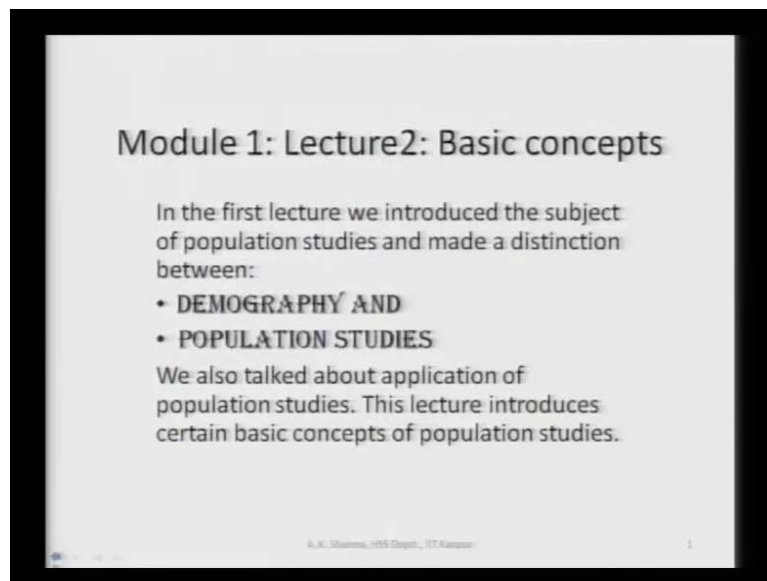**Population and Society**

Prof. A.K. Sharma

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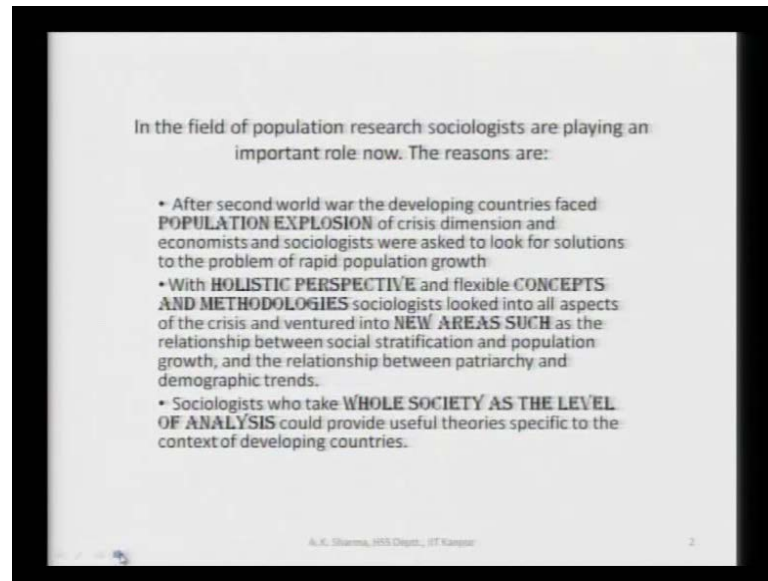
Indian Institute of Technology, Kanpur

Lecture No. # 02

Basic Concepts

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Dear students, in the first lecture, we introduced the subject of population studies and made a distinction between demography and population studies. I said the demography is the quantitative study of population trends and population studies deals with the socio-economic, political and psychological aspects of population. We also talked about application of population studies.

(Refer Slide Time: 00:48)

In the field of population research sociologists are playing an important role now. The reasons are:

- After second world war the developing countries faced POPULATION EXPLOSION of crisis dimension and economists and sociologists were asked to look for solutions to the problem of rapid population growth
- With HOLISTIC PERSPECTIVE and flexible CONCEPTS AND METHODOLOGIES sociologists looked into all aspects of the crisis and ventured into NEW AREAS SUCH as the relationship between social stratification and population growth, and the relationship between patriarchy and demographic trends.
- Sociologists who take WHOLE SOCIETY AS THE LEVEL OF ANALYSIS could provide useful theories specific to the context of developing countries.

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Now, this lecture introduces certain basic concepts of population studies. In the field of population research, sociologists are playing an important role now, and the reasons are: first; that after Second World War, the developing countries face population explosion which means very rapid growth of population of crisis dimension, and economist and sociologist were asked to look for solutions to the problem of rapid population growth.

Second; with holistic perspective and flexible concepts and methodologies, sociologists looked into all aspects of the crisis and ventured into new areas such as the relationship between social stratification and population growth, and the relationship between patriarchy and demographic trends. These students of sociology are all familiar with the concept of social stratification and patriarchy and related issues.

Now the third thing is that the sociologist who take whole society as the level of analysis unlike say psychologist who take individual as the level of analysis, they could provide useful theories specific to the context of developing countries.

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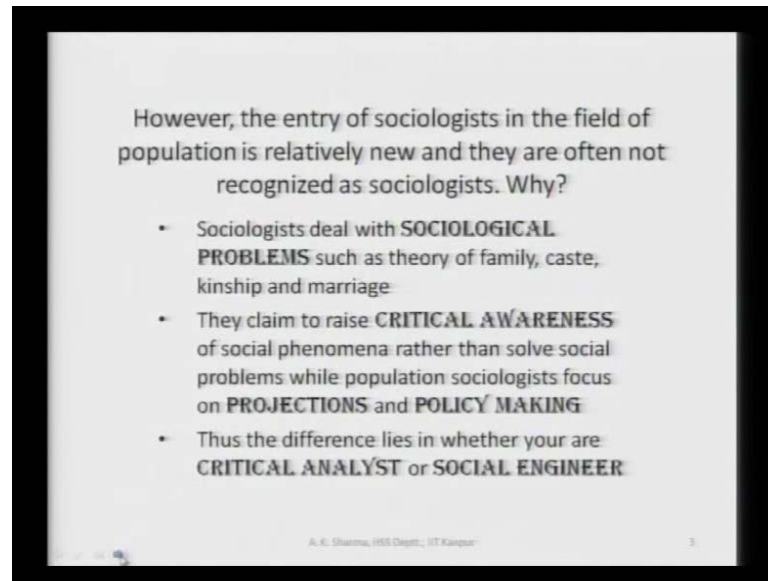
However, the entry of sociologists in the field of population is relatively new and they are often not recognized as sociologists. Why? First sociologists deal with sociological problems such as theory of family, cast, kinship and marriage. In India, sociology started with anthropological and orientalistic perspective and is studied mostly family, cast, religion, kinship and marriage. So, they have theories of these institutions and processes of societies.

Then sociologists claim to raise critical awareness of social phenomena rather than solve social problems, while population sociologists focus on projections and policy making. projection means projections of future population, composition and distribution of population, and what kind of policies are required to deal with the problems caused by excessive population growth or as in the context of western countries now, problems caused by declining population.

The difference lies in whether you are a critical analyst or social engineers. There is a preference among sociologist to be critical analyst and not to be social engineers while population sociologist or population scientists mostly play the role of social engineer.

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So, it is obvious that sociologists talk in terms of status, class, gender, institutions, structures, state and civil society etcetera. Demographers talk in terms of birth rate, death rate, growth rate, age and sex composition of population and so on.

