hettner did. Hassinger's analysis of man is disappointingly anthropological. Huntington and Shaw in their Principles of Human Geography did not make any direct reference to population. Some amount of discussion on population is available by Pierre George of France. But, on the whole, population geography remained a subject of little importance before 1950s. The question is: if population geography is so vital a subject why was it neglected so far? The reasons for the neglect of population geography are the following; **Firstly;**

1. Prior to the Second World War, reliable and sufficient data on population were not available for analysis. Many countries did not start census operations. Only a few countries outside North America and Western European had any records relating to population.
2. The existing study on geography placed too much emphasis on the areal differentiations on the earth's surface. Although the earth was inhabited by men, they were neglected. Thus, the study of geography in the past was like staging "Hamlet" without the prince of Denmark.
3. In the past, considerable emphasis was laid on regional geography. It was considered as the core of geography. The neglect of geography was evident in many fields of enquiry. For instance, in a survey of the publications of American geographers on population since 1925, there were only 45 titles within a period of a quarter century, 'the number of contributions on population geography in different journals was negligible. In many writings, population geography was given a subsidiary position, and it was made a branch of settlement geography. The population element was slighted in the holistic regional studies of American geographers.

**Secondly;** much less work was being done in the area of population geography as far as doctoral dissertations were concerned. Out of a total of 43 doctoral dissertations completed in American universities up to 1946, only two (a little over three per cent) were on population.

**Thirdly;** population geography was not included in the study courses in many American institutions. An inventory of the programs in over 20 of the largest or most distinguished departments in America revealed that not a single department had a course dealing exclusively with population.

From all this it appeared to Trewartha that population geography was systematically being neglected in the past. Till the 1950s, geography was treated as a study of landscape. For the first time, in 1953, G.T. Trewartha of the University of Wisconsin made a case for population geography as a subdivision of systematic geography in his presidential address to the Association of American Geographers. He was the first to organize and offer a full-fledged independent course on population geography at the graduate level. Many universities in the USA soon followed suit. Today, in many countries population geography is an independent discipline. There is now a growing awareness among members of the profession of the importance of population geography. Population geography in particular, and geography in general, is now recognized as a social science.

The more important question centres on the path that population geography has traversed and the methodologies adopted by its practitioners in their progress towards a better understanding of the



spatial dimension of population and its attributes. However, population geography as a relatively recent and largely underdeveloped branch of geography, has not had its boundaries rigorously circumscribed. Attempts are still being made to improve the method of study and course-content of this growing discipline. It is recognized that population geography can be developed as a systematic specialty. The course-content was outlined by Trewartha, and we have earlier given the scope and subject-matter of population geography. A significant development took place in the approach to the study of population geography during the 1950s. This made it possible for understanding the regional differences in a better way. Trewartha asserted that a topical approach is the best approach for understanding places and people. This approach found favour with the western geographers and, as an outcome, many studies appeared following this systematic approach. The second approach, called the behavioural approach, is now being followed in the area of population geography in most countries. In this approach, the behaviour of human beings in the decision-making process is recognized and given importance. This type of approach is followed in the analysis of migration, fertility control and so on. This approach has led to the introduction of many techniques in geographic study and research. Some of these techniques are: game theoretic approach, simulation approach, models of decision-making and the like. Recently, a qualitative approach was introduced in the analysis of population dynamics. However, quantification is considered a major problem in describing the space relations effect. Observational techniques need much further development if they are to match the need for quantification. A study of co-variance of the significant processes is now in the offing.

Geographic study is likely to proceed on the assumption that the cultural, physical, and biotic worlds are something of a continuum for the understanding of space relations. However, disaggregative research, stressing quantification, will be most influential in imparting future direction to population geography.

Population geographers are also resorting to a system approach in cases of multi-variate relationships. In such an approach the focus is primarily on the understanding of the structure and functioning of the system. It is a holistic process.

In the system approach, the geographers should identify the attributes and involved parameters. Then, after the structure is defined, the structural relationship may be specified in terms of some equations. In that case it becomes easy to analyze the system and make prediction. It is also necessary to understand the system both endogenously as well as exogenously so that a theoretical formulation can be made possible. It is a mechanical exercise for the study of a phenomenon. The system approach and behavioural approach to the study of population geography are not competitive but complementary in nature. The traditional systematic approach is helpful in understanding the spatial patterns of population, whereas the system approach and behavioural approach offer new ways of explanation for the implications involved in spatial patterns. Population geography is now making use of statistical methods of analysis, and it is becoming essentially more quantitative in character.

It would be of immense help to population research and study if a special quantitative method for the analysis of population geography is developed gradually by the population geographers.

Such a quantitative technique may be named as geogrametrics and it can function in the same way as econometrics for economic analysis, and psychometrics in psychoanalysis.

## **2. Population Data and its sources**

Data is a body of information, usually in numerical or quantitative form, but data can also be in qualitative form. Thus there, are two types of data, quantitative and qualitative data used for population studies. However, the study of most of the aspects of population geography are based on quantitative data.

### **Types, Sources and Problems of Population Data**

Population geography is basically an empirical subject of study. As such it has to rely on empirical data for making study and projection. A population geographer has to have knowledge of different types and sources of data. He must also know the problems associated with population data from various sources. In what follows, we analyze the types, the sources and some of the problems of population data.

### **Types of Data**

There are mainly two types of data required by population geographers;

1. One type of data, known as cross-section data are collected from a cross-section of the population with respect to a particular variable or a group of variables at a point of time.
2. The data may also be historical in character, extending over a period of time consisting of several years. Such data are called time-series data. Time-series data are collected with respect to a particular variable or a group of variables for a long period of time. Time-series data give a long-run perspective, whereas cross-section data give only a temporal and short-term picture of a phenomenon.
  - The data may be collected from a particular family, household or individual. Such data will be micro level data which are utilized for micro level study.
  - Data may also be collected from various families and countries for the system as a whole for macro level study. Macro level study requires macro level data which are to be collected for the country as a whole for finding some useful conclusion which will have policy implications.
  - The data may be personally collected by the investigator through questionnaires, schedule or personal interview methods. Such a method of data collection is known as primary method of data collection.
  - Statistical data may also be collected from published sources like books, reports, journals and so on. This type of collection of data is known as secondary method of data collection. Whereas the primary data are collected by the investigator himself from the primary sources, the secondary data are what have already been collected by somebody else and are available in published form.

The study made by population geographers may be aggregative or dis-aggregative in nature and, accordingly, they have to find out the suitable data. Following are the main sources of population data;

### **1. Population census**

In most countries, the population census is undertaken generally at ten-year intervals, A census is an enumeration at a specified time of individuals inhabiting a specified area, during which

operation particulars are collected regarding age, sex, marital status, occupation, religion, etc. A census does not intend to count the number of people alone. It collects information on the various aspects of the population. A census of population may be defined as ‘the total process of collecting, compiling and publishing demographic, economic and social data pertaining, at a specified time or times, to all persons in a country or delimited territory.’

A census is primarily an official enumeration through direct contact with all people either physically present or regularly residing in a country, or in any of its divisions. An enumeration of all persons physically present is a *de facto* census; one confined to residents like the census of the USA and its subdivision, is a *de jure* census. The main roots of population statistics hardly run back beyond the second half of the 17th century. The earliest was a municipal census of the entire population of Nuremberg taken in 1649. The honour of introducing a modern census has been claimed by several countries, notably Canada, Sweden and the USA. However, there may be special censuses for different purposes, e.g., occupation, employment, fertility, mortality and so on. There cannot be any unique method of census. A census enquiry is that in which all the items constituting the population are studied, and conclusions are drawn therefrom. In a census, the entire universe is studied, thereby the possibility of any bias is eliminated or minimized. The data are collected in the mass. Therefore, there is every possibility of extreme items being neutralized by one another in a natural way. The law of inertia of large numbers is consistently followed. This ensures greater accuracy and correctness.

The scientific importance of the census lies mainly in the fact that it furnishes the needed basis for a study of changes in the number of people through births and deaths, immigration and emigration, and of changes in their status through marriage and divorce. Census data provide important information to the population geographers. New problems can be recognized by thoroughly studying the newly collected census data. Information regarding emigration, urbanization, unemployment, national integration, social security, casteism, group conflict, etc. can be derived from the census data. Population projection can be made on the basis of the census report. The census is like a national stock-taking in which the rate of growth of population, sex ratio and occupations of the people are presented in full. The economic and social characteristics of the people can be known by studying the census report.

