<div align="center">**Importance of Study of Age-Sex Structure**</div>

1. Introduction

In this module the basic concepts of age and sex structure like its importance, definition, usefulness and basic measures will be taught. It brings out the age-sex structure of India for a better understanding.

The distribution of population by age and sex are among the most fundamental demographic characteristics of human populations as well as of demographic statistics. It plays an important role for the development of any society. The economic and cultural life of society critically depends upon the age and sex structure of the population. Moreover, the planning process of any country makes use of this data extensively for the development of the economy and culture as well as for its individual regions.

It is well known that many developed countries and international agencies study the distribution of the population by sex and age across countries as it has significance to the world population trajectory. The future size and structure of the population depend on the current age-sex structure of the population. Moreover, in the current context of global concerns of environmental degradation and climate change, the age-sex structure and its future growth carry an important role in the global sustainability.

1.1 Definition

Age is a more complex characteristic than that of the sex. The age is normally definedby a person at his/her last birthday at the time of the survey. Thus, demographically, age is considered as the completed years while many cultures use age with varied other meanings. The definition of sex, on the contrary, does not face many statistical issues. The age-sex distribution conveys the relative numbers of children, young and old as well as the balance between men and women at different ages. Almost all population characteristics vary significantly with different ages. As a component of population analysis, most of the analysis is based on the age-sex structure of the population.

1.2 Usefulness of Age Sex Information

In the previous section, we have studied that the age-sex data is of prime importance and is used for various purposes in social sciences. Age-sex structure conveys the relative numbers of children, young and old as well as the balance of men and women at different ages. Such information is useful for formulations of several country-specific policy-making and planning purposes. It can be observed that many population characteristics vary significantly with different ages and therefore, the demographic dynamics can only be understood with a careful analysis of the age-sex structure data. As a component of population analysis, most of the demographic analyses are based on the age-sex structure of the population. The future population growth also critically depends upon the age-sex structure.

The data is considerably used in the field of health, social, economic, and political processes, both present and future. For instance, the different age-sex compositions result in different proportions of the population in the school, labour force, older ages for social security systems, etc.

The fruitfulness of age data is noticeable when it is cross-classified by variables like educational attainment, marital status and economic activity which alter with ages in different patterns or forms. Apart from demographic concerns, the data of age-sex structureis required for age-specific analysis for planning, scientific, technical, and commercial purposes.

2. Measuring Age-Sex Structure

2.1 Age composition: It can be categorisedin terms of age groups (e.g., 0-14 years, 15-64 years, and 65 years or above). The changing structure of the population in each of these broader age groups, reveals many possibilities to understand the age composition of the population as well as the sex distribution across these ages. As per Census 2011, India has a moderately significant proportion of the people in the younger age groups in the world. Around 31 % of the population of the country belongs to the age group of 0-14 years according to Census 2011. At the same time, the adult population between the age group of 15-59 years constitute 60.5% of the population.

2.2 Dependency ratio: Another important way to measure age structure is by computing *Dependency ratio.* It is a ratio of economically active to the economically inactive population (Srinivasan, 1998). It is important to mention that the composition of a population at a given point in time is of significant interest to the demographers. The age-sex structure of a population is a fundamental determinant of the numbers of demographic events which form the basis of the services that population will require, e.g., schools, care homes, maternity services, etc.

$$Dependency\ ratio = \frac{Number\ of people\ aged\ 014\ and\ aged\ 60\ and\ over}{Number\ of\ people\ aged\ 15-60} \times 100$$

2.3 Population pyramid: The population pyramid shows the age-sex structure of a population. Age-sex pyramids are also known as population pyramids. The information is graphically displayed to improve understanding and ease of comparison. They are also potentially very informative on the history of a society and its prospects. The importance of the age-sex structure can be understood from a simple fact that it acts as a starting point for any demographic investigation. A particular methodof assessing them through statistical methods can be performed through graphical tools. The depictions of age-sex structures through the horizontal bar diagrams on the both sides of the axis are called population pyramids (Srinivasan, 1998;Shryock and Siegel, 1976).