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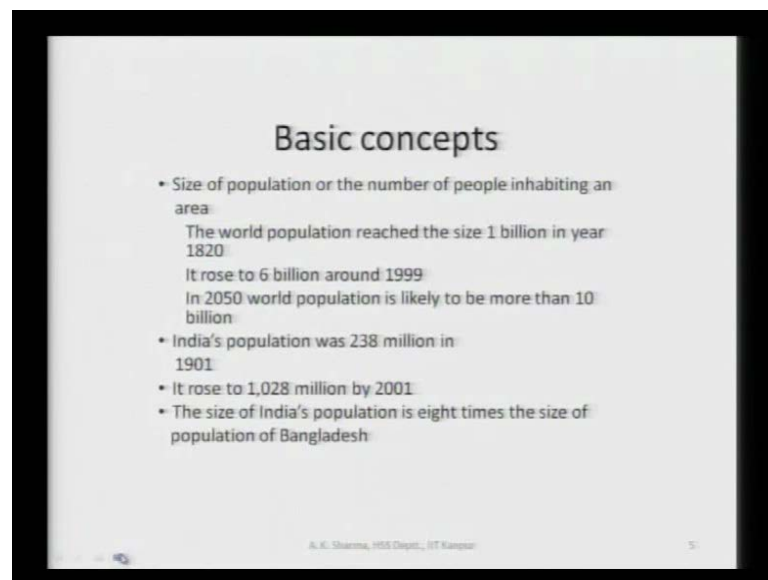
So, we will look into some these concepts today. Among the basic concepts, size of population is the most basic of all the concepts. Anybody who wants to study population of a country would first ask a question; what is the size of population.

Now, the size of population means the number of people inhabiting an area. For example, the world population reads the size one billion in year 1820. 1820 was the first year in the history of mankind when the world population reached the first billion size, and you see it rose to 6 billion around 1999.

We do not know when human society began. People estimate that perhaps human society was or human beings appeared on this planet earth some 5 or 6 million years ago; that means, it took 5 to 6 million years for the world population to reach first billion mark in year 1820. Less than 200 years time, it was to 6 billion in 1999. This itself is a very revealing fact about growth of population.

There are projections; United Nations projection that in a 2050, world population is likely to be more than 10 billion. We look at India's figures. Then India's population in 1901, in the beginning of the last century was 238 million. This is what we mean by size, that size of India's population where 238 million in 1901. It rose to 1028 million by 2001; that means, in hundred years time, India's population became more than four times. The size of India's population is eight times the size of population of Bangladesh. These kind of statements can be made if we look at the size of population.

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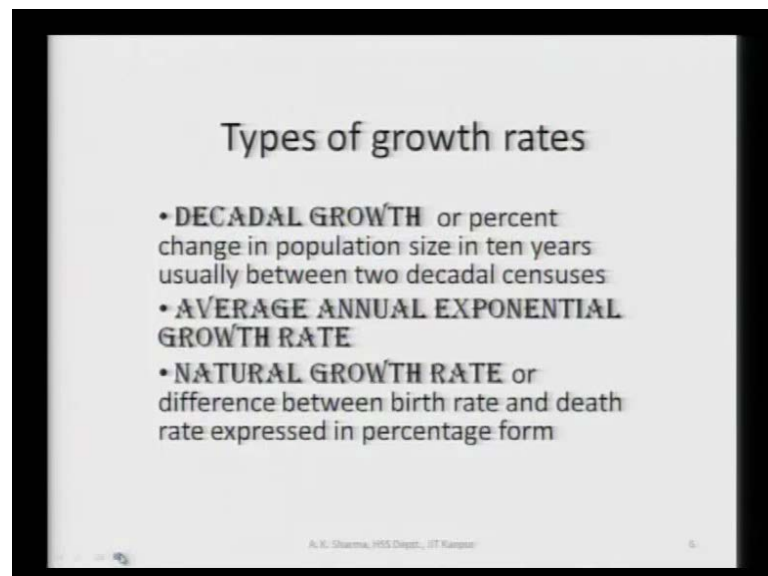
The next concept is growth rate. For defining growth rate of population means the rate or rapidity at which size of population is changing. There are several types of growth rates

and three most important growth rates are decadal growth rate, annual exponential growth rate and natural growth rate.

Decadal growth or percent change in population size in ten years is calculated when you have figures from decadal censuses at two consecutive dates. For example, in India, the first census was started in 1872, but that was not a synchronous census. It is said that in 1881, for the first time, we had an all India census at the same point of time and after that, every time years we have a history of uninterrupted censuses.

So, if you have say figures for 1981 and 1991 censuses, you can calculate decadal growth rate between 81 and 91 or if you have figures for 1991 and 2001, you can calculate decadal growth rate for 1991 to 2001 period.

Then there is average annual exponential growth rate, I will define this in a moment. And the natural growth rate or the difference between birth rate and death rate expressed in percentage form. This is how we calculate decadal growth rate.

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Population of India in year 2001 as revealed by census of India at that time was 1028737436. Population of India in 1991 was 846302688. So, that decadal growth rate between 1991 and 2001 comes out to be the difference between two census figures divided by census figures of 1991; means 846302688 multiplied by 100. Its customary to express decadal growth rate in percentage form.

These calculation show that the decadal growth rate of India's population between 1991 and 2001 was 21.55 percent. In other words, population of India has increased by 21.55 percent in 10 years time; between 1991 and 2001. In per year terms, we can say that the population of India on the average between 91 and 2001 censuses, increase at the rate of 2.1 percent per year. This is what we called decadal growth rate.

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Then comes the exponential growth rate. Actually in calculation of exponential growth rate, we assume that population of a country is rising exponentially.
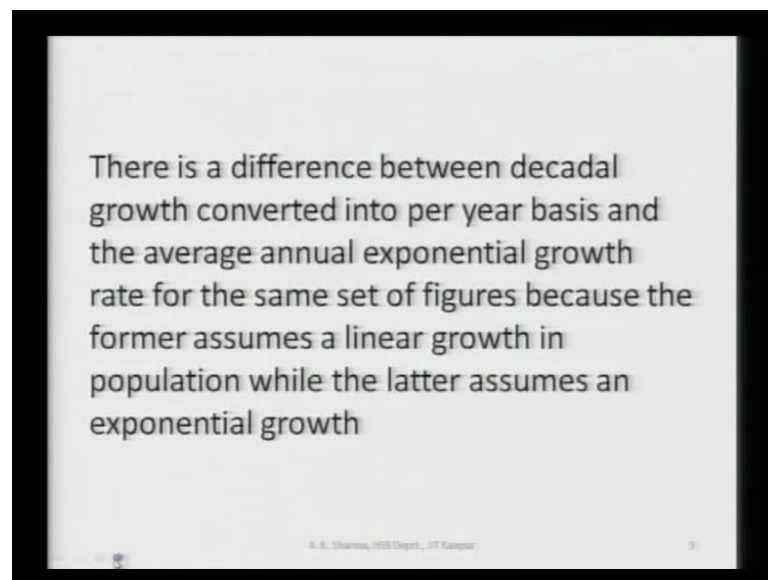
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For example, if I write P t equal to P 0 e raise to power r t, where P t is population at time t at time t, P 0 is population at time 0, and r is the rate of growth, then we can write that r rate of growth is 100 divided by t log P t divided by P 0.

For India, between 1991 to 2001, this comes out to be r is 10 log 1028737436 divided by, this time we are dividing 2001 figures by 91 figures, we are not subtracting them. So, 1028737436 divided by 846302688; that comes out to be 10 log 1.21556 or 1.952 percent per year.