Enumeration is very important in a census. There are two methods of enumeration but some time combination of both is used;

1. Canvasser method, or enumeration by appointed enumerators: Under the canvasser method, the information is obtained by a personal interview and entered on the schedule (performa) by the officially appointed enumerators.
2. Householder method or self-enumeration: Under the householder method, schedules are distributed to all households along with instructions on how to fill them. The schedules are filled by heads of households and then they are collected by the officially appointed enumerators.
3. Combination of above two methods: Sometimes a part of the schedules is filled-up by the households and the other part is filled-up by the enumerators.

Censuses are not free from defects.

1. Firstly, because of the changes in the definitions of some terms such as urban, worker, literacy, and occupation, and so on, the census data of different countries cannot be compared.
2. Secondly, boundary modifications makes the comparison of census difficult.
3. Thirdly, the census has not been introduced fully in many countries. In some countries, census-taking is not regular. Even in the same country, the methods and modes of census-taking differ considerably.
4. Fourthly, the enumerators are mostly not trained and efficient. The information collected is also mostly biased.
5. Fifthly, the figures given by the people relating to birth, death, age and the like are grossly inaccurate, misleading and unfit for statistical analysis. In LDCs, births and deaths are not officially reported fully and accurately.
6. Sixthly, the coverage of the census is inadequate. Many important aspects, e.g., underemployment, income, wages and the like at different periods of the year are not covered by most of the censuses.
7. Seventhly, statisticians and demographers are associated with census-taking. It is also necessary to associate population geographers who can give advice regarding the type of data to be used for spatial analysis of population. In view of the wide disparity among countries with regard to the census data and definitions, the United Nations has been trying to bring uniformity in the census procedures.

The fundamental deficiency of the census method for collecting vital statistics is that it can, at best, produce returns for the census year and no other. Census years are usually ten years apart. For the inter-censal years, current vital statistics are not produced by the census method, and thus, that method fails in the first and minimum requisite for vital statistics, i.e., production of data on a current basis. Not only does the census method fail to provide inter-censal data, it also fails to record completely the occurrence of births and deaths even for the census year.

Periodic surveys have been employed to obtain information on births and deaths in areas where the registration method has not been established, or where it is very defective.

In such situations, surveys have the distinct advantage of making available some vital statistics not otherwise obtainable and of securing at the same time the corresponding population.

## **2. Sample Surveys**

In the absence of the required data, the investigator may make a sample survey with respect to a particular area in order to obtain data from the primary source. Data can be obtained through a statistical survey, also called statistical enquiry or investigation. For example, a survey can be made regarding the consumption and income patterns of the individuals of a particular locality. A statistical survey may be either a general purpose survey or a special purpose survey. In a general purpose survey we obtain data which are useful for several purposes. The best example of this type of survey is the population census taken every 10 years in India. Such a survey provides information not only about the total population but about its division into males and females, literates and illiterates, employed and unemployed, age distribution, income

distribution, etc. A special purpose survey is that in which data obtained are useful in analyzing a particular problem only. Surveys are essentially for a limited purpose, limited time and limited area only, whereas a census is for the entire country and is more general in nature. However, for a specific study, particularly a micro level study, surveys have become essential for the population geographers for collecting population data.

### **3. Analytical method**

The analytical method can be applied for collecting vital statistics. This method is a mathematical one based on an analysis of the returns of two consecutive censuses of population. The data from the available censuses can be used to derive information through the methods of interpolation and extrapolation regarding the approximate numbers of births, deaths, marriages, migration and so on. The indirect method yields only aggregates under certain assumptions only. This type of method is followed for finding out the vital statistics for the missing year or for making projections. Brazil, like other countries, has been following this method. It is used in those areas where statistical data are insufficient and irregular. Under this method, in order to determine the population at a time subsequent to a census of between two censuses, one may use a number of procedures. A very common method is to make use of statistics of births, deaths, immigration and emigration. The population  $P_t$  at time  $t$  is then obtained as:

$P_t = P_c - f(B - D) - f(I - E)$ , where,  $P_t$  = total population at a point of time,  $P_c$  = total population recorded at last census,  $B$  = total number of births during the given period,  $D$  = total number of deaths during the given period,  $I$  = total number of immigrants,  $E$  = total number of emigrants.

### **4. Vital Registration**

The registration method is the cornerstone of vital statistics. It is a continuous, permanent and compulsory method of recording vital events like birth, death, marriage and so on, in a country. It is compulsory and legal in every country to get vital events registered. Data on vital events can be obtained from the registration offices of the concerned government. In DCs, the registration is complete and its scope is very wide. However, the type of information and the quality of data obtained under this method vary from country to country. In LDCs, the system is neither complete nor wide. In India, the task has been assigned to the Registrar-General, Previously it was entrusted to the Sanitary Commissioner. In India, while some of the States have their own birth and death registration acts, some others have collected statistics in accordance with the laws framed by the Municipal and District Boards. These rules make registration compulsory. In the rural area, village officials like the Patwaris, and Chowkidars collect these statistics.

### **5. Miscellaneous Sources of Vital Statistics**

There are many sources, both national and international, for the collection of vital data. At the national level, the following sources may be helpful;

1. Health Service Records
2. Live Registers of Employment Exchanges
3. Records of Migration
4. Statistical Abstract (published by many States)
5. Certificates of Birth, Death, and Marriage

6. Administrative Records
7. Records of the Ministry of Labour and Employment
8. Records of the Ministry of Health and Family Planning-cum-Welfare
9. Records of Labour Bureau
10. Journals and publications of different universities and research organizations
11. National Sample Survey (NSS)

At the international level, vital data may be made available from the following sources;

1. World Health Organization (WHO)
2. UNESCO
3. World Bank Reports and Studies
4. Food and Agricultural Organization (FAO)
5. International Labour Office (ILO)
6. United Nations Publications (such as Demographic Year Book, Statistical Year Book, World Population Data Sheets, Reports and Special Studies in Population).

### **Problems of Population Data**

Population geographers have to face difficulties in using the population data for the purpose of research and studies. These data may have the following defects: inadequate information, insufficient coverage, biased data, and changes in definitions of vital matters, lack of uniformity, and inaccuracy (possible) of the data. The data may be inaccurate owing to ignorance, bias and false statement on the part of the subjects of investigation.

The investigators who have collected the data may not be properly trained and qualified. Thus, population geographers have to be very careful and cautious in using the vital data. There may also be the problem of over-enumeration or under-enumeration in many countries. The data become heterogeneous due to the changes in the definitions of the variables, changes in the boundaries, changes in the census units, changes in the connotations of the terms used, and the like. Therefore, international comparison in many cases is not possible with respect to population data. The population geographers specially face two difficulties like;

1. Frequent changes in the census units and areas
2. Lack of any definite map for showing the exact point of location of settlements.

Very often, population geographers will have to resort to indirect methods for calculation of vital rates. The indirect method has to be analytical for making extra-population and interpolation with respect to population data (see Analytical Method in this Chapter).

Many calculations can be indirectly made with the help of sex composition data. This data is considered to be the most reliable information available in demography. Data regarding the age-structure may be the most unreliable for many reasons. People have a tendency to hide their actual age.

They very often understate their age. The population geographers can analyze the age-structure and age-groups which can neutralize the effect of mis-statement and approximations. The population geographers find that there are no standard definitions of vital elements like literacy, urbanization, occupation and so on. This makes international comparison of these elements almost impossible. Therefore, what is required is a uniform set of definitions of all the vital terms

as used in a standard census. This is perhaps one of the reasons why international studies on population problems are not coming out adequately. The necessity of standard and uniform definitions of vital terms is immediate and urgent. The task may be assigned to the United Nations. It can help the member-countries by evolving a set of uniform definitions and procedures which are required for census-taking in different countries. This will not only help the cause of research in the area of population, but will also broaden the scope of international comparison of vital statistics.

