

**Population and Society**  
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**Module No. #01**  
**Lecture No. #27**  
**Demographic Transition Theory and Related Issues**

So friends, this is our third lecture on population theories. In the first two lectures, I have discussed Malthusian theory of population, and Marxist theory of population. In Marxist theory, last time I showed that Marx rejects Malthusian idea that there can be any natural law of population, and he says that basically the relationship between population, and poverty or unemployment is not a relationship between two independent factors.

Unemployed **unemployed** population or unemployment is only one part of the capital or one part of the labor. The un-part unpaid part of the labor is represented by accumulated capital, and the paid part by variable capital. So, it is a relationship between two components of the same labor unpaid part, and paid part.

And according to law of capital accumulation, what we call iron law of capitalist accumulation. As time progresses and as capitalist advancement takes place, proportion of variable capital keeps on declining, means that part of the capital which goes to workers in the form of wages facilities and perks declines and fix capital increases.

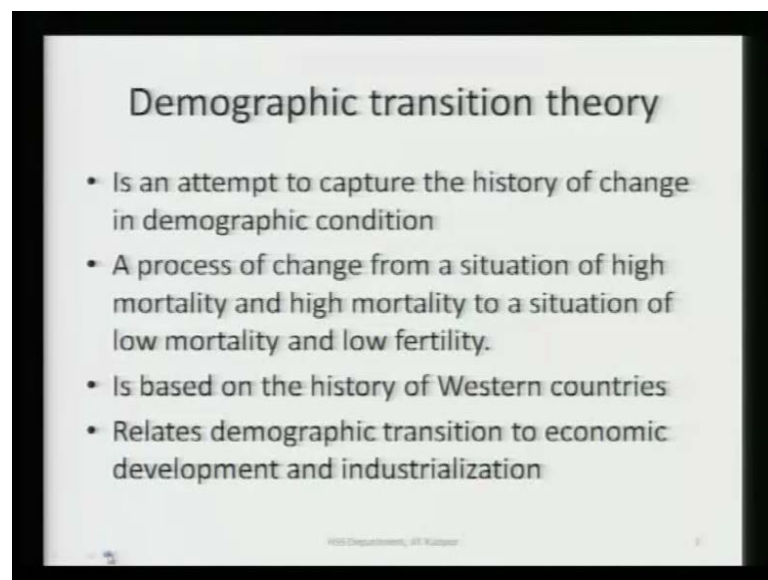
Then I also talked a little bit about Hardin's idea and Eldritch idea of population bomb, which are in a way more supportive of Malthusian theory and made a comment that ultimately when you look at population policies around, then policies of different countries are governed more by practical considerations rather than by theoretical considerations. In today's lecture, I will concentrate on demographic transition theory, unlike the other two theories Malthusian and Marxian, which are speculative theories. Demographic transition theory is more of a factual kind database, empirical and a short factual.

In sociology, you know the meaning of the term facts, social facts Durkheim gave this concept of social fact. Durkheim would say that something like suicide as a concept would deal with definitions, how is suicide define, how does suicide gets defined. That is the conceptual part and the pattern relationships or **or** of patterns, regularities in ideas,

beliefs, values which can be discerned with the help of empirical data or facts. They are outside individual's consciousness.

In looked at from that perspective, in demographic transition birth and death rates are facts. They have a pattern. As according to Durkheim suicide rate was a fact because for each culture, there was a distinctive rate of suicide and for different categories of population there were different suicide rates, likewise demographic transition is a fact because birth rates and death rates represent demographic situation of a country, a culture, a social structure, a society and they are unrelated to individual choice. They are result of individual choices but, ultimately at the societal or macro level, they emerges facts.

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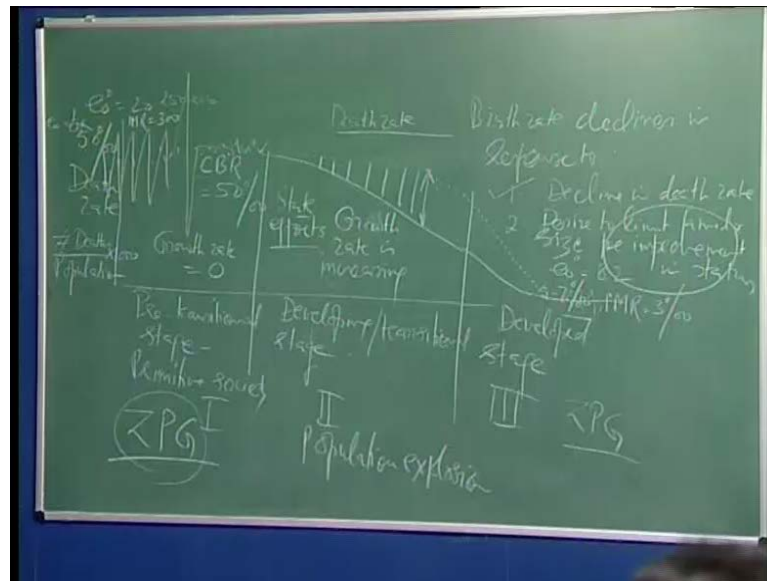


So, demographic transition theory is one such attempt, which explains changes in demographic regimes or changes in birth and death rates, in response to processes of development and modernization. What happens to society? Is there a pattern? Can we say that a society which is in the primitive stage or undeveloped stage and is characterize by high birth and death rates. When it modernizes, when it develops what happens to its demographic regime. That is the question the demographic transition theory attempts to answer.