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There is a difference between decadal growth converted into per year basis and the average annual exponential growth rate for the same set of figures because the former assumes a linear growth in population while the latter assumes an exponential growth

A. K. Sharma, HSS Deptt., IIT Kanpur

Then the difference between decadal growth converted into per year basis and the average annual exponential growth rate for the same set of figures because the former assumes a linear growth in population while the later assumes an exponential growth.
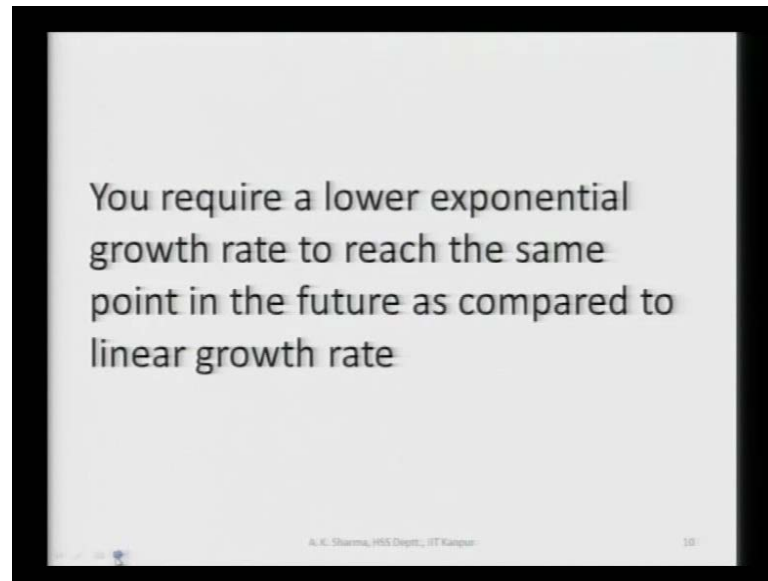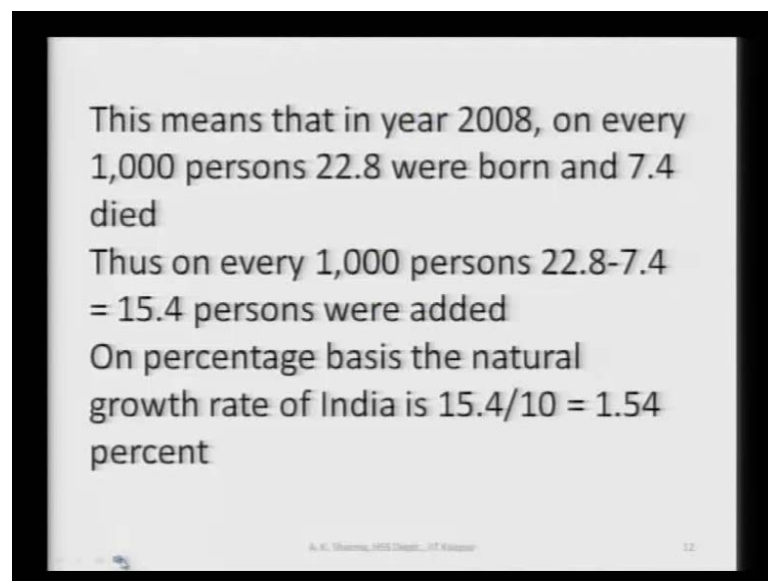
You require a lower exponential growth to reach the same point in the future as compared to linear growth rate.

Now, what is natural growth rate? The third type of growth rate. Natural growth rate gives the difference between birth rate, births per thousand populations, and death rate, deaths per thousand populations.

SRS; it is a sample registration scheme bulletin of 2009 published by registrar general India show that birth rate of India is 22.8 and death rate is 7.4. This means that in year

2008, on every 1000 persons, 22.8 were born and 7.4 died. Here we ask how can fractions be born and died. This means that on 10000 persons, 228 were born, and on 1000 persons, 74 died. In this statistical language, we say that on 1000 persons, 22.8 were born. It is customary to define birth rate in per thousand terms that is why a fraction.

Thus on every thousand persons, if 22.8 were born and 7.4 died, then 22.8 minus 7.4 or 15.4 persons were added; that means, on every 10000 persons, 154 persons were added. If I calculate growth rate on percentage basis, then the natural growth rate of India is 15.4 divided by 10 or 1.54 percent.

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See that natural growth does not consider migration. Decadal growth rate and exponential growth rate consider fertility, mortality and migration, but natural growth rate considers only migration. This is the difference between birth rate and death rate. It comes out to be lower than other two rates because it is there is a reason for that because it is calculated for year 2008. Sample registration scheme of 2009 is giving figures for 2008 and not for the period 91 to 2001.

In India, by the year 2008, fertility had declined substantially. So, when you calculate natural growth rate which is based on birth rate and death rate for year 2008, when fertility has declined substantially, then obviously, you will get a lower growth rate, but
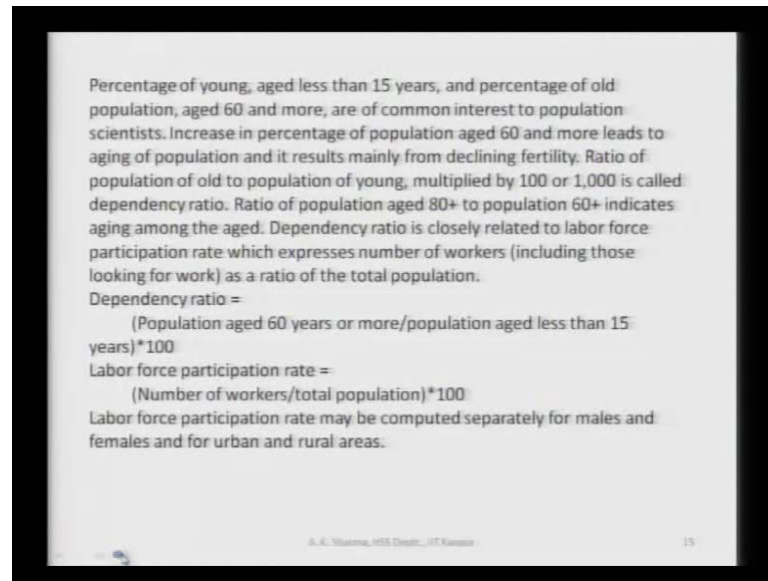
this natural growth rate is a much more realistic representation of what is happening in India today as compared to decadal growth rate or exponential growth rate.

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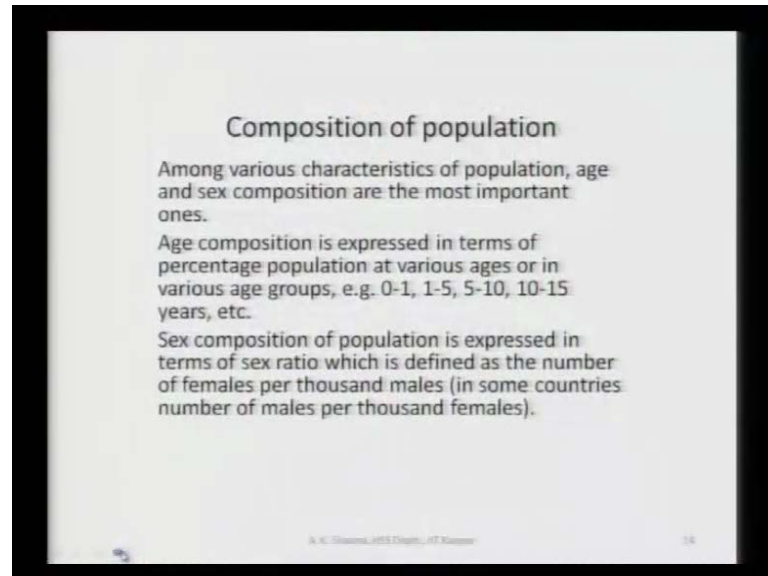
The next concept in the studies of population would be composition of population. Among various characteristics of population, age and sex composition are the most important ones. Age composition is expressed in terms of percentage population at various ages or in various age groups. For example, 0 to 1, 1 to 5, 5 to 10, 10 to 15 years etcetera. So, you can have single year age composition, you can have age composition in five years or ten years; it depends on the purpose of enquiry.

Percentage of young, aged less than 15 years, and percentage of old population, aged 60 and more, are of common interest to population scientists. Increase in percentage of population aged 60 and more leads to aging of population and it results mainly from declining fertility. Ratio of population of old to population of young, multiplied by 100 or 1,000 is called dependency ratio. Ratio of population aged 80+ to population 60+ indicates aging among the aged. Dependency ratio is closely related to labor force participation rate which expresses number of workers (including those looking for work) as a ratio of the total population.

Dependency ratio =
    (Population aged 60 years or more/population aged less than 15 years)*100

Labor force participation rate =
    (Number of workers/total population)*100

Labor force participation rate may be computed separately for males and females and for urban and rural areas.