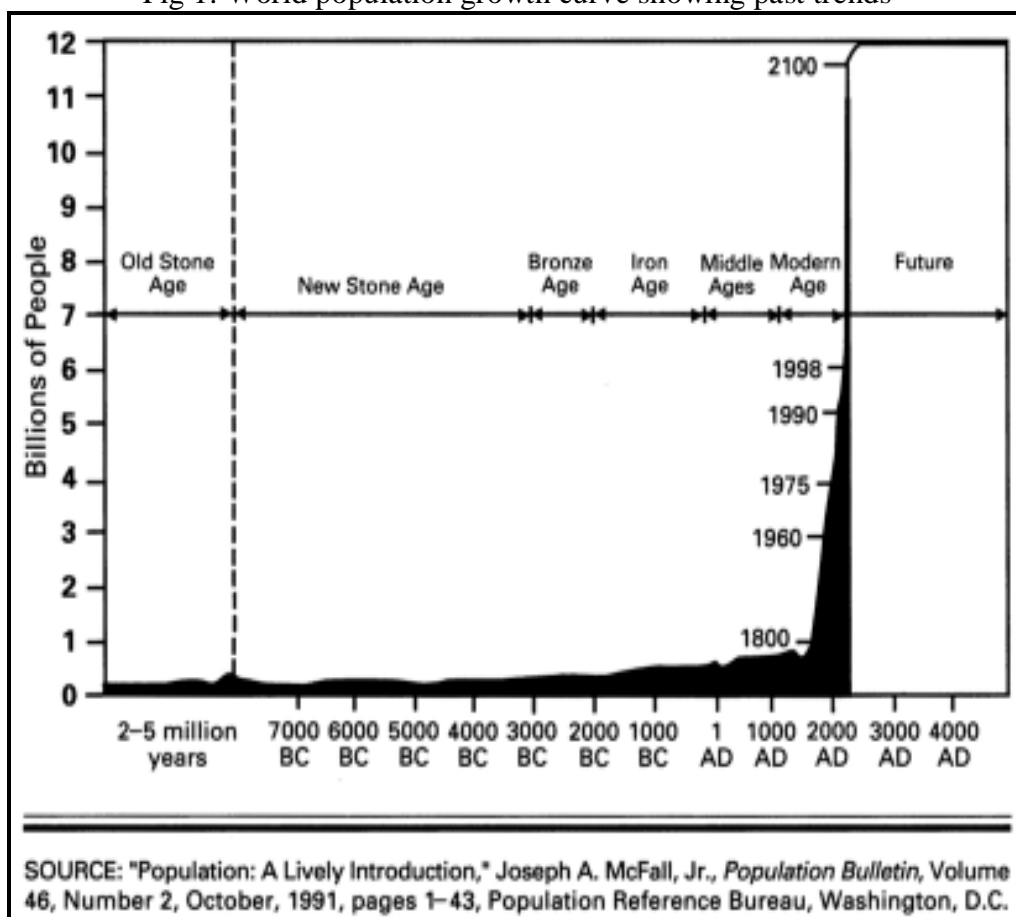
### 3. Population growth

#### Population growth

Population growth refers to the growth of the human population in a particular area during a specific period of time. In the world population, individuals are added by natural increase while in the population of countries or individual areas, people are added due to both natural increase and migration. To understand world population growth temporally, it can be divided into following three distinctive phases;

1. Past population growth trends (mainly influenced by agricultural revolution, industrial revolution and revolution in medical sciences). Past population growth process (fig 1) can be divided in to following three phases;
  - Very very slow growth of population has been observed up to agricultural revolution of 8000 BC.
  - Slow growth of population has been experienced up to industrial revolution of 1750 AD.
  - Accelerated growth started due to industrial revolution which was further geared up due to medical revolution of 1950s.
2. Present growth trends (Fast growth in LDCs and slow growth in MDCs is occurring). (Follow world population data sheets of 2018 & 2019 available on internet).
3. Future predictions (Different possibilities have been pointed out by the experts). In this regard law of seventy stated as, population doubling time  $PDT = 70/GR$  (PDT stand for population doubling time and GR stands for population growth rate), T. R. Malthus theory and Paul Ehrlich views can be helpful.

Fig 1: World population growth curve showing past trends





Past and present data shows that world population has grown at an increasing pace. At present it has reached to about 7.7 billion and growing at a rate of 1.2 percent per year. About 90 million individuals are added to it each year (table 1).

Table 1: World population growth

Billions of People on Earth	Year	Time Span
1 B	1800 AD	50,000 years
2 B	1930	130 years
3 B	1960	30 years
4 B	1975	15 years
5 B	1987	12 years
6 B	2000	13 years
7 B	2011	11 years
8 B	2025	14 years
9 B	2045	20 years

Experts currently project that Earth's population will reach just over nine billion by 2050, with virtually all growth occurring in developing countries. Future fertility trends will strongly affect the course of population growth. This estimate assumes that fertility will decline from 2.6 children per woman in 2005 to slightly over 2 children per woman in 2050. If the rate falls to 2.5 children per woman would increase world population to 10.6 billion by 2050. World population growth in the 21st century will be different from previous decades in several important ways.

- First, humans are living longer and having fewer children, so there will be high number of older people (age 60 and above) than very young people (age zero to four).
- Second, nearly all population growth will take place in urban areas.
- Third, fertility rates will continue to decline

All of these trends will affect nations' economic development. Senior citizens can be active and productive members of society, but they have many unique needs in areas ranging from medical care to housing and transportation. Growing elderly populations will strain social services, especially in countries that do not have well-developed social safety nets to guarantee adequate incomes for older citizens. In countries that have "Pay As You Go" social security programs, increasing ratios of older to younger people may create budget imbalances because fewer workers are paying funds into the system to support growing numbers of retirees.

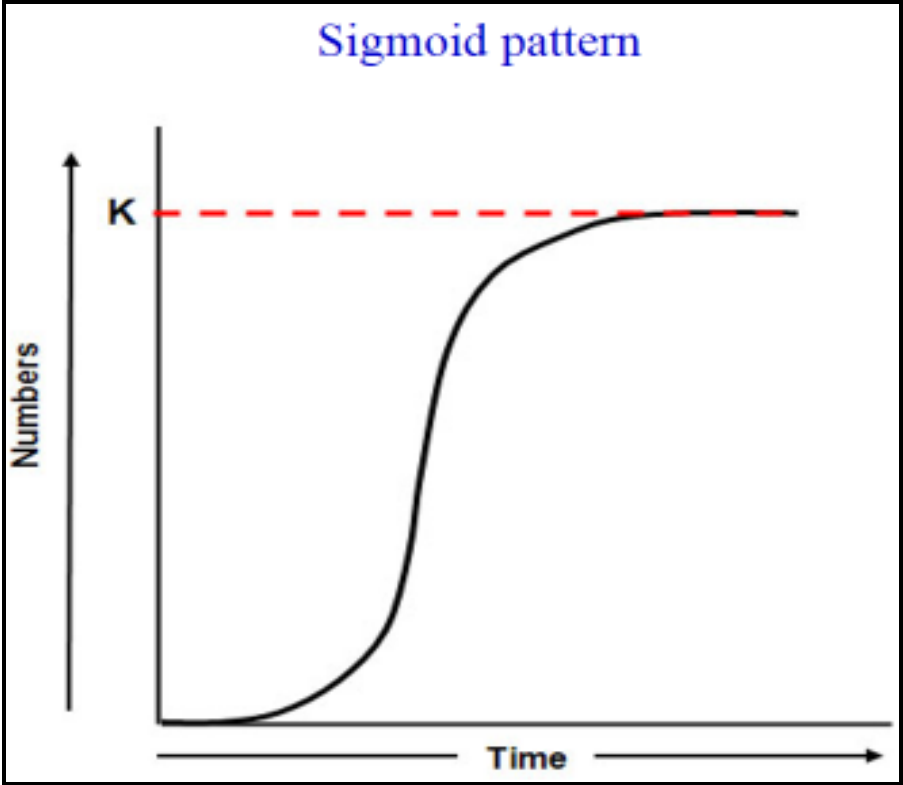
As societies age, demand for younger workers will increase, drawing more people into the labor force and attracting immigrants in search of work. Declining fertility rates allow more women to work outside of the home, which increases the labor supply and may further accelerate the demographic transition

As fertility rates fall, some countries have already dropped below replacement level; the number of children per woman that keeps population levels constant when births and deaths are considered together over time (assuming no net migration). Replacement-level fertility requires a total fertility rate of about 2.1 to offset the fact that some children will die before they reach adulthood and have their own families (in a society with higher mortality rates, replacement-level fertility would require more births). Total fertility rates in most European and some Asian and Caribbean countries currently range from about 1.2 to 1.8, well below replacement level. Some observers argue that declining fertility rates in both industrialized and developing countries will lead to a "birth dearth," with shrinking populations draining national savings and reducing tax revenues. However, societies can transition successfully from high mortality and fertility to low mortality and fertility with sound planning. Promoting good health standards (especially for children), expanding education, carefully opening up to international trade, and supporting older citizens through retirement are all policies that can help to offset the negative impacts on society of an aging population.