So, demographic transition theory is an attempt to capture the history of change in demographic condition. It is a process of change from a situation of high mortality and

high fertility. This should be fertility. A process of change from a situation of high mortality and high fertility to a situation of low mortality and low fertility. Demographic transition theory is based on the history of western, mainly north-west European countries and it relates demographic transition to economic development and industrialization.

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Let me use the board, so that the transition becomes more clear. You know demographic transition theory says that initially in pre-transitional stage or you can call it primitive or ancient society, primitive society. A society in pre-transitional stage or you may call it primitive society has high and fluctuating death rates. Death rate is number of deaths per year divided by average population for that year.

So, number of death divided by average population. Why average because population is changing every day, every minute, every second population is changing. So, it is in some kind of average of population between first January and thirty first of December and number of deaths in a year. You know, in primitive society as we have seen when we were talking about world population growth, death rates were high and fluctuating. The long term tendency of death law was around 15 per 1000, 50 per 1000 population.

In ancient society or in primitive society or in less developed **less developed** stage, death rate was around 50 per 1000. Life expectancy at that time was around 20. When we discussed demographic models, I said that in a theoretical case life expectancy is 1 upon

c d r, you see this kind of connection here. When life expectancy was around 20 and the population was stable with 0 rate of growth, then the death rate of population was around 50 but, it was fluctuating. You know sometimes it would rise to a level of 250 or 300 also. If there is an epidemic, if there is severe malaria, (( )), small pox, plague or some such disease or earth quakes or devastations or wars, then the death rate can rise to even 250 but, then it also means that subsequently death rates can decline to a much more lower level. So, there were fluctuations.

As time pass, in stage 2 means in developing stage or to use that term of demographic transition theory transitional stage. You find that death rates, first the fluctuations are smoothened up, death rates remain high but, these fluctuations become less severe and then death rates start declining. So, death rates are declining and in the third stage or developed developed stage, this is stage 1, this stage 2, this stage 3, developed stage, death rates have come to a very low level. How low? It may be as low as 5 to 7 per 1000 population.

Sometime back, our death rates were high and fluctuating and the crude death rate was around 50. Today, it is almost one-tenth of that. 5 to 7 per 1000 population and life expectancy at this stage is around 82 years. That is some of the developed countries like Japan or Sweden life expectancy for women has gone up to 82 years. One major reason behind high crude death rate was high infant mortality rate i m r. i m r was as high as 300 but, today this i m r has declined to around 3 per 1000 child birth.

When thousand, in in country like Japan when a thousand children are born, only 2 or 3 of them die before celebrating their first birth day. All of them survive. So, this happen to mortality. As society progress from stage 1 to stage 2 and then stage 3, mortality started declining. During this time, as you have seen that for millions of years, the rate of growth of world population was almost 0 or very low that means fertility. If I show fertility by dotted lines, then fertility or crude birth rate was also around 50 per 1000.

So that, the growth rate of the population is 0. We call it Z P G, zero population growth. In stage 1, we had 0 population growth because mortality was high, fertility was also high and perhaps, along with mortality fertility was also fluctuating. In those years, in which mortality (( )) of population was much better. On long term basis, birth and death rates remained around 50 and we had 0 population growth but as time passes as society

developed, mortality declined, for quite some time fertility remained same or fertility did not decline at the same pace at which mortality declined. So, fertility remains high.

And that means that the difference between fertility and mortality, which gives us the growth rate that is increasing. We have increasing growth rate during the transitional period and there is some time, when this growth rate is maximum after that point fertility also starts declining and eventually, it is possible as it has happened in some countries that the level of fertility goes below the level of mortality or at least they remain at the same level. They may fluctuate, fertility may fluctuate, death rate may remain low or some time increase a bit or decrease a bit and the 0 population growth is again restored.

So, this is the second stage is the period of population explosion **population explosion** and the third stage is again the stage of 0 population growth. This is what the theory of demographic transition says. Now, why does this happen, why did this happen, that death rates start declining and reach a low level like this, can death rates improve further, why does birth rate decline, what maximum value of growth rate is possible. These are all questions related to demographic transition theory.

This, according to classical version of demographic transition theory, it explains reduction in death rate in terms of industrialization economic development and urbanization, in a broad sense that industrialization economic development, urbanization lead to transition in death rate. Though, many subsequent versions of demographic transition theory reject this idea of death rates responding to urbanization, industrialization and economic development but, in the classical form, it was said that death rates reduce because of this.

You see, normally we think that **that** death rates reduce in response to public health expansion or improvement in medical technology or health facilities, yes or development of antibiotics or advance in general advancements in medical technology. That is there but, at least in the developed countries, in **in** the countries of north west Europe, improvement in medicine was not the major factor. The major factors were related to economic development to improvement in labor laws, political stability, improvement in public awareness, education, improvement in nutrition and only subsequently in the last century. When mortality declined further, then development of antibiotics or

improvements in surgical procedures, development of anesthesia and increasing role of public health became important factors but, initially they were not the important factors.