3. How to read Age-Sex Pyramid?

1. It consists of two histograms placed on their side, and back to back.
2. It shows absolute numbers or percentages, where the X-axis must be labelled accordingly.
3. Itis calculatedfor each age-sex group from the total population (males and females).
4. The Y-axis represents the age, where the youngest at the bottom and the oldest is the pick.
5. The scale can be in single or five-year age groups depending on the precision needed.
6. It must be of equal width, apart from the final open-ended age group.
7. The statistics for males are plotted on the left, and for females on the right.

3.1. Types of Population Pyramids: It not only graphically displays long-term trends in the birth and death rates, and migration but also reflects the shorter term of baby-booms, wars, and epidemics. Demographers recognise three prototypical pyramid structures– constrictive, expensive, and stationary. All these structures indicate the conditions of the populations which comprise them. A population pyramid illustrates age and sex structure of a country's residents and may provide better insights intothe political, social, as well as economic expansion within a nation.

3.1.1 Constrictive pyramid: A constrictive pyramid is the opposite of an expansive pyramid. A constrictive pyramid has fewer people in the younger age categories and has been typical of the U.S. population as baby boom populations shift to more conservative birth rates with a slight narrowing in its younger age groups. Such type of pyramids is seen in the places with high life expectancy, and healthy living conditions aresignificantly contributing to a higher number of older people. Notwithstanding this, there is a lesser number of births taking place, which are outnumbered by some deaths and work as a check to the growing population. Also, a rising number of older people than the youth in the country places a burden upon the working-age population to maintain a large number of elderly dependents. The decrease in the number of births indicates that people are moving towards

either the small families normsor they are in the unstable partnership due to enhanced migrations.

3.1.2 Expansive pyramid: This type of graph has a classic or triangular shape, with a very wide base and pointed apex. It denotes larger numbers of people in the younger age categories and is a reflexion of many developing nations where birth rates are high or stalled, and life expectancy is compact. Each age group presents a bar less wide than that of the age-group before it, showing that more people are dying at the higher group (Shryock and Siegel, 1976). The large base confers to a high birth rate, which is probably due to circumstances like a developing economy, low levels of female education, poverty and less awareness of birth control measures. The tapering top of the pyramid indicates to theprevailing high mortality rates, which signifies for a low level of life expectancy at birth in the country. Determinants like poor living conditions and lack of proper medical amenities may be responsible for high mortality rate among elderly. Such nations have a higher population of children compared to people of working-age and elderly resulting to burden over the population of working age to help the large younger population, making them work in stressful states. Such type of the pyramids corresponds to stage 2 of the demographic transition.

3.1.3 Stationary pyramid: It indicates a population which is neither growing nor declining in its size. This "pyramid" looks more like a column and typically has a relatively static birth and death rates. Countries or areas with population pyramids like this belong to the final stage of the demographic transition. A stationary pyramid explicates approximately equal numbers of people in all age classifications, with a tapering towards the older age categories. Nations as, Sweden show stationary age categories because of relatively low, steady birth rates, and a high standard of life.

Figure 1: Types of Population Pyramids
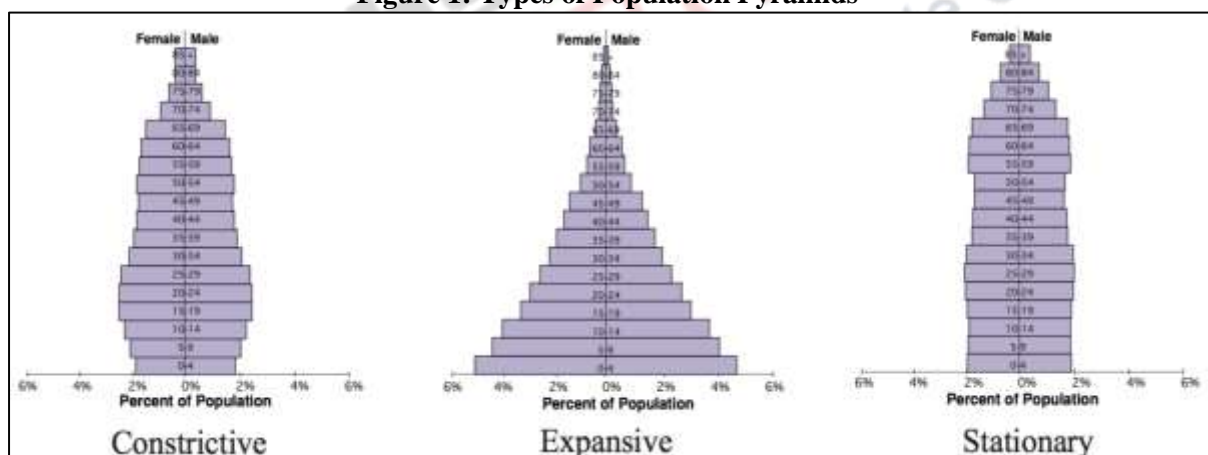
Source:
http://www.fsl.orst.edu/pnwerc/wrb/Atlas_web_compressed/5.Human_Populations/5h.pyramids_web.pdf