Sex composition of population is expressed in terms of sex ratio which he defined at the number of females per thousand males. In some countries, number of males per thousand females defines sex ratio. Percentage of young aged less than 15 years and percentage of old population, aged 60 and more this is now I am coming to age composition. How is exactly certain an indicator or indexes of age composition develop.

Percentage of young aged less than 15 years and percentage of old population aged 60 and more; young and old are of common interest to population scientist. Increase in percentage of population aged 60 and more leads to aging of population, and it results mainly from declining fertility.

Sometimes people may think that declining mortality or improvement in life expectancy should increase proportion of people aged 60 and above, but actually wherever aging has taken place, and proportion of population 60 and above has increased. It is not so much because of improvement in life expectancy. It is more because of declining fertility. the reasons are obvious.
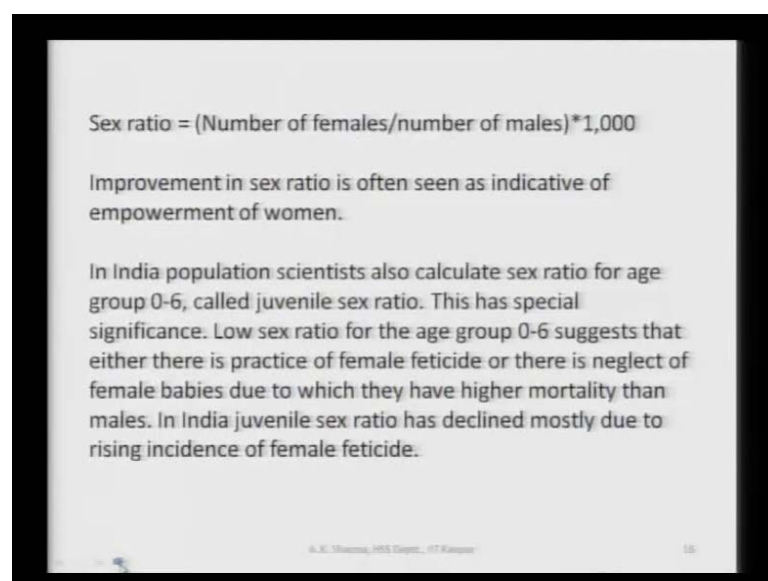
When mortality improves or life expectancy improves, then population belonging to all age groups benefits from this more or less and therefore, decline in mortality or improvement in mortality does not affect the age composition of population so much, but when fertility declines, it immediately reduces proportion of children in age group 0 to 5 and later 0 to 15, and therefore, raises proportion of 60 and above.

A ratio of population of old to population of young multiplied by 100 sometime by 1000 is called dependency ratio. Ratio of population aged 80 plus to population 60 plus indicates aging among the aged. Earlier we were talking only of aging, now in the context of western countries, your life expectancy has gone up and fertility has declined not only proportion of old population has increased, old population is living more.

So, there is a process of aging among the aged. This aging among the aged is reflected by increase in proportion aged 80 plus to population 60 plus. Dependency ratio is closely related to labor force which expresses number of workers including those looking for work as a ratio of the total population because it is mostly those between 16 and 60 who are looking for work or working and therefore, dependency ratio define demographically is closely associated with the economic concept of labor force participation rate.

Dependency ratio is defined as population aged 60 years or more divided by population aged less than 15 multiplied by 100. Labor force participation rate which is an economic concept is defined as number of workers divided by total population into 100. Labor force participation rate may be computed separately for males and females and for urban and rural areas now; obviously, because there is a link between population 15 to 60 or 16 to 60 and number of workers. So, the two demographic concept of dependency and economic concept of labor force participation rate are closely associated.

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Now, coming back to sex ratio. Sex ratio as I said earlier is defined as number of females per thousand males. At least in India it is defined like that. This improvement in sex ratio is often seen as indicative of empowerment of women. See the connection between demography and sociology. Sex ratio as such is a demographic concept; a demographic indicator, which is a ratio of number of females to number of males, but it has social implications. It can also be taken as an indicator of development in some sense.

It is indicative of empowerment of female. In India, population scientist also calculates sex ratio for age group 0 to 6. This is called juvenile sex ratio. This has special significance. Low sex ratio for the age group 0 to 6 suggests that either there is a practice of female infanticide or there is neglect of female babies due to which they have higher mortality than males. In India, juvenile sex ratio has declined mostly due to rising incidence of female feticide.

It is interesting to look at nature's way of maintaining balance between sexes. Nature wants to maintain balance between sexes. So, at the time of conception; biology show that at the time of conception, this proportionately more male babies are conceived as compared to female babies, but right from the beginning, please from the time of conception to advance age of 100 years, 105 years whatever is the longevity of population, a fetus to find from birth to death at all ages in the population if not distorted by social factors, male mortality is higher than female mortality; that means, nature producing more male children and also kills more males and this is how maintains a balance, but if there is a distortion,…

Recently I was reading that in Kanpur city. The survey showed that sex ratio at birth has declined to below 600; that means, in Kanpur city, when 1000 males are born, only 500 to 600 girls are born. Now this is not natural. This is not nature's way to maintain balance between sexes in the population. This is happening simply because in Kanpur and around Kanpur city from which cases come to Kanpur hospitals, there is an increasing practice of going for sex determination. If the fetus is determined to be female fetus, people are going for feticide.

One of our surveys in peril urban areas of Kanpur showed that nearly 20 percent women went for sex determination and in all those cases in which fetus was identified to be

female, 100 percent women went for feticide or induce the abortion. This is how 0 to 6 sex ratio is declined.

This is very important from the point of view of empowerment of women. And interestingly, unfortunately almost all the developed regions of the country are showing decline in juvenile sex ratio.

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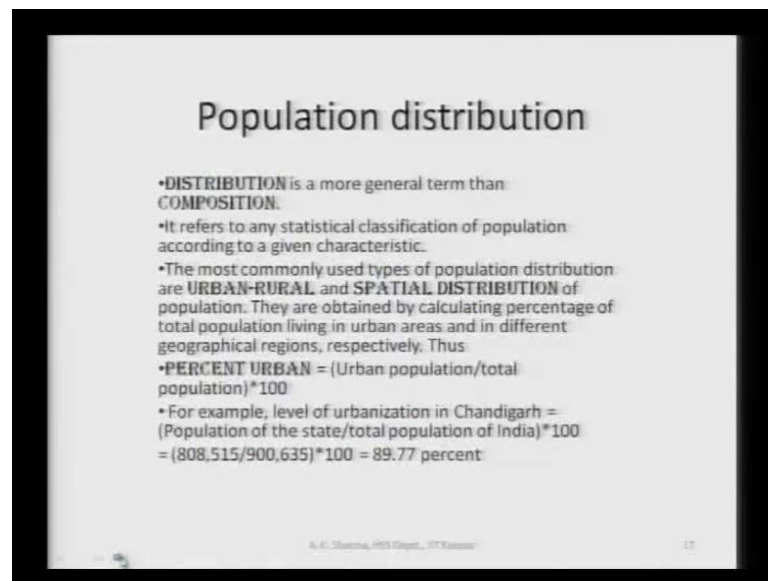
 Its declining everywhere, but states like Haryana, Punjab, Delhi, Himachal Pradesh, western UP, western part of Uttar Pradesh; the relatively more advance regions of the country are experiencing later decline in juvenile sex ratio as compared to backward and remote areas.

The next concept is population distribution. Distribution is a more general term than composition. Composition; we talked about sex composition and age composition. Distribution is a more general term. It refers to any statistical classification of population according to a given characteristic which may be of economic nature or social nature.

The most commonly used types of population distribution are urban-rural and spatial distribution of population. Urban-rural means whether there is a shift from rural to urban areas and spatial distribution means whether there is a shift of population from one state to another, one region to another, one part of the country to another part of the country.