It is easier to reduce death rate, death rates nobody wants to die and all societies want to make an effort to reduce their death rate. There is not much opposition to improvement in scientific medicine, opening of hospitals, DDT spray, there has been some resistance somewhere. But by a large irrespective of socioeconomic status, religion, culture all countries accepted all efforts on the part of the state to reduce death rates. But state has limited capacity to influence birth rate; birth rate decision regarding births is taken at the micro level, individual couple's level and unless couples are themselves convey, that it is in their interest to reduce family size. They will not do so.

So, it takes time for birth rates to decline. Death rates can decline due to state efforts, macro level efforts and due to general improvement in socioeconomic conditions of society. But birth rates decline only when the individual couple perceive that reducing birth rate is in their interest. So, in short this is what demographic transition theory says. To repeat, according to demographic transition theory, you can divide the history of demographic transition in a country into three parts; stage 1, when death rate is fluctuating and high, it is at the level of around 50 per 1000 and the life expectancy is 20.

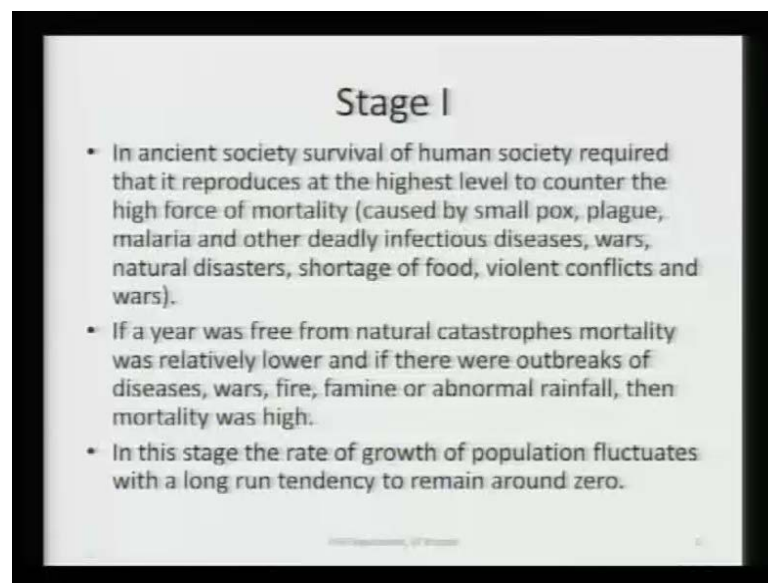
The development, economic development, industrialization, urbanization death rates start declining and eventually, they reach a low level, as low as say 5 to 7 per 1000. In this stage, life expectancy has gone. Already gone up to 82 and there is a possibility that life expectancy can improve further. Initially, in the stage 1, birth rates are also high and fluctuating. On long term basis, birth and death rates remain at the same level. So, the growth of population is 0 and then after some time, when death rates have already declined.

So, decline in birth rate, birth rate decline in response to two factors. In response to one, decline in death rate and second, desire to limit family size for improvement in the status. So, this is not very well understood phenomenon, why does birth rate decline, why do couples limit family size. There may be several reasons behind and reasons varied from country to country but, decline in death rate was suppose to be a necessary condition, not the sufficient condition, in necessary condition for decline in birth rate and then, general

improvement in socioeconomic condition, modernization, development and this is what demographic transition theory says.

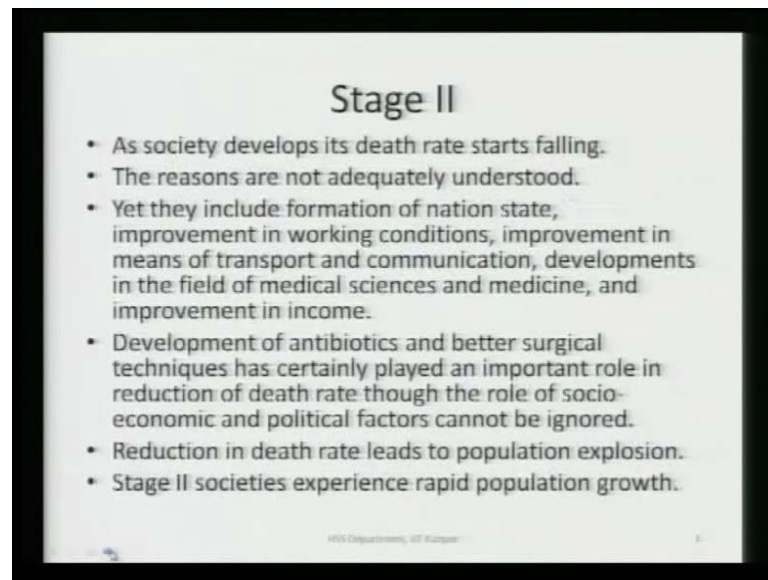
So stage one, in ancient society, survival of society require that it reproduces at the highest level to counter the high force of mortality cause by small pox, plague, malaria, infection diseases, wars, natural disasters, shortage of food, conflicts and wars.