These are the three population pyramids thatpertain to age-sex structures in different phases of demographic transition (Shryock and Siegel, 1976). The age structure of a population can help a country choose the needs of its population in the future so that it is further prepared to face them. It is the cumulative result of past trends in fertility, mortality, and migration.
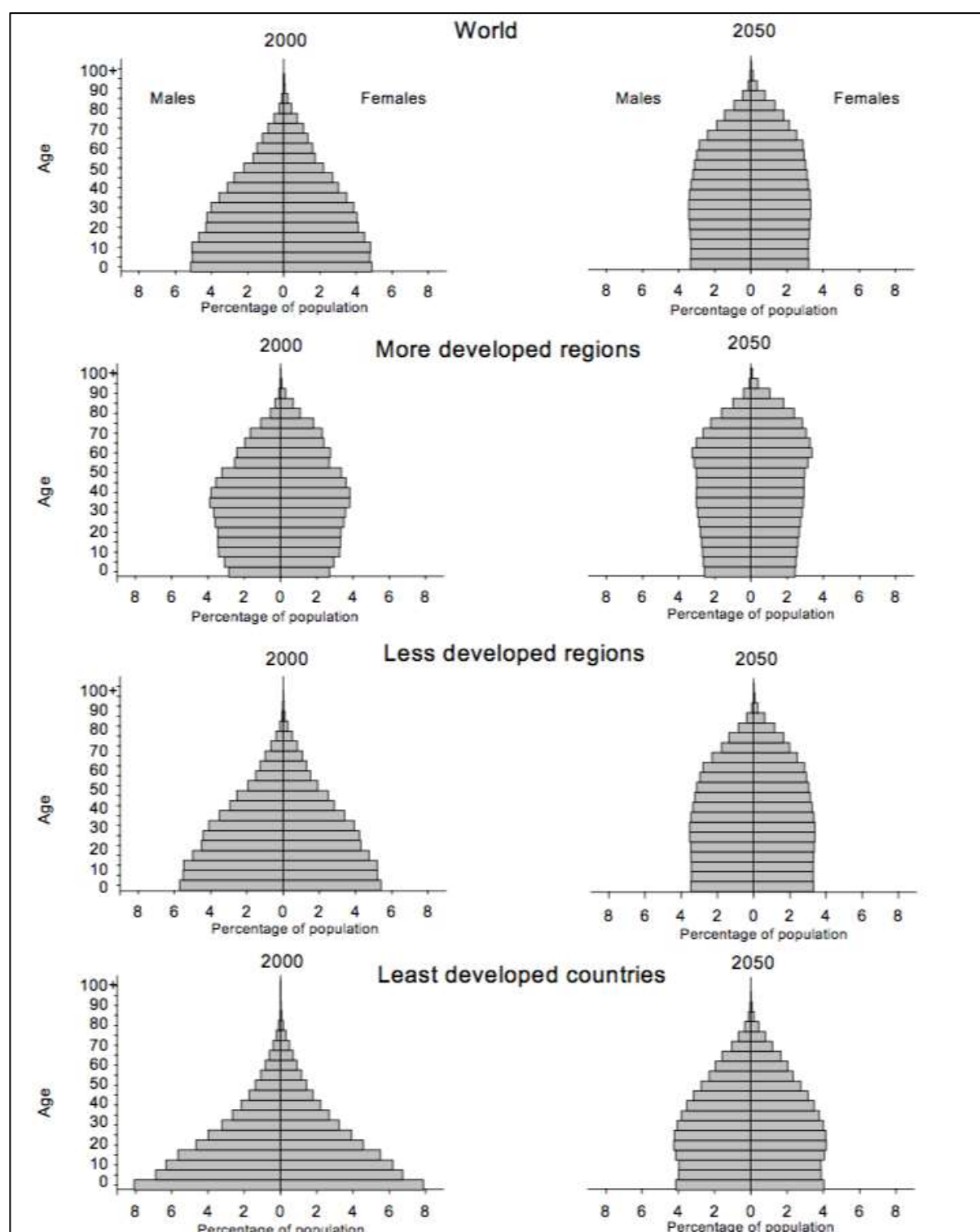
4. Age and Sex Structure of Population in the World