They are obtained by calculating percentage of total population living in urban areas or in different geographical regions respectively. Thus percent urban is defined as urban population or size of urban population divided by total population into 100. For example, level of urbanization in Chandigarh is population of the state of Chandigarh; level of urbanization in Chandigarh should be urban population of the state of Chandigarh divided by total population of Chandigarh into 100 and that comes out to be 808515 divided by 900635 into 100 or 89.77 percent; that means, 89.77 percent population of Chandigarh state is living in the urban areas and the rest nearly 11 percent is living in the rural areas.

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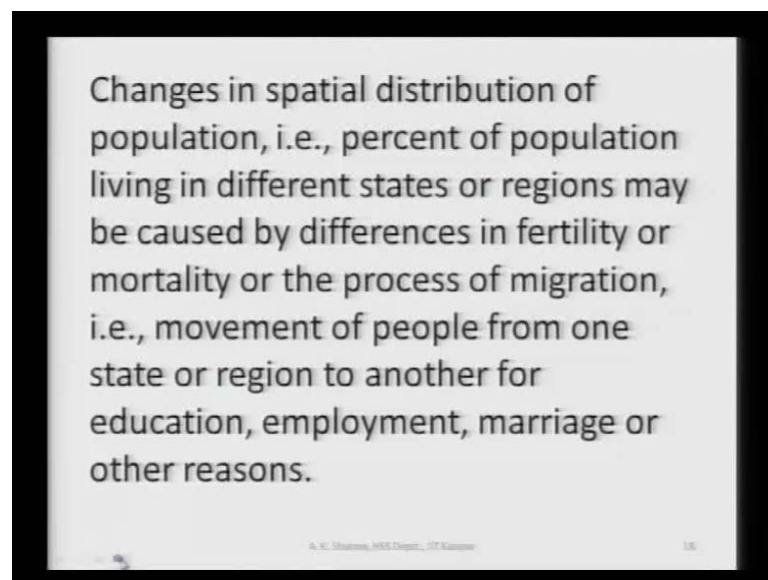
Changes in spatial distribution of population, that is; percent of population living in different states or regions may be caused by differences in fertility or mortality or the process of migration, that is; movement of people from one state or region to another for education, employment, marriage or other reasons.

Spatial distribution of India's population is changing quite significantly. Actually sometime some south Indian states expressed worry that if the present demographic turns continue, then the proportion of population in north Indian states will continue to increase, and proportion of population in south Indian states will continue to decline which is going to have enormous political implications for the country.
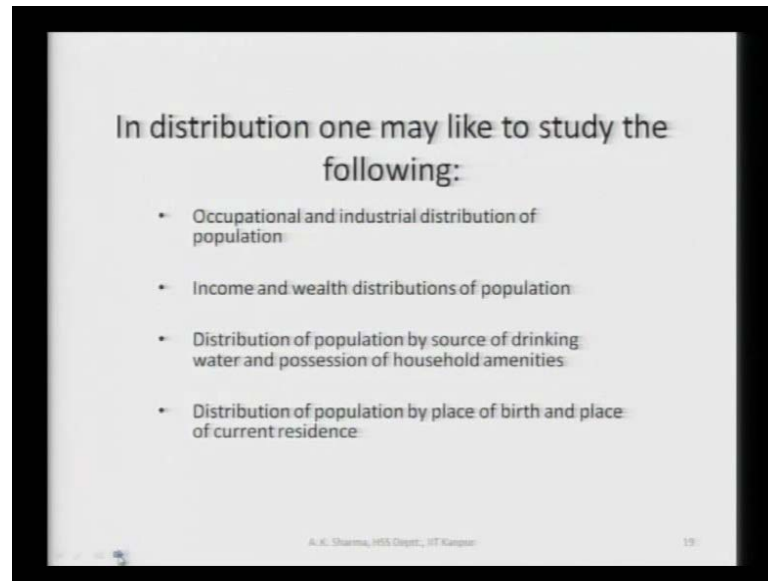
In distribution, one may like to study the following. These are the major types of distributions; these are the variables, I can say these are the variables according to which most commonly population distribution is studied. Occupational and industrial distribution of population. There is a difference between the term occupation and industry.

Occupation is the exact work that one does at the place of work and industry refers to the kind of activity which is done at the place where one works. For example, one may be working in manufacturing sector, manufacturing then manufacturing become the industry, but the work occupation of a person in manufacturing sector may be clerical or accounts. So, being clerical, being engaged in clerical or managerial or related activities show the occupation of the person and manufacturing shows the industry.

Sometimes, we are interested in income and wealth distribution of population because we want to know what is happening to the inequality; income inequality, heath inequality, educational inequalities. Among all types of inequalities, income inequality comes to mind first. So, income and wealth distributions of population.

Then distribution of population by source of drinking water and possession of household amenities. You may like to have frequency distributions of people with different types of sources of drinking water like wells, canals or pipe lines or hand pumps and possession

of household amenities; television sets, furniture, ==kasha== house, ==pukka== house and so on. And distribution of population by place of birth and place of current residence.

In India, data on place of birth has been an important source of data on migration from which we know from which states people are migrating to which other states and what could be the reasons. We also have a question on reasons now.

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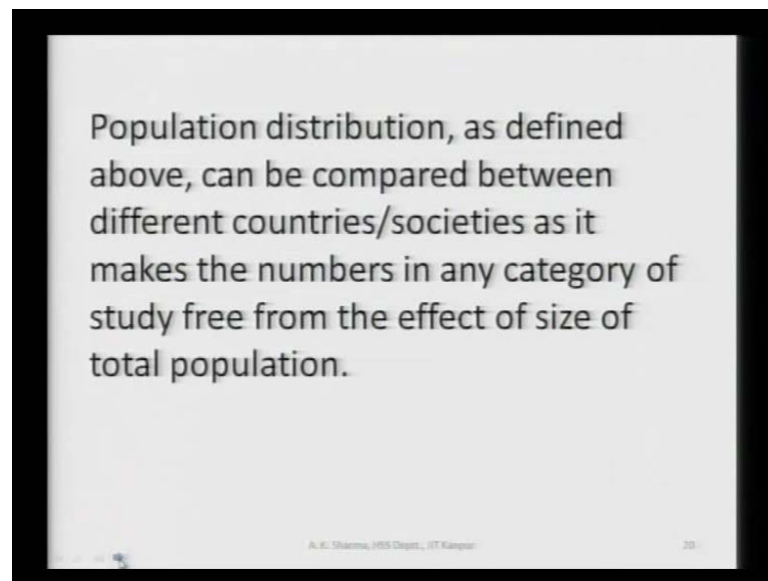
Population distribution as defined above can be compared between different countries; societies as it make the numbers in any category of study free from the effect of size of total population. So, what it means is that you cannot compare urban population of Chandigarh with urban population of UP because Chandigarh is a small state, UP is a big state. You cannot compare urban population of Bangladesh and Nepal with urban population of India. We assume that urban population of India would be large because India is much bigger.

I said that India is eight times the size of population of Bangladesh, but when you calculate percentages, these percentages make figures free from the effect of size of the total population. Therefore, in calculating distribution as defined earlier, we are comparing different countries and societies by making numbers; numbers in urban area, numbers in different states, numbers in categories of rich, middle class, poor, etcetera etcetera from the effect of size of total population.

What I have said so far that population study deals with size, composition and distribution of population. By studying size, composition and distribution of population, we have a photographic picture of society. What is size of population, we can also calculate growth rate from size.