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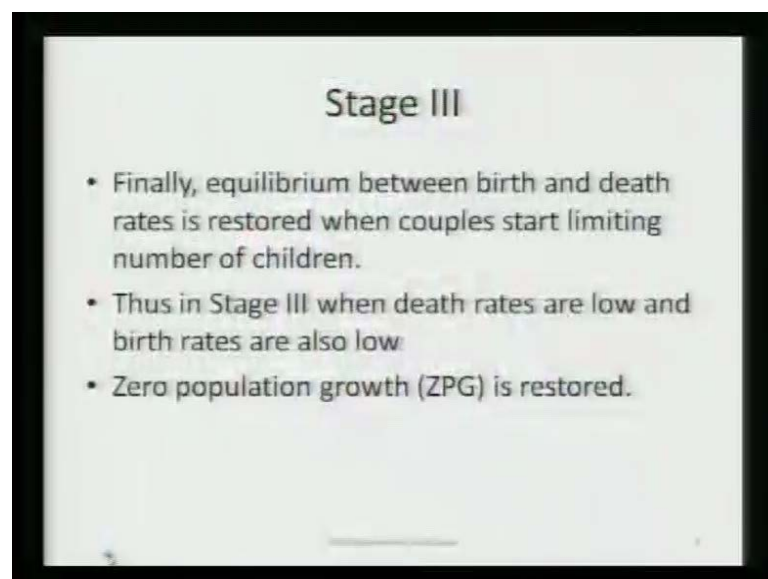
If a years was free from natural catastrophes, mortality were relatively lower and if there were outbreaks of diseases, wars, fire, famine or abnormal rainfall, then mortality was high. In this stage, the rate of growth of population was around 0.

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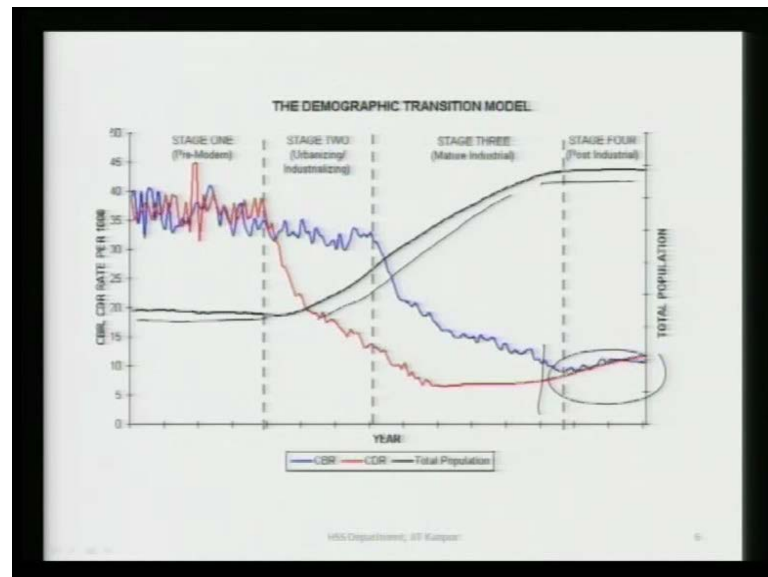
In the stage 2, society develops, death rate starts falling, reasons are not adequately understood but, have to do more with economic development, urbanization and industrialization rather than expansion of public health facilities. Developments of antibiotics and better surgical techniques have certainly played an important role in reduction of death rate but, mostly in the second part. In the second part of the transition, in the last century not in the first part and this reduction in death rate therefore, in absence of reduction in birth rate led to population explosion.

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Stage 2 society experience rapid population growth. Then finally, stage 3, there is equilibrium between birth and death rates again, when couples start limiting number of children. In stage 3, when death rates are low and birth rates are also low, you have the condition of 0 population growth.

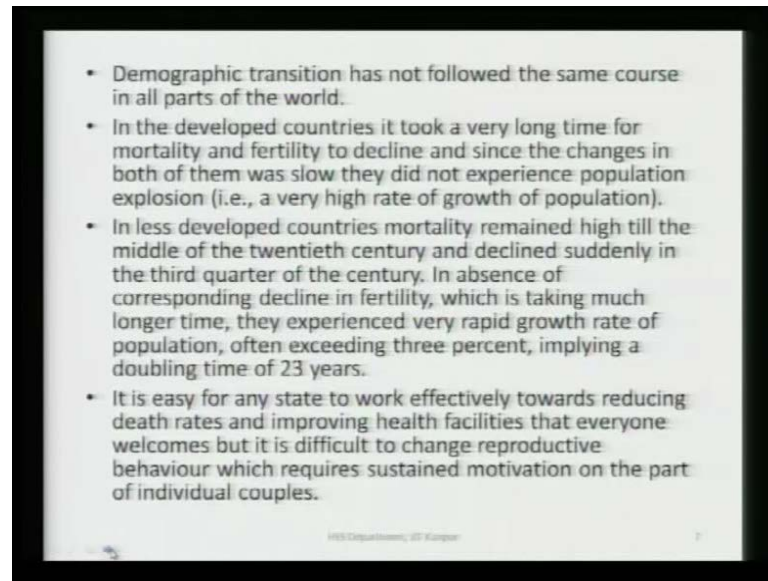
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So, this is a typical picture of demographic transition, with blue colour transition in birth rate is marked, red colour transition in death rate is marked and you see as society moves to towards stage 2, then the population size starts increasing at a faster rate. Initially, in this period, in the stage 1, the size of population remains same. Then the size of population starts growing at faster and faster rate and in the stage 3 and 4, **they**, in this picture we have shown stage 4 also, which is a more advanced stage.