Among many future possibilities predicted by the experts, following three are commonly mentioned and discussed;

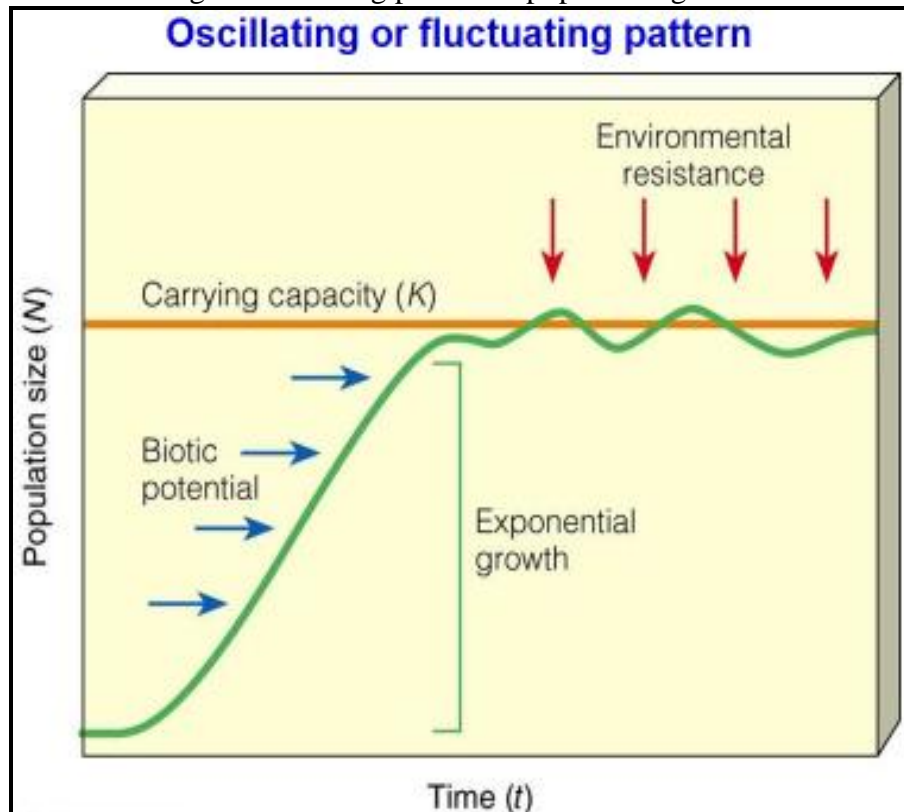
1. Sigmoid pattern of growth is possible if population remains within the limits of earth's carrying capacity (fig 2).

Fig 2: Sigmoid pattern of population growth



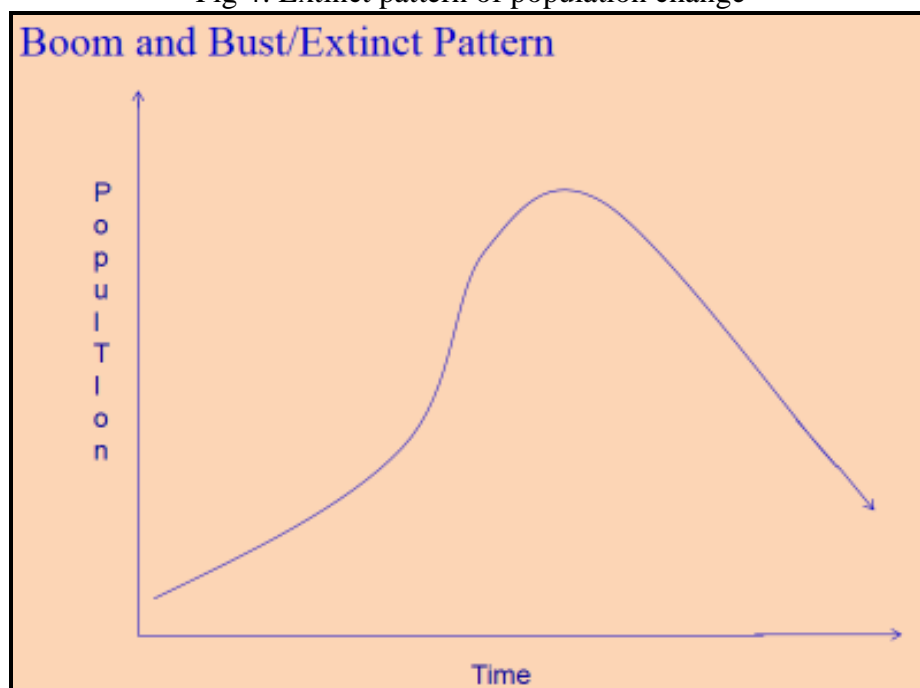
2. Oscillating or fluctuating pattern of growth is possible if population size fluctuate up and down the earth's carrying capacity following the production wise good and bad years (fig 3).

Fig 3: Oscillating pattern of population growth



3. Extinct pattern of growth is possible if population declines to very low size due to serious problems like unlivable environment, diseases, famines, wars etc. (fig 4).

Fig 4: Extinct pattern of population change



However, all the future predictions are based on past and present trends of population change. In future, population growth trends and its size will depend upon the forces which control population change phenomena.

## **4. Dynamics of population**

(Includes topic 5, 6 & 7)

Population dynamics are the processes or forces which control its growth and determine its size during any given period of time. Thus these are also called as population change factors. These include fertility, mortality and migration. Number of people in different age groups is also an important determinant of the future population growth trends.

### **1. Fertility**

The actual reproductive performance of women in a population is called as fertility. Fecundity is a sister term of fertility which mean ability of women to reproduce children. Infertility or sterility means inability to reproduce children.

Fertility has following two types;

- Natural fertility occurs where no population control measures are practiced.
- Controlled fertility occurs where population control measures are used.

Fertility studies involve following aspects;

- Fertility types (natural and controlled).
- Components of fertility (biological and social).
- Fertility structure (total fertility, replacement level fertility, wanted fertility, excess fertility).
- Determinants of fertility (factors which determine the fertility level of a population such as age at marriage, literacy rate and level of education, employment status etc.).
- Fertility differentials (fertility differences between different social, economic and other groups of population).
- Measures of fertility (methods of calculating fertility rate of population).

### **Fertility measures**

Several methods are used to calculate fertility level of population but just few most common methods are mentioned here.

- Crude Birth Rate (CBR) =  $\text{Total number of live births in a year} \times 1000 / \text{Midyear total population}$ .
- Child Woman Ratio (CWR) =  $\text{Total number of children of age 0-4 years} \times 1000 / \text{Total female population of age 15-49 years}$ .
- Age Specific Fertility Rate (ASFR) =  $\text{Total live births in a year to women in specified age group} \times 1000 / \text{Total number of women in that specified age group}$ .
- Total Fertility Rate (TFR) =  $\sum \text{ASFRs} \times 5 / 1000$ .

### **2. Mortality**

Removal of people from a population by deaths is called mortality. It is more easily & clearly measured phenomena/fact of human life than fertility & migration

Mortality studies involve following aspects;

- Determinants of mortality (factors which determine the mortality rate of a population such as age level, health facilities, nature of work, occupation etc.).

- Mortality differentials (mortality differences between different social, economic and other groups of population).
- Measures of mortality (methods of calculating mortality rate of population).

### **Measures of mortality**

Several methods are used to calculate mortality rate of population but just few most common methods are mentioned here.

- Crude Death Rate (CDR) =  $\text{Total number of deaths in a year} \times 1000 / \text{Midyear total population}$ .
  - Male Crude Death Rate
  - Female Crude Death Rate
- Age Specific Death Rate (ASDR) =  $\text{Total deaths in a year to population in specified age group} \times 1000 / \text{Total population in that specified age group}$ .
  - Male Age Specific Death rate.
  - Female Age Specific Death rate.
- Child Mortality Rate (below age 5)
- Infant Mortality Rate (below age 1)

### **3. Migration**

- According to Johan Robert Weeks (2008) “any permanent change in residence” is called migration.
- According to Gold Cheider (1971) “detachment from the organization of activities at one place and the movement of the total round of activities to another” is known as migration.
- According to US Census Bureau, only those people are termed as migrants who cross the political boundaries whereas those who change residence but stay within the same country are termed as movers but not migrants.