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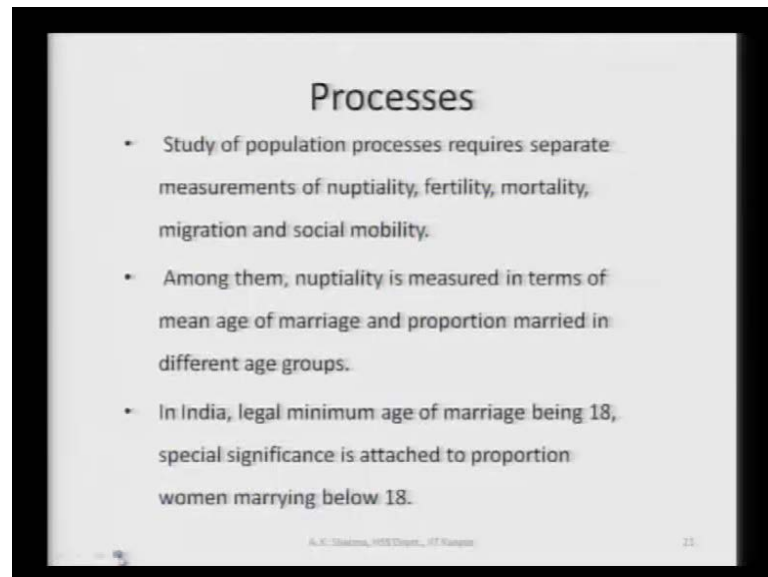
So, at what rate is population increasing, and what are the numbers in different age groups, numbers of males and females, urban and rural areas, in case of India numbers in different states; these numbers or this size, age composition, sex composition and distribution of population are result of certain deep routed processes.

So, in population studies, we also study processes. What are these processes? Processes mean things which change with time. Study of population processes requires separate measurement of five demographic processes. Nuptiality; the term nuptiality may be new to some of you. Nuptiality means marriage. Fertility; fertility means birth. Mortality; mortality means death. Migration; migration means movement of people from one place to another and social mobility.

Social mobility means that in a stratified society. Imagine that there is a stratified society which means that in that society people are engaged in different types of occupations. Some are considered to be high, some are considered to be low. If there is movement of people from so called low to high or from high to low, it is called vertical mobility.

It is like if a son of a peon becomes an IAS officer, we will say that there is inter-generational vertical mobility. The person is moving upward. In the next generation, the person is moving upward. Imagine if son of a rich farmer becomes a landless laborer due to some misfortune, there is a downward inter-generational social mobility, but if a son of a doctor becomes engineer, then its only horizontal mobility, but still mobility.

So, there is mobility and these are the processes which affect population, size, growth rate, composition and distribution. Among them, nuptiality is measured in terms of mean age of marriage and proportion married in different age groups. There are so many indicators of nuptiality. Some simple, some complex, but the two most commonly used measures of nuptiality which are of policy importance in countries like ours are age of marriage and proportion married.

You know that in India there is a law. You cannot arrange for your daughter's marriage at age below 18, but the data show that there are 50 percent marriages in the country which are still taking place at ages below 18. The average age of marriage in India is around 18. It varies from state to state.

In some south Indian states, age of marriage is higher, and in some north Indian states age of marriage is lower because the child marriages, but the fact is that overall in the country, fifty percent marriages are taking place at age less than 18; means they are illegal marriages, but illegal marriages are a reality. 50 percent marriages are illegal and then we also calculate proportion married in different age groups.

In India, marriage is early and universal. So, by the time a woman reaches 30 or so, almost all are married. To understand fertility patterns, proportion of married women in different age groups would be of immense help. So, these are two indicators of nuptiality. As I said that in India legal minimum age of marriage being 18, special significance is attach to proportion women marrying below 18. So, whenever we conduct surveys or when census figures will be out, we will immediately look at what is the proportion of marrying below 18. This is about nuptiality.

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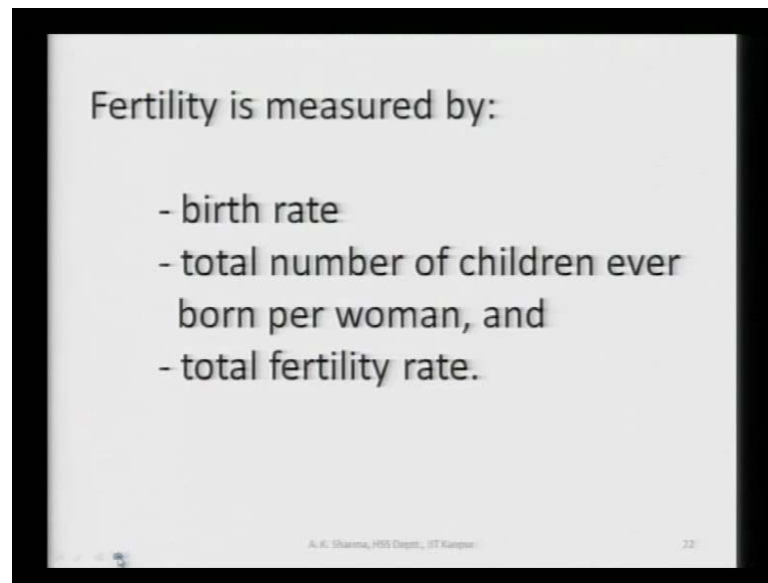
The next process is that of fertility. Fertility is measured by birth rate, total number of children ever born per women and total fertility rate.

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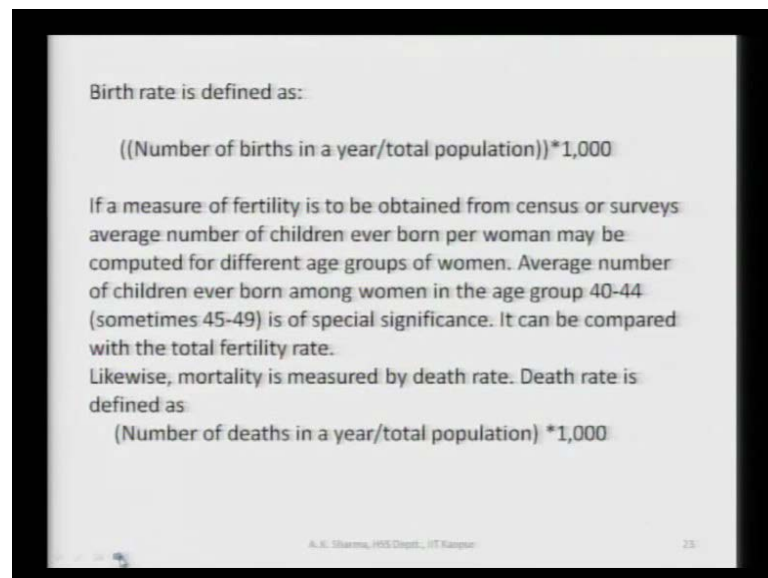
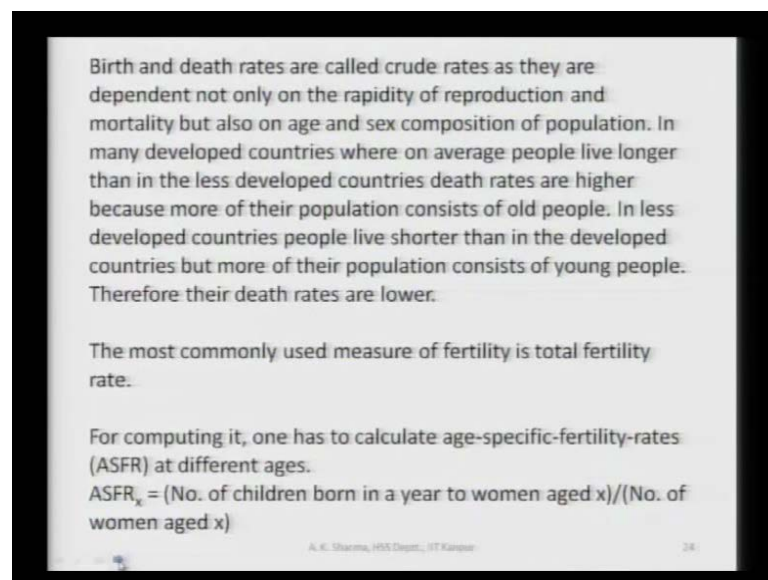Birth rate is already defined. When I defined natural growth rate of population, I defined birth rate. It was defined as number of births in a year divided by total population multiplied by 1000. It is customary to multiply this birth rate by 1000. In some analytical studies, birth rate, death rates; we do not multiply by 1000, but that is only for analytical purposes.