You know, in some books demographic transition stops here. But in some other books, there is an attempt to do justice to experiences of developed countries in contemporary times. So, a fourth stage is shown and in this, by the time countries enter the fourth stage. when birth and death rates are extremely low and fluctuating, then population size has almost stabilize.

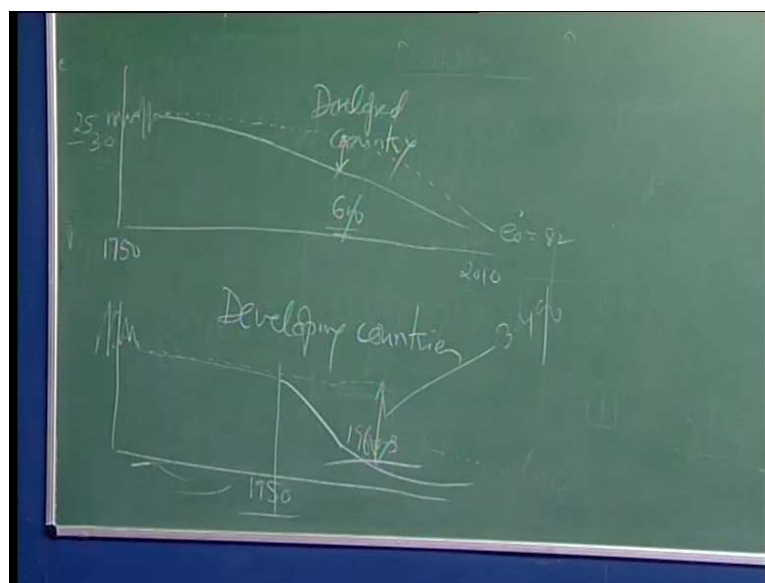
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Demographic transition has not followed the same course in all parts of the world. This is a very important point and this also explains why you had population explosion. I must talk of population explosion only in 1950s.

If I show the difference between developed and developing countries, it is like this. In developed countries, you never had population explosion. The reason was, that in developed countries it took a very long period of time for death rates to decline. In a developed country, again the students of sociology can understand these things better. This developed, developing; these are all ideal types. Otherwise, when you go to a specific countries, then experiences in specific countries may slightly differ from what we show here, in the form of graphs and diagrams.

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In the developed countries, mortality started declining in 1750; not exactly 1750, means some time in the second or third part of 18th century and death rates, before transition also in the developed countries, death rates were relatively lower. May be for environmental reasons or whatever or developmental reasons, death rates were slightly lower, fluctuating over and it took a very long period of time to reach the level of death rate of contemporary developed countries. It took a very long period of time. Today, in 2010, it is form now that I am saying that life expectancy of 82 years increase from life expectancy of say 25 to 30.

Developed countries had lower death rate and a higher life expectancy than the case of developing countries has been. So, from 1750 to 2010, merely 260 years, the major change in death rate took place in this 260 years time. Some demographer say that it took about 300 years, 3 centuries for death rates to decline from nearly 25 to 30 death rate to a death rate of 7 or 8.

And during this time, their fertility had also started declining. Actually, in some countries like France, when we talk of demographic transition model, we are referring to situation in England. In France both fertility and mortality declined at the same time but, in classical version of demographic transition, birth rate decline, birth rate decline follow and gap between birth and death rate at any point of time never exceeded a figure like 0.6 percent per year because it was a long term process. It took more than 2 centuries or

even 3 centuries for death rates to decline. So, death rates declined at a slower pace and in the mean time, birth rate also started declining and they never had the problem of population explosion.

Anyway, less than one-third of the population of the world lived in developed countries and when they started growing in 18th and 19th century, their growth rate was also never very significant, maximum 0.5, in some countries 0.4, some countries 0.5, 0.6. Rarely, some countries exceeded 1 percent. So, this was the situation in developed countries.

In less developed countries like India or other developing countries of south Asia, Africa; what happen, the death rates were high and fluctuating and the situation remained almost like this, till till the Second World War, till 19. if I If I write year 1950 here, it will be arbitrary, we cannot exactly say that till 1950 death rates were same and then suddenly but, this is indicative of a brought trend, that there was not much decline in death rate in developing countries till the time of second world war.

After that and may be more because the countries of Asia, Africa and Latin America became free around this time and they had their own governments, they had advanced medical technology, DDT and all these things were already available, what they needed was simply to borrow money from developed countries for international organization and use that for expansion of public health and suddenly, you find the death rate has declined. So, in this is in developed countries, in developing countries there was a sudden decline in the death rate but, fertility remained same.

There are some indication that in some countries including some parts of India, initially with modernization and economic development fertility increased a bit. It is possible. Fertility can increase with with modernization but, not much and it took quite some time for birth rate to reduce. Even now, our birth rate is much higher than the death rate. Now, this express why in 1960s the world population was exploded. First, nearly two-third of the world population lived in less developed countries or developing countries. Second, the transition was sudden. Suddenly after Second World War, death rates started declining, birth rates did not decline and this decline in death rate was independent of started declining Hindu, Muslim, Christians, Africa, Asia, Latin America.