The age and sex structure of a country's population can affect gender issues in a variety of ways. Age structure is a process of population ageing that is determined primarily by trends in fertility and mortality. Any population with considerably a long history of high fertility has a "young" age structure,alike in its general characteristics to the present age structure for the group of least developed nations (see Figure 2).The median age of thepopulation starts to rise when both the fertility and mortality rates decline. By 2015, the world's population is projected to reach 7.2 billion, of which

about two-thirds will be residing in countries at or below replacement fertility (United Nations, 1999c). From Figure 2, projected and estimated age and sex distribution of the population from 2000 and 2050 shows world population moving from expansive growth to constrictive growth rate, followed by less and least developing country. Whereas, more developed country transitions from constructive to stationary stage or as we call towards the older aged population. A situation like this arises when fertility rest below replacement fertility, besides low death rates.

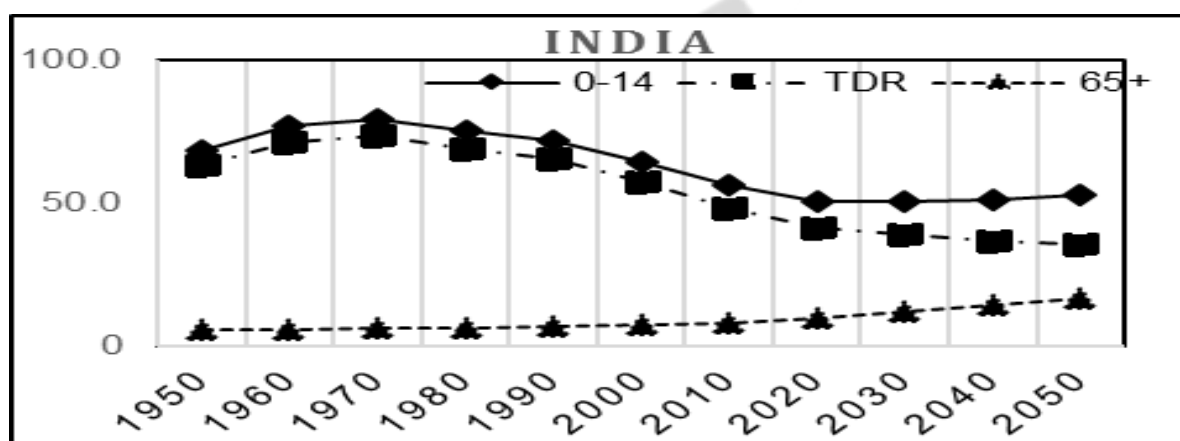**Figure 2: Age and sex distribution, 2000 and 2050**

Source: United Nations, Department of Economic and Social Affairs, population divisionDepartment of Economic and Social Affairs, population division, World Population Prospects: The 1998 Revision. https://esa.un.org/unpd/wpp/

5. Age and Sex Structure of Population in India

The population composition according to age and sex is known as the age and sex structure. For a given country or region, it can be analysedby classification of age groups. Therefore, it itcategorized into three groups: (i) young, (ii) adults, and (iii) old. Although there are no standardized break points, yet the 15 and 60 ages are ordinarily used to breakpoints in the developing nations and 15 and 65 ages in the developed nations. The socio-economic and political implications of these age groups as well as geographical variation in their distributionhaveserious implications. For a country like India, age groups below 15, 15-59 and above 60 years are used for better understanding the dependency burden. In India during 2011, about 31percent of its population was below 15 yearsofage, and 8.6percentwas above 60 years. On the contrary, the European countries, with low fertility rate and long life expectancy, had20 percent of populations in the younger age group.In India, 60.5 percent of its population in 15-59 age group and it increased to 63.6 percent, if we consider 15-64 age group (Figure 3).