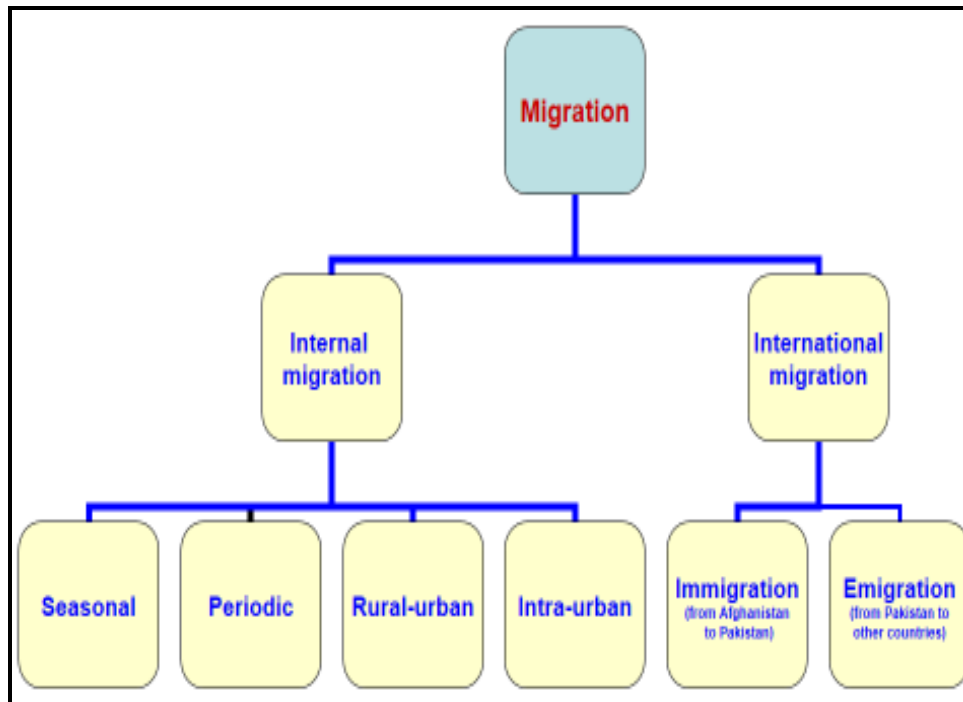
The population growth or decline of a country is not only a matter of natural increase or decrease but also involves the movement of people into or out of that country. For example, in case of USA, the natural increase of population is substantially lower than the overall growth, because in-migration from other countries exceeds out-migration by several hundred thousand people every year.

- Migration may or may not recur
- It may be return to the original point or another move to a new destination
- It may involve more than single individual i.e. a family or an entire village may migrate together
- People may move short or long distances
- People may or may not cross political boundaries

### **Types of migration**

There are basically two types of migration namely internal or local migration and international migration which are further sub divided in to several types (fig)

Fig 5: Types of migration



### Measures of migration

- It is intrinsically difficult to measure migration accurately
- There are, by the way, no universally agreed-upon measure of migration that can summarize the overall migration levels
- Crude net migration rate (CNMR) is commonly used measure-that is the net number of migrants in a population per 1,000 people per year

$$\text{CNMR} = \frac{\text{Total in-migrants} - \text{Total out-migrants} \times 1,000}{\text{Total mid-year population}}$$

We call it net because it the difference between those who move in & those who move out. If both the numbers are same, then net rate of migration is zero, even though in reality there may have been a lot of migration activity.

- The contribution that migration makes to population growth is calculated by measuring the ratio of migration to natural increase;

$$\text{MR} = \frac{\text{Net migration} \times 1,000}{\text{Births-Deaths}}$$

### Causes/factors of migration

Migration is an old phenomena in human history. Perhaps it started when continental glaciers began to retreat about 11,000 years ago. As a result of the pressure of numbers, need for food resources, changes in climate, conflicts & wars, and other factors, people started to move. Massive movements within countries, between countries, and between continents occurred. Migration gained importance as a great international issue in late 20<sup>th</sup> century

Many factors stimulate the migration process;

1. Conflicts (armed conflicts)- Afghanistan, Kashmir, Tribal areas of Pakistan
2. Political strife/circumstances (instability)-Afghanistan
3. Cultural circumstances-India
4. Environmental circumstances-Cholistan
5. Technological aspects-European countries
6. Information flow & job opportunities-Middle Eastern countries

## 7. Push & pull factors

Migration usually takes place in stages-rural-to-urban movement occurs in steps, often from smaller to larger centers. Migrants tend to relocate repeatedly in the land of their destination. They move on the basis of their destinations. Distance tends to affect the accuracy of these perceptions

### **Impact of migration**

Migration has several impacts both on the area left behind and the area reached. Some of the most significant impacts are enlisted below;

1. Change national economic structure
2. Change population density, distribution & composition
3. Migration alters traditional ethnic mixture
4. It inflames national debates
5. May cause and influence international tensions

## **8. Population composition**

Composition or structure of population refers to those aspects of population which can be measured and sometimes are termed as quantitative aspects.

For the study of population composition on world or country level data is obtained from population census.

For the study of population composition on local level data can be collected through field surveys.

Some important aspects of population composition are;

- Age composition/structure/distribution
- Sex composition
- Marital status
- Families & households
- Economically active population
- Employment status & occupational composition
- Industrial/ economic activity composition
- Nationality
- Language composition
- Religion composition
- Ethnicity & caste composition

### **Age composition**

Analysis of age structure is perhaps the most important of population studies because there is hardly any aspect of individual or community life which is not affected by age (food, housing, clothing, health, education, workforce, economic & social activities, military & other services etc.)

According to UNO definition 'age is the estimated or calculated interval of time between the date of birth and the date of census expressed in completed solar years'.

Age data is obtained through census & field surveys by asking questions like; what is your date of birth? (Usually from literate persons). What is your age? Or what was your age at last birth day? (Usually from illiterate persons).

Age data are usually available in the form of single years that is the number of persons in a population of for example age 17, 18, 19, 20 years etc. For demographic analysis, however, age data are seldom used in this form. It is convenient to classify them into age groups.

Age structure of population is commonly studied in following ways;

1. Age groups- percent distribution of population in each age group
2. Age indices
3. Age pyramids
4. Age graphs
5. Average age (mean, median & mode)

### **Age groups**

Age groups are made in several ways according to the requirements such as age groups by single year, age groups by five years interval, broader age groups etc. Broader age groups are made as;



1. Young or Infants & adolescents (0-14 or 0-19 years)
2. Adult (15-59 or sometimes 15-64 or 20-64 years)
3. Aged (60 or sometimes 65 and above)

### Age indices

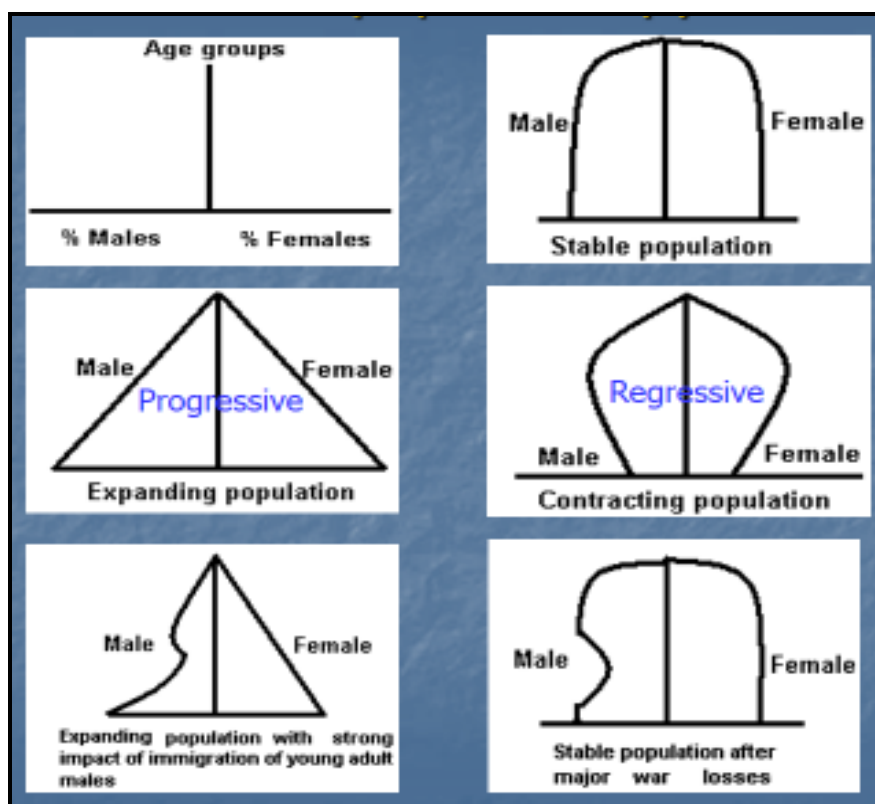
1. Young dependency ratio (YDR) =  $\text{Young/adult} \times K$ 
  - a. or  $\text{YDR} = \frac{P_{0-14}}{P_{15-59}} \times 100$
2. Old dependency ratio (ODR) =  $\text{Aged/ adult} \times K$ 
  - a. or  $\text{ODR} = \frac{P_{60+}}{P_{15-59}} \times 100$
3. DR or Total DR = Young DR + Old DR
  - a. or  $\text{DR} = \text{Young} + \text{Aged/ Adult} \times K$
  - b. or  $\text{DR} = \frac{P_{0-14} + P_{60+}}{P_{15-59}} \times 100$
4. Ageing index (AI) =  $\text{Aged/ Young} \times K$ 
  - or  $\text{AI} = \frac{P_{60+}}{P_{0-14}} \times 100$

### Population pyramids

Also known as age and sex pyramid, age pyramid, age and sex composition diagram, and or age structure diagram. A population pyramid is vertical bar graph showing the population of individuals in various age groups.