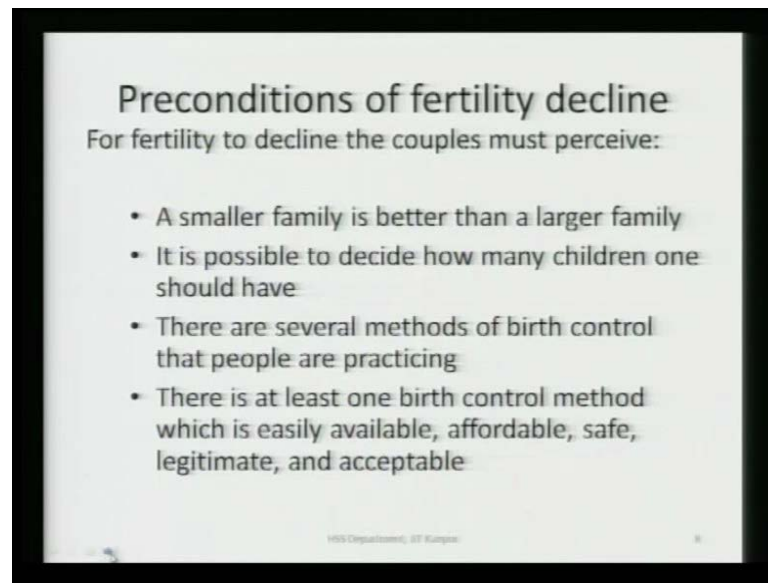
The extent of decline defers but, in all countries, there was a decline in death rate, birth rates remained high. So, as a result of that you find that many of the less developed

countries during this time grew at a rate 3 to 4 percent per year, with the doubling time of 20 to 25 years. Very rapid growth of population. This is the cause of population explosion in the world. So, in 1960s we had explosion. This was that time and demographic transition was occurring in less developed countries and due to sudden decrease in death rate and constancy or slight improvement in birth rate, there was a population explosion.

So, this is what the slide explains, that in the developed countries it took a very long time in mortality and fertility to decline and since, the changes in both of them was slow, they did not experience, means developed countries did not experience population explosion. In less developed countries, the change was sudden. Now, it is easy for any state to work effectively towards reducing death rates, there is no religious or political opposition to DDT spray or vaccination or immunization program in the country. It is not that if congress party develops immunization program for children, then BJP opposes. Nothing, everybody supports reduction in death rate.

But, this is not the case with family planning. If those of you who read literature of that time and you know little bit about emergency period, when congress party and specially under the leadership of Sanjay Gandhi, Sanjay Gandhi was a very strong supporter of family planning program. So, when congress party went for family planning in a big way promoting sterilization, then it became a big political issue and the next parliamentary election was fought on the issue of sterilization only and the congress party was defeated and Janata came. So, it is not easy for states to reduce fertility.

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Now, coming to causes of fertility decline, because this is the problem we are facing now. For fertility to decline, the couples must perceive, a smaller family is a better family than a larger family. This perception is important, individuals must recognize couples must recognize that smaller family is better than a larger family. Second thing it is possible to decide how many children one should have. You may like to have a small family but, if you think that it is in the hands of god, that if god wants to give you a small number of children, you will have small number of children; if god is sending more number of children, you will have more number of children, where you cannot do anything.

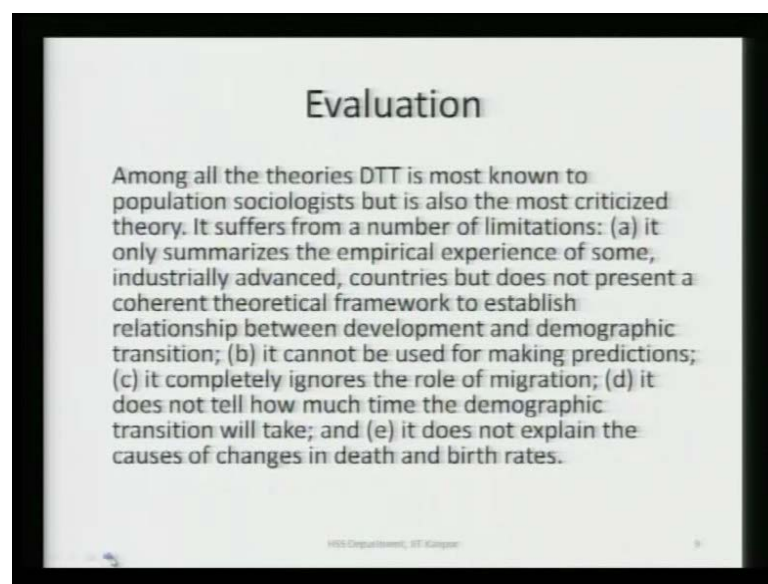
People may not know that they can do something to limit family size, then also fertility will remain high. So, this is second thing, that people must know that it is possible to decide how many children one should have and then, there are several methods of birth control that people are practicing, means norms; it must become a norm. People are practicing, I am not the only person to practice family planning. Couples must realize that we are not deviants, if we are trying to limit family size, if we are using contraceptive methods, we are not deviants. It has become a norm and there is at least one birth control method, which is easily available, affordable, safe, legitimate and acceptable. but, what is safe, affordable, acceptable; these all depends on the culture.