Figure 3. Dependency transition ratios for India

Source: United Nations, Department of Economic and Social Affairs, population divisionDepartment of Economic and Social Affairs, population division, World Population Prospects: The 2015 Revision. https://esa.un.org/unpd/wpp/

India's population is expected to grow by just over 57% between 2000 and 2050. The overall growth will, in part, be due to increased life expectancy and, therefore, a larger elderly population, around 10 million, aged 80 years and over in 2005 would grow around 50 million in the 2050s. Though, the population is supposed to begin decline exceeding 2050, with the 0-4-year-old group dropping from over 110 million in 2005 to just over 105 million. It means that India's Age-Sex Pyramid was in the 1st stage in the past and assumed to here at the 4th stage in 2050. Since 1981, India has been moving through the 3rd Stage of demographic transition whereas some of states and union territories of India will already reach the 4th stage. (refer to Module-3)

6. Importance of Age-Sex Structure

The importance of age-sex structure is crucial not only in population studies but also in the several branches of social sciences that deal directly or indirectly with the population variables like social, economic, political, biological, genetic, geographical sciences. It is very useful in various programmes of study, as mentioned below.

1. It represents the number of people at given age and sex in society and is built from the input of births, deaths, and migration of every age.
2. It is an expression of the number of people found in each age group of the population by sex.
3. All the rate and ratio in demography are generalised for either age or sex or both.

4. It helps in projecting and estimating future trend to make it useful for planning purposes.
5. It reflects the essential characteristics or the biological attributes of a group of particular a population that influence not only its demographic but also the social, economic, and political structure of a population over the elapsed period.
6. It is the result of significantand interrelated determinants such as fertility, mortality, and migration, which has accomplished during the continuance of the oldest inhabitants.
7. It influences birth and death rate, national and international movement, the composition of marital status, workforce, the gross domestic product, planning concerning educational and medical services and housing, etc.
8. The age-sex structure of the population estimates of the school-age population may be composed, and on that basis, one may arrive at an estimation of the number of educational organisations, teachers, playgrounds, textbooks, etc., which will be required.
9. Likewise, in the field of social welfare, the planning of social services for instance, for mothers and children, and for the aged has to be based on the age-sex distribution of the population.
10. The attitude of society towards children, youth, and elderlyis influenced by the age-sex distribution of the population.
11. The demographic data classified by age-sex and made available to all data users. Data on fertility, mortality, migration, marital status and economic components are first shown separately for males and females and cross-classified according to age. It is widely known that in most of the traditional Hindu family, status is accorded by age-sex. Men are considered more important than women, and older persons are regarded as more important than young individuals.
12. When a population expanding steadily, the elongated bars of the graph will appear at the bottom of the pyramid and will shorten in length as the top of the pyramid is entered, indicatingto a large population of children under five age, which sinks toward the top of the pyramid due to the death rate.
13. A stationary age structure of the population is one in which birth and death rateremains unchanged over an extended period.
14. It is more influential in business and marketing and allied commerce fieldas it helps in determining the need of the consumers in the quantitative term.
15. The age-sex structure is useful in the planning of social services, for instance, maternal, child care or for elderly population.

Summing up

The age-sex structure of a population at a given time may be characterized as an aggregation of cohorts born in various years. A famous graphic illustration of the age-sex structure of a population is the "Age-sex Pyramid," or "Population Pyramid." It shows for a definite point in time the various surviving cohorts of persons of each sex. A population pyramid is one of the most sophisticated ways of graphically presenting sex and age distribution data together on the same axis. It is nothing more than two conventional histograms, representing the male and female populations in, usually, 1 or 5-year age categories, set on their sides and back to back. The knowledge of the age and sex structure of the population tells us a great deal about the demographic trends in the past. It indicates the way demographic events have performed in the past and the effect of various policies on vital events. The age-structure of the population is keenly observed by demographers, sociologists, politicians, administrators, etc. In the first place, indices of the population's age and sex structure play an important part in the system of indices of the plan for the development of the economic and cultural life of our socialist society. Planning agencies use them for assessing the attained level of development of the economic development of the nation, and of its regions for verifying the course of fulfilment of plans as well as for current and long-term planning.

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