Age pyramid is a bar graph showing percentage of males and females in each age group on horizontal axis and age groups from bottom to top on vertical axis (fig 6).

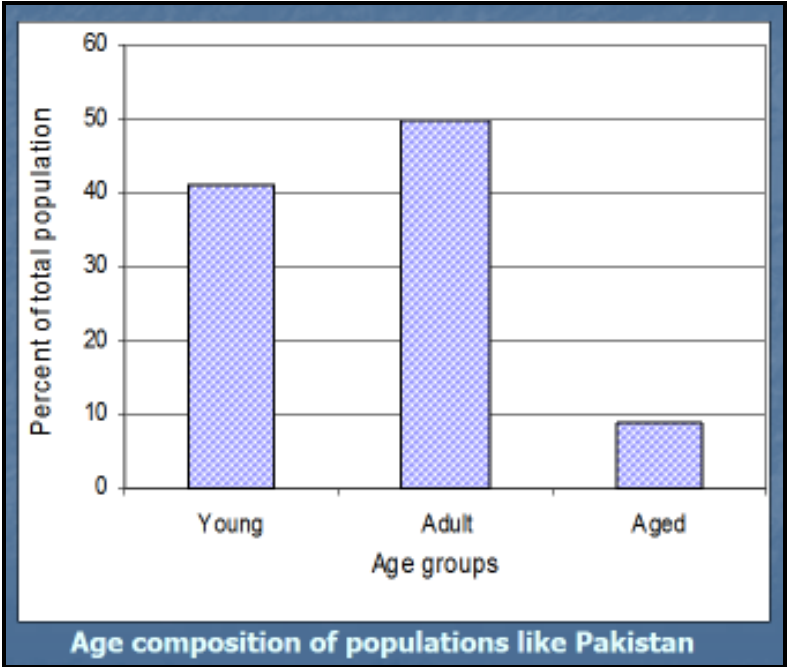
Fig 6: Idealized population pyramids



### Age graphs

Age composition is also analyzed by using age graphs such as triangular graph, bar graph, sector graph etc. (fig 7).

Fig 7: Age graph of population composition



(Note: For the study of other aspects of population composition follow book)

## **9. Population distribution over the globe**

Presently, the Earth contains over 7.7 billion people. But these people are not evenly spread over the world's habitable surface. People are very unevenly distributed (fig 5). Where are all these people located? Many factors contribute to the geographic spread of population around the globe. Mainly following groups of factors control the distribution of population over the globe;

1. Physical or environmental factors such as climate, terrain and topography, soils etc.
2. Economic factors such as resources, trade, agriculture and other economic activities
3. Social factors such as religion, norms, educational opportunities etc.
4. Political factors such political boundaries, political stability, migration rules etc.
5. Biological factors such as diseases, healthy environments, fertility rates etc.

However, broad general patterns of populations on earth can still be understood. Here the general characteristics of Earth's human population distribution will outlined. Highly uneven distribution of population is mainly due to uneven distribution of resources & marked variations in geographic environment. Around 90 percent of the world's population is concentrated on only 20 percent of the land surface. Therefore, a large majority of Earth's inhabitants live on and occupy a small portion of Earth's total habitable land area. Major population concentrations are; East Asia, South Asia' South East Asia, Western Europe, North Eastern North America.

In recent age industrialization, improved means of transportation & communication, trade, and urbanization are also the main factors affecting population distribution in the world.

- About 80% of the world population is concentrated on 20% of the land area on one side and 20% population is sparsely distributed on 80% of the land area on the other side.
- Another view exists that 20% of the land surface is too cold to live, 20% is too dry to live, 20% is too marshy, and 20% is too rugged. So, only 20% remaining land is habitable and 80% is uninhabitable.

The major population centers around the world include;

1. East Asia (China, the Koreas, and Japan)
2. South Asia (India, Pakistan, and Bangladesh)
3. South East Asia
4. Europe (Western, Eastern, and Southern Europe)
5. North Eastern North America.

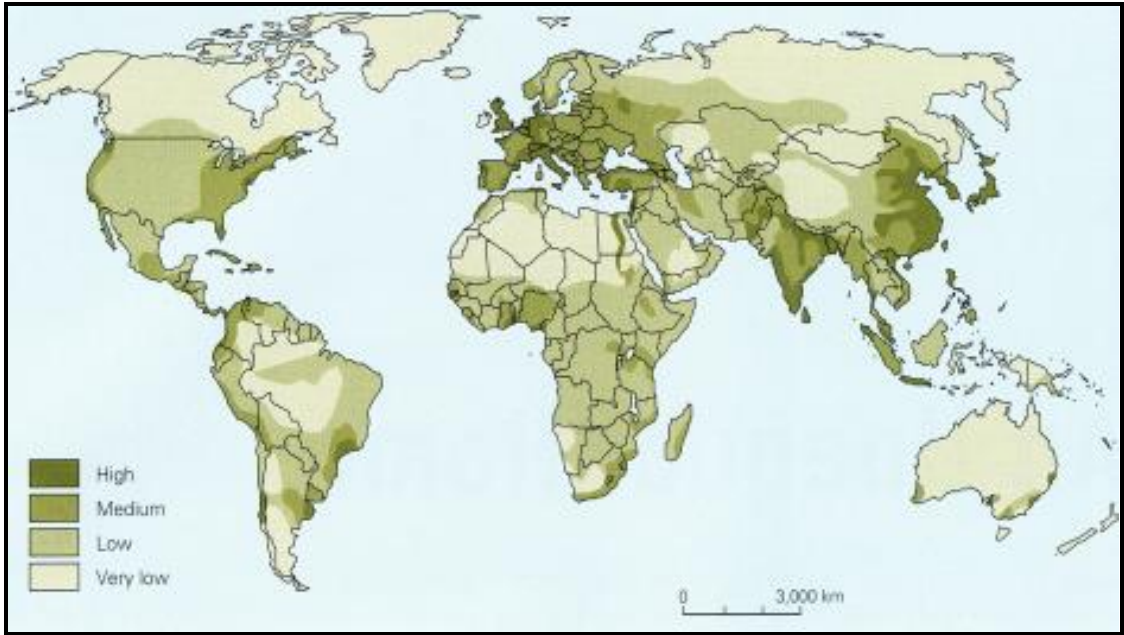
In fact, two countries each contain over 1.3 billion people: China and India. Since Earth's population is over 7.7 billion, this means that China and India each contain at least one-fifth of the Earth's total human population. Each major world region contains the following percentage of the Earth's total population;

- Asia (60.8 %)
- Africa (12.8 %)
- Europe (12.2 %)
- Latin America and the Caribbean (8.5 %)
- North America (5.1 %)
- Oceania (0.5 %).

While low-lying areas are more preferable for the locations of settlements, still a large portion of the Earth remains quite uninhabited. The sparsely population regions include northern and western North America, northern and central Asia, and interior South America, interior Africa, and the interior of Australia. Cities and urban regions have seen dramatic increases in population over the last fifty years, with much growth continuing at present and into the future. Currently over half of the Earth's population live in urban areas.

Two-thirds of Earth's population lives within the mid-latitudes and almost 90 percent of the world's population lives north of the equator.

Fig 5: Distribution of population over the world



## 10. Types of population density

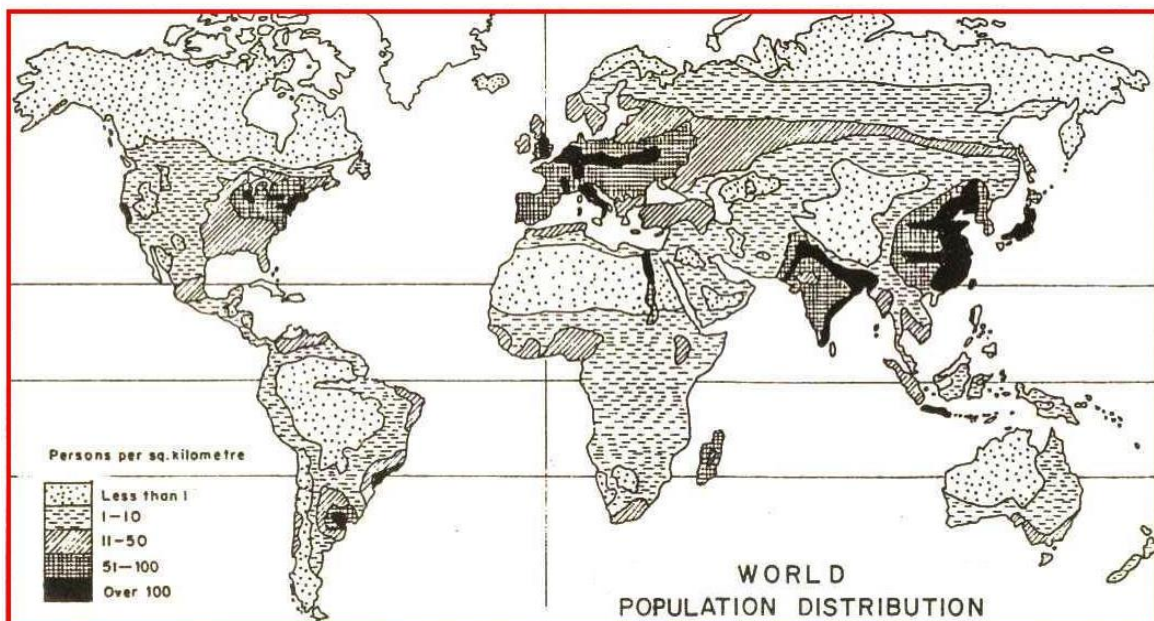
**Population density** is a measurement of population per unit area or unit volume. It is frequently applied to living organisms, and particularly to humans. It is a key term used in geography and helps to understand the distribution of population (fig 6) and population-land ratio.