For descriptive purposes, whenever we compare birth rates, death rates of different countries, more convenient from the point of view of communication to express it like this. If we measure fertilities to be obtain from census or surveys, average number of children ever born per women may be computed for different age groups of women.

So, for different age groups of women, you have how many children or ever born. Calculate their average. Average number of children ever born among women in the age group 40 to 44, sometime 45 to 49, is of special significance because this is the time by which total fertility has been achieved. There is no more chance of producing a baby beyond 49. So, it can be compared with the total fertility rate. I will express what total fertility rate is.

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Birth and death rates are called crude rates as they are dependent not only on the rapidity of reproduction and mortality but also on age and sex composition of population. In many developed countries where on average people live longer than in the less developed countries death rates are higher because more of their population consists of old people. In less developed countries people live shorter than in the developed countries but more of their population consists of young people. Therefore their death rates are lower.

The most commonly used measure of fertility is total fertility rate.

For computing it, one has to calculate age-specific-fertility-rates (ASFR) at different ages.
$ASFR_x$ = (No. of children born in a year to women aged x)/(No. of women aged x)

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24

Likewise, mortality is measured by death rate. Death rate is defined as number of deaths in a year divided by total population into 1000 again. Birth and death rates are called crude rates as they are dependent not only on the rapidity of reproduction and mortality, but also on age and sex composition of population.

In many developed countries, you will be surprised to know that in the developed countries, we are on average people live longer than in the less developed countries. Death rates are sometimes higher because of their population, because of because more their population consist of old people, that in some of the developed countries, life expectancy for women has gone up to 80 to 83 years; means, a girl child born today in a

developed country like Japan or Germany or Sweden can expect to live for 82 years and there are still many sub Saharan African countries where a child a girl child born today can expect to live only for say 40 years, but when you calculate crude death rates, crude death rates of most countries come out to be similar.

The reason is that all the life expectancy in the developed countries is higher. Proportion of people at older ages is also higher. On the other hand, in the less developed countries like India, Bangladesh, Afghanistan, Kenya; people live shorter. Life expectancy is between 50 and 60. In India, it is somewhat better, 64. More of their population consist of young children there was a time when in India we said that nearly forty percent population of the country lived at ages below 15; below 15, forty percent. When the number of children is so large in age group up to 15; obviously, mortality is much lower than the mortality at ages above 70 or above 80.

So, that is a reason why in less developed countries, crude death rates are similar to crude death rates in the developed countries. That most commonly used measure of fertility, I said that in fertility they are measures like birth rate; average number of children born per women and total fertility rate. Among them the most commonly used measure of fertility is total fertility rate.

For computing it, one has to calculate age specific fertility rates at different ages. You can take them to be kind of birth rates computed for women belonging to different age groups. So, age specific fertility rate at age x is defined as number of children born in a year to women of age x divided by number of women aged x. See that here we are not multiplying this by 1000. There is a reason for that because ultimately you want to convert this measure into a number of children ever born.
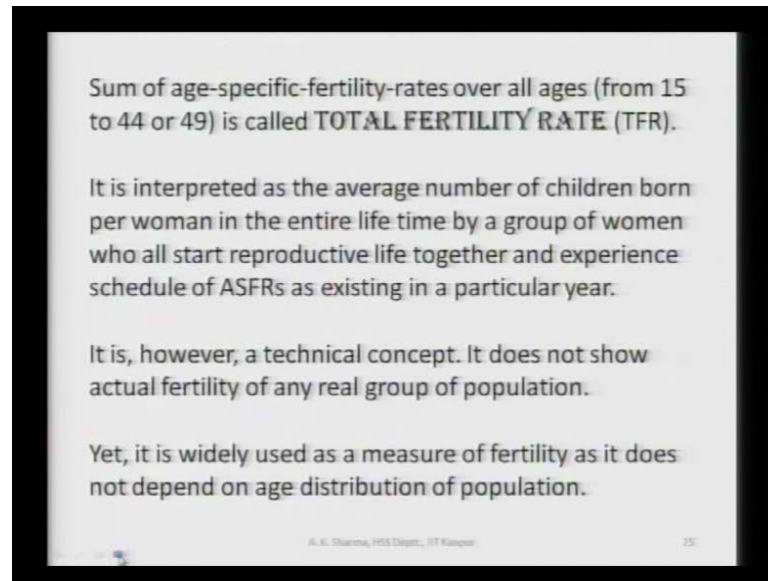
Sum of age specific fertility rates over all ages from 15 to 44 or 49 whatever is considered to be the upper limit of reproduction is called total fertility rate. It is interpreted as the average number of children born per women in the entire lifetime by a group of women who all start reproductive life together and experience schedule of age specific fertility rates as existing in a particular year.

It looks very complicated, but if I tell you that there was a time say on the average, in entire life, a women in India produce seven children, and today total fertility rate has come down to nearly two, it is not exactly two its more than two, but it has come down to almost two; that means, today in India, in entire lifetime a woman is producing two children. This is on the average.

There are many states like Bihar or UP where on the average women are still producing four or more children, and there are states like Kerala, Goa, Himachal Pradesh where fertility has gone below two. So, interpretation of total fertility rate is very simple. Total number of children born in the entire life.

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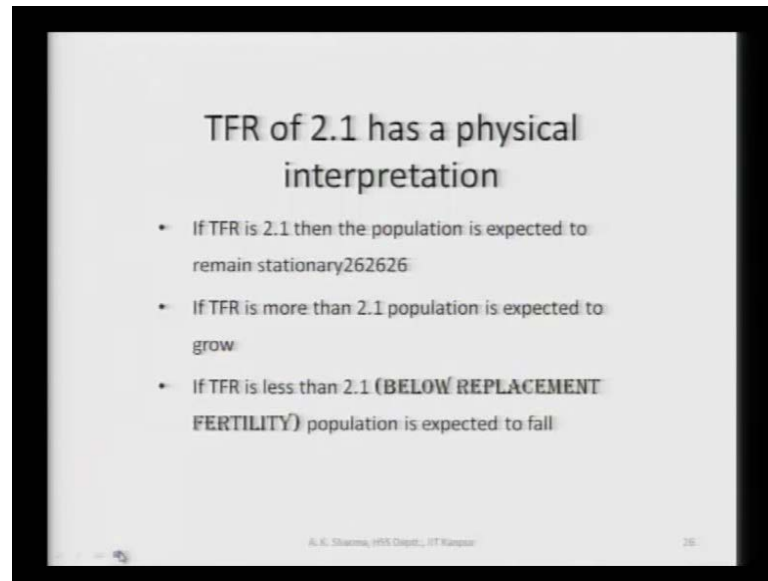
So, all though it is a technical concept, it does not show actual fertility of any real group of population where it is very useful. It is widely used as a measure of fertility as it does not depend on age distribution of population as mortality or fertility, crude birth rate or crude death rates depend. Total fertility rate of 2.1 has a physical interpretation and a special significance.

If total fertility rate is 2.1, then the population is expected to remain stationary. If total fertility rate is more than 2.1, population is expected to grow. If total fertility rate is less than 2.1, it is called below replacement fertility. Population is expected to fall. The idea of two that is two children means roughly one son and one daughter, and if total fertility rate is 2.1, then each woman is replaced by one daughter in the next generation so, the population becomes stationery.

If total fertility rate is more than 2, then a woman is replaced by more than one daughter and therefore, population grows. If total fertility rate is less than 2, then one woman is replace by less than one daughter and the population declines. Almost all the developed countries fertility has gone below the replacement level. All industrially advanced countries have this below replacement level fertility.