Now, from your perspective or my perspective, from the perspective of educated people in India or anywhere, easily available, affordable, safe, legitimate method must be condom. But you know that in a country like India, most of the family planners are using sterilization, that too female sterilization. If you look at statistics of family planning in India, most couples are using female sterilization as the method of **as the method of** birth control, which is not easily available. After all, it involves some surgical operation but, it is affordable.

As compare to condoms, it is not so easily available, so affordable, so safe and but, it is legitimate because we are a patriarchal society and in patriarchal society, we cannot take risk for men, we can take risk for women only. Even if **even if** there are perception, even if there are rumor that in some village somewhere after female sterilization 2 women died. No problem but, no men should become weak after sterilization because man is so important and as a result of that we have more of female sterilization than anything else.

The couples accepting condoms is hardly 5 percent and most people are using female sterilization. Our country, our family planning program, our nacho national aids control program, where they want that condom should become more popular and particularly in your age group, among adolescents and young adults. Not only for the reason of family planning but, for preventing the spread of HIV AIDS epidemic and we must freely talk about that and motivate couples, motivate youths, young adults to use condoms.

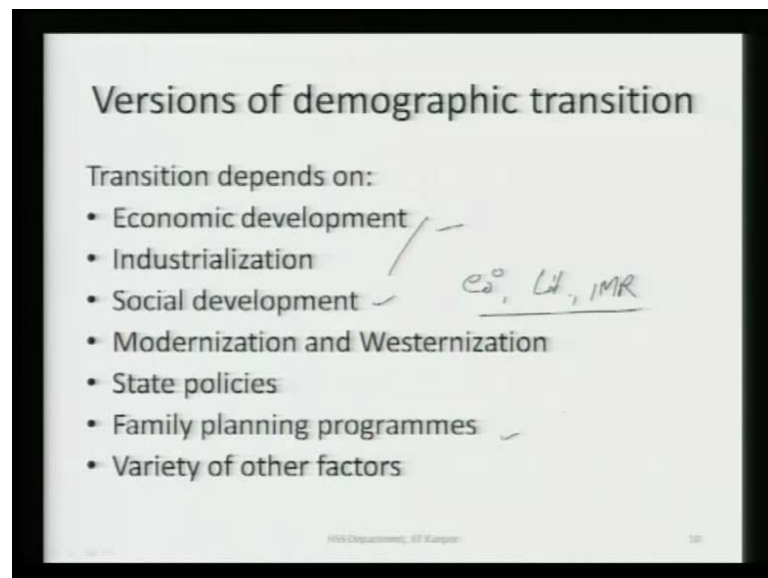
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As far as evaluation of demographic transition theory is concerned, it has certain limitations also. First, it only summarizes the empirical experiences of some industrially advanced countries but does not present a coherent theoretical framework to establish relationship between development and demographic transition. It cannot be used for making predictions. So, suppose we know demographic transition theory, can we predict how much more time Pakistan will take to reach below replacement fertility. We cannot and it completely ignore the role of migration. Demographic transition theory takes into consideration only birth rate and death rate. There are many countries like countries of middle-east, which are greatly affected by the process of migration, international migration. It does not talk about international or national migration.

And it does not explain **it does not explain** the time that a country will take to reach low levels of birth and death rates. In some country, in developed countries they have taken 250 years or 300 years. In some countries, in the less developed world, they are taking much less time. It does not explain the causes of change in death and birth rate, the causes of change have not been same everywhere.

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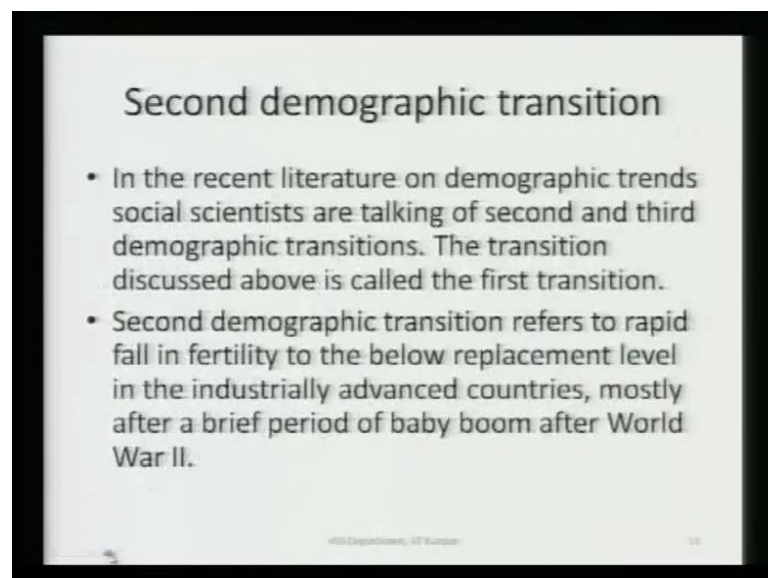
And therefore, there are various versions of demographic transition theory. Some give more importance to economic development, some to industrialization, some to social development. Social development means not economic development, not income, not

improvement in per capita income but improvement in education, health and empowerment of women.