- **Biological population density:** Population density refers to the number of individuals per square kilometer of land area. It is a common biological measurement and is more often used by conservationists as a measure than population size.
- **For humans,** population density is the number of people per unit of area usually per square kilometer (which may include or exclude cultivated or potentially productive area). Commonly this may be calculated for a county, city, country, another territory, or the entire world.

While arithmetic density is the most common way of measuring population density, several other methods have been developed which aim to provide a more accurate measure of population density over a specific area.

- **Arithmetic density:** The total number of peoples / area of land measured in km<sup>2</sup> or sq miles.
- **Physiological density:** The total population / the amount of arable land.
- **Agricultural density:** Also called as nutritional density is the total rural population / amount of agricultural land.
- **Residential density:** The number of people living in an urban area / the area of residential land.
- **Urban density:** The number of people inhabiting an urban area / the total area of urban land.
- **Ecological optimum:** The density of population which can be supported by the natural resources of an area.
- **Other types of density:** Rural density, economic density etc.

Fig 6: Density distribution of population over the world



## 11. Population theories

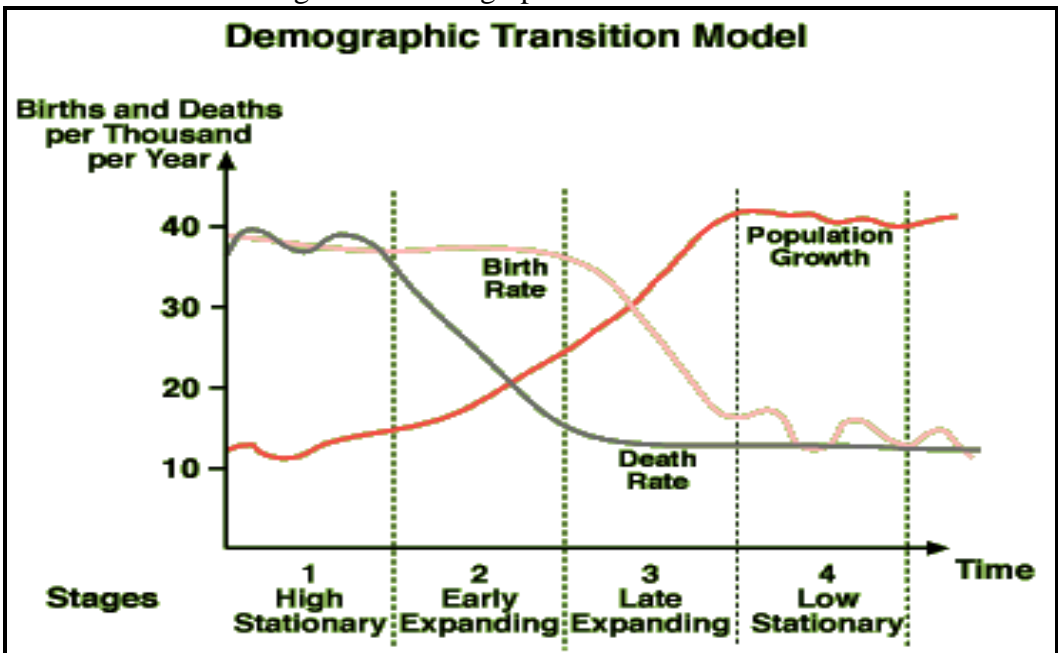
Several theories about various aspects of population have been formulated up till now and help to understand the population phenomena. Among them fertility related theories, demographic transition theory, Malthus theory, Paul Ehrlich view etc. are significant. However demographic transition theory will be considered here briefly.

### Introduction

Although, demographic transition model is the result of the input of several geographers but Warren Thompson is credited mainly. He framed out this model in 1929 exemplifying Western Europe. Demographic transition tells the sequence of changes in vital rates (birth rates and death rates) over time. According to the founders of the model two major factors namely industrialization and urbanization have caused the changes the characteristics of population over time specifically in its vital rates.

The demographic model as you may guess is a model, in other words it is a certain amount of data taken raw and transformed into something which people may understand. In other words it is an oversimplification of reality. The demographic transition model has taken data from industrialized countries such as England, France and many more in order to see what similarities there are between countries and deciding what stage other countries are going through at this moment in time. It is divided into 4 stages (fig 7). The first being the most primitive and fourth as being the most developed even though there may be a fifth stage (fig 8).

Fig 7: The demographic transition model



### Main stages of the demographic transition model

#### Stage 1

Stage one of the demographic transition model is the most primitive of the stages where there is a high fluctuating birth and death rate. Because of this there is no great population growth. These countries or even tribes have very basic living standards such as those in the Amazon rainforest where they hardly have any education, medicaments or birth rates such that population is based on food supply, health of tribe members etc. Other factors involved are no family planning



therefore many children or because of the faith of the people which may look at large families as a sign of virility etc.

**Stage 2**

In this stage of the demographic transition model there are a lot of births, however the death rate has gone down to about 20/1000 infants who die. This results in a rise in population due to the fact that more infants are surviving. Reasons for which more people may be surviving may be better health care, improved sanitation such as water etc., more transport and medical care as well as inventions relating to this. In other words this stage involves a slight modernization in health care raising people's living standards as well as their life expectancy.

**Stage 3**

Stage three is the stage at which there is already a low death rate as well as a declining birth rate therefore leading to a slight increase in population. The reason for the fall in births may be due to family planning, better education, lower infant mortality rate, a more industrialized way of life and the want for more material possessions as well as women being able to go out to work. In other words these countries are in the final stages of becoming like the western countries such as the states and those in Europe.

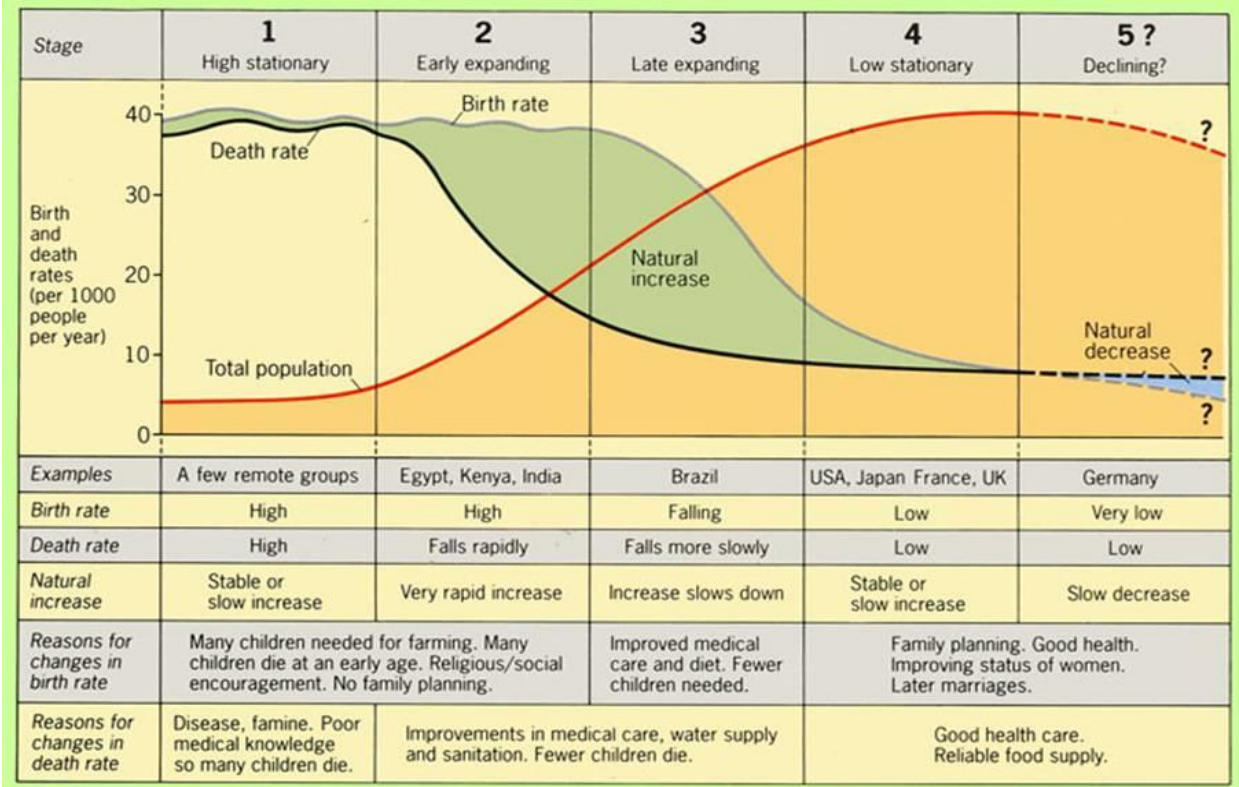
**Stage 4**

Stage four is the one at which Switzerland is. There is a stable population without much change because both the death and birth rate are low and in some cases there are more deaths than births therefore leading to a possible stage five.