In post independence India, total fertility rate has declined from more than 6 to 2; however, some states have TFR close to 4. Kerala, Goa and Himachal Pradesh; I mentioned have fertility levels comparable to developed countries. UP and Bihar have fertility levels close to four. I sometime say that in India you have a both; an Africa and also a Europe. The states on the other side of the Vindhyachal may be called the Europe of India.

In almost all south Indian states, fertility is low and mortality is also low. And in almost in all the north Indian states, on this side of Vindhyachal, you have a high fertility and high mortality. So, states like Kerala are the Europe; they constitute the Europe of India and the states like Bihar or Uttar Pradesh; they are the Africa of India where fertility is close to 4.

As in case of fertility, mortality rates are also computed separately for different ages or age groups. Thus age-specific-death-rates (ASDRs) are defined as

$ASDR_x$ = (No. of deaths in a year among persons aged x)/(No. of women aged x)

Yet, the most commonly used measure of mortality is life expectancy which refers to time in years for which a new born child is expected to live. Life expectancy at birth is calculated from age-specific-death-rates (ASDRs). Since there are sex differences in ASDRs, life expectancy is calculated separately for males and females.

Number of infant deaths, i.e., deaths of children in age group 0-1 year per thousand births is called infant mortality rate (IMR). Likewise one can also define child mortality rate (CMR) for children aged 0-5 years. IMR is an indicator of both development and health services.

As in case of fertility, mortality rates are also computed separately for different ages or age groups. Thus age specific death rates are defined as age specific death rate at age x equal to number of death in a year among persons aged x divided by number of women aged x. You know age specific death rates can be computed separately for males and females. So, age specific death rates for males would have males in the denominator, and age specific death rates for women or females will have number of women or females in the denominator.

Yet the most commonly used measure of mortality is life expectancy which refers to time in years for which a new born child is expected to live. Life expectancy at birth is calculated from age specific death rates. Since there are sex differences in age specific death rates, life expectancy is calculated separately for males and females.

In India, there was a times say twenty years before, when female life expectancy was lower than male life expectancy. I said that what nature has done; according to purely natural law, male life expectancy must be lower than female life expectancy, but there are many situations and twenty till twenty years ago, India was in that situation, in which female life expectancy was lower than male life expectancy and the reasons related to female infanticide, female feticide, neglect of female children, high fertility and lack of proper care at the time of child birth or non institutional or at home deliveries which produce a very high maternal mortality ratio.

Number of infant death; that is deaths of children in age group 0 to 1 year per thousand births is called infant mortality rate. Likewise, one can also define child mortality for children in age group 0 to 5 years. IMR is an indicator of both development and health services because to remove large chunk of infant deaths, you have to have development and also improve health services.

Development means availability of say clean drinking water, development means education, awareness, concern for children's health, concern for women's health, and health services means access to better quality, health services, and particularly institutional deliveries.
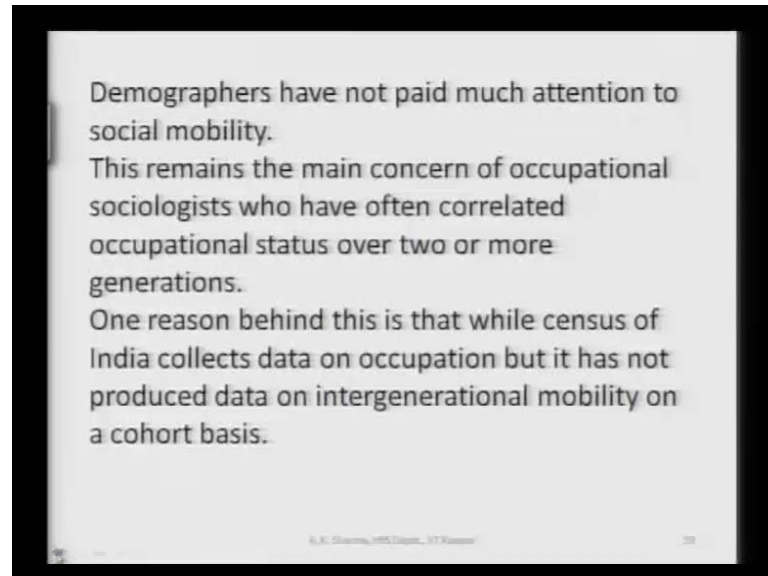
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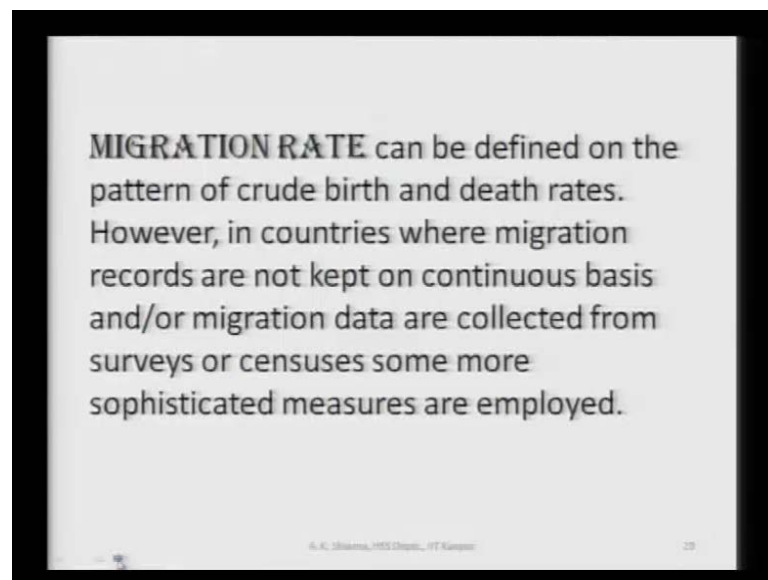
Migration rate can be defined on the pattern of crude birth and death rates. However, in countries where migration records are not kept on continuous basis and or migration data are collected from surveys or census, some more sophisticated measures are employed. On the pattern of birth rate and death rate, you can calculate migration rate as number of migrants divided by size of population or median population or average size of population in a year, but in India, we do not have a migration data on a continuous basis.

For us, the most important sources of data on migration are surveys, natural surveys, NSSO which sometimes collect data on migration and census. In census, we ask some questions like place of birth, place of last residence, duration of residence or region for migration from which by using certain analytical methods, we calculate migration rates

for different states, in migration rates, out migration rates and net migration rates. That is calculation of such things is beyond the level of this introductory course.

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This remains the main concern of occupational sociologists who have often correlated occupational status over two or more generations.
One reason behind this is that while census of India collects data on occupation but it has not produced data on intergenerational mobility on a cohort basis.

Demographers have not paid much attention to social mobility. I said that there are five demographic processes; fertility, mortality, nuptiality, migration, and social mobility. Demographers have focused mostly on nuptiality, fertility, mortality and migration. For a long time, we spend more time on studies of mortality and then on fertility and family planning program. It is only now that more attention is being paid to health related variables. Social mobility has rather been an ignored area in India. This remains the main concern of occupational sociologists who have often correlated occupational status over two or more generations.

One reason behind this is that while census of India collects data on occupation, it has not produced data on intergeneration mobility on a cohort basis. Even occupational data collected in census is not much analyzed. There are only broad industrial categories. One wants to know what proportion of people are cultivators, what proportion of people are agricultural laborers, what proportion of people is engaged in household industry; only broad classification.

We have lots of data on occupation, but demographers and even sociologist have not made much use of data on occupation. And it is particularly difficult almost impossible to study inter-generational mobility on the basis of census because to study inter-

generational mobility, you require data on a cohort basis; means on what happens as time passes, what happens to occupational people as time passes.

The next lecture will be devoted to perspectives on population. Today we stop here.

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