**Possibly a stage 5?**

A country such as Sweden is currently entering into the negative growth rate meaning that there are less births than deaths so that the country's population size is decreasing leading to problems which will be discussed later on this page. To quote "Geography: An Integrated Approach by David Waugh "Will there be a **stage 5** where birth rates fall below death rates to give a declining population?"

Fig 8: Stages of the demographic transition



## **12. Problems of expanding population**

World population as well as population of many LDCs is expanding rapidly exerting lot of pressure on environmental and other resource. Consequently several problems of serious nature are cropping up which need immediate attention. These problems resulting from expanding population can be dealt under following main headings;

1. Environmental problems like pollution, global warming, landscape changes, forest depletion, soil erosion, changes in ecosystem, changes in natural drainage system, acid rains etc.
2. Social problems like increasing crimes, lack of educational facilities, social values changes etc.
3. Economic problems like unemployment, food insecurity, shortage of water and other resources, shortage of residences etc.
4. Political problems like implementation of law and order, administration of political entities, clashes and wars, increasing resource and boarder disputes, migration problems etc.
5. Health and other biological problems like diseases, lack of health facilities etc.
  - Children in the poorer countries die of illness at birth 5 times faster than those in the US.
  - About 500 million people all over the world are starving or ill-fed at the moment. 53% of the South Asian population is malnourished.
  - Vast areas of the world have poor sanitation and serious health problems. They don't need more population.
  - Half the women (and one third of the men) in the world cannot read and write. They won't improve their lot without education.
  - Crops and animals for food are placing a huge strain on the earth's soil and fertility.
  - Forests are chopped down for housing; wildlife faces extinction, the forests that used to be sinks soaking up carbon dioxide are no more.
  - A large population means more sewage and pollution, CFCs, car fumes, water pollution, carbon dioxide.
  - More people means more resources used up for food, clothing, housing, everything.
  - There are not enough doctors in Africa and Asia now. Diseases will spread rapidly with more population.
  - Inadequate fresh water for drinking as well as sewage treatment and effluent discharge. Some countries, like Saudi Arabia, use energy-expensive desalination to solve the problem of water shortages.
  - Depletion of natural resources, especially fossil fuels.
  - Increased levels of air pollution, water pollution, soil contamination and noise pollution. Once a country has industrialized and become wealthy, a combination of government regulation and technological innovation causes pollution to decline substantially, even as the population continues to grow.



- Deforestation and loss of ecosystems that sustain global atmospheric oxygen and carbon dioxide balance; about eight million hectares of forest are lost each year.
- Changes in atmospheric composition and consequent global warming.
- Irreversible loss of arable land and increases in desertification. Deforestation and desertification can be reversed by adopting property rights, and this policy is successful even while the human population continues to grow.
- Mass species extinctions from reduced habitat in tropical forests due to slash-and-burn techniques that sometimes are practiced by shifting cultivators, especially in countries with rapidly expanding rural populations; present extinction rates may be as high as 140,000 species lost per year. As of February 2011, the IUCN Red List lists a total of 801 animal species having gone extinct during recorded human history.
- High infant and child mortality. High rates of infant mortality are associated with poverty. Rich countries with high population densities have low rates of infant mortality.
- Intensive factory farming to support large populations. It results in human threats including the evolution and spread of antibiotic resistant bacteria diseases, excessive air and water pollution, and new viruses that infect humans.
- Increased chance of the emergence of new epidemics and pandemics. For many environmental and social reasons, including overcrowded living conditions, malnutrition and inadequate, inaccessible, or non-existent health care; the poor are more likely to be exposed to infectious diseases.
- Starvation, malnutrition or poor diet with ill health and diet-deficiency diseases (e.g. rickets). However, rich countries with high population densities do not have famine.
- Poverty coupled with inflation in some regions and a resulting low level of capital formation. Poverty and inflation are aggravated by bad government and bad economic policies. Many countries with high population densities have eliminated absolute poverty and keep their inflation rates very low.
- Low life expectancy in countries with fastest growing populations.
- Unhygienic living conditions for many based upon water resource depletion, discharge of raw sewage and solid waste disposal. However, this problem can be reduced with the adoption of sewers. For example, after Karachi, Pakistan installed sewers, its infant mortality rate fell substantially.
- Elevated crime rate due to drug cartels and increased theft by people stealing resources to survive.
- Conflict over scarce resources and crowding, leading to increased levels of warfare.
- Less personal freedom and more restrictive laws. Laws regulate interactions between humans. Law "serves as a primary social mediator of relations between people. The higher the population density, the more frequent such interactions become, and thus there develops a need for more laws and/or more restrictive laws to regulate these interactions. It was even speculated by Aldous Huxley in 1958 that democracy is threatened due to overpopulation, and could give rise to totalitarian style governments.

### **13. Population Policies**

Population policies are the purposeful measures which are aimed at affecting the demographic processes, notably fertility, mortality, and migration are called population policies.

#### **Fertility related policies**

Fertility related direct policies are divided in following two main groups;

1. Pro-natalist population policies
2. Anti-natalist population policies

Pro-natalist population policies are aimed at to encourage population growth and opted by those countries where there is a danger of population decline. Examples of such countries are Japan, Canada, Australia, European countries etc.

Anti-natalist population policies, in contrast, are aimed at to discourage population growth and opted by those countries where population is growing rapidly and causing many environmental, social, economic and other problems. Examples are Pakistan, India, and Bangladesh etc.

Natalism (also called pro-natalism or the pro-birth position) is a belief that promotes human reproduction. The term is taken from the Latin adjective form for "birth", natalis. Natalism promotes child-bearing and parenthood as desirable for social reasons and to ensure national continuance. Natalism in public policy typically seeks to create financial and social incentives for populations to reproduce, such as providing tax incentives that reward having and supporting children. Adherents of more stringent takes on natalism may seek to limit access to abortion and contraception, as well. Economic prosperity has been linked with having a good population size, lots of workers, lot of consumers. Countries like Sweden have adopted pro-natalist policies. Iran also had it because of the devastating loss in their population after the Iran-Iraq war. Now, due to this, 75% of their entire population is under the age of 30. On the other hand countries may implement anti-natalist policies to reduce a growing population for example China's one child policy.

Anti-Natalist policies are policies that are against human reproduction. These policies created to solve demographic problems such as overpopulation, famine and depletion of energy resources. An influential rationale for anti-natlist policies was provided in a study by Ansley Coale and Edgar Hoover (1958), who argued that high births ages of population growth jeopardized long term economic development by diverting resources from growth enhancing investments to the mere maintenance of population. Reduced fertility rate on the other hand, could speed economic development by freeing more resources for investment in productivity - enhancing activities.

Why are population policies in place?

Governments become concerned when birth rates fall too far. For example, Italy's current population of 56 million is expected to decline to around 41 million by 2050 likely to create problems with:

1. Too few consumers and skilled
2. Workers to keep the economy going
3. Decreasing tax revenues and increasing pension and health care costs as the population ages.

Germany provides another good example of having a declining population. Without an increase in the current birth rate of 8.25 per 1,000 (or increased immigration), the German workforce will fall by 40% over the next 50 years. Since growing workforce is one of the important factors in generating a country's overall wealth, it is likely that Germany's prosperity may be damaged. Even if the birth rates to be doubled overnight, it could take at least 20 years for a country such as Germany to turn around the negative impacts of declining population. From predictions like these, it is necessary to implement population policies, because it may lead to a future economic crisis, with the limited working population.