So, there are different versions of demographic transition theory in the sense, that they use different explanatory variables for explaining why transition. In some theories, more importance is given to economic development, mostly in explaining transition in north-west Europe. Economic development and industrialization were given more importance but when the transition was observed in less developed countries, they have the social development, life expectancy, then education (( )) and westernization means values in place of economic development or social development, some demographers give more importance to values than state policies. In many countries like China, state policies have played a more important role in reduction in birth rate. In our country also family planning program and state policy has influence changes in birth rates quite significantly.

That our was the first country in the world to launch an official family planning program in early 50s and as a result of that today, more than 65 percent couples, married couples in India are using family planning methods and man may be variety of other factors.

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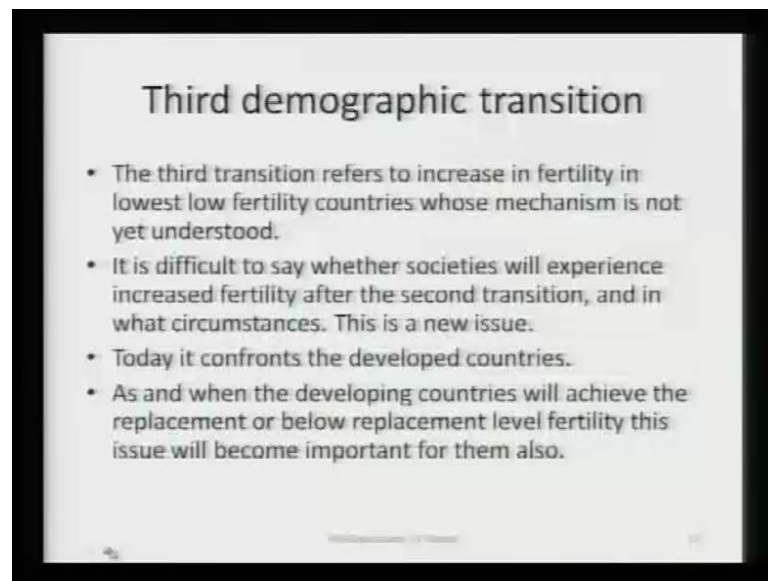


Some people are also talking about second demographic transition, in which this refers to rapid fall in fertility to the below replacement level. Some of the developed countries, you see the fertility has not only come to below replacement level 2.1 but average

number of children in many countries has gone down to 1.2 or 1.3, which is a cause of worry for them and a cause of ageing of population.

So, whether our country, whether India will also have second demographic transition. Already some states like Kerala, Himachal Pradesh, Goa, some states in India have gone below the replacement fertility. So, it is not zero population growth. It is potentially a negative rate of growth of population.

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Then there is third transition, some people use the term third transition for a situation, in which after reaching below replacement fertility, some countries have shown some sign of improvement.

As in, when the developing countries will achieve the replacement or below replacement level fertility, this issue will become important for them also. So, in Kerala the next question would be, is it possible for Kerala to have replacement level fertility? In the past we were worried about high fertility. Now, the issue would be whether Kerala or Himachal Pradesh or Goa or Delhi would be able to maintain the replacement level fertility at least or they will also suffer from negative growth rate of population.

Now, connected with the demographic transition, is the threshold hypothesis. Some demographers ask this question in the context of the developing countries, whether development, economic development, social development, industrialization

**industrialization** and urbanization will immediately produce results or it will take some time for them to produce results in terms of reduction in birth and death rates.

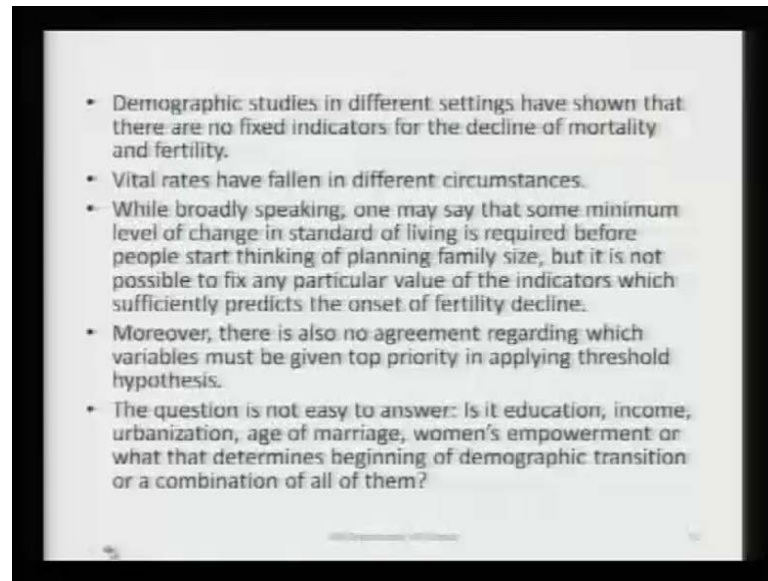
So, the threshold hypotheses suggested, that some threshold level of socioeconomic improvement is required, after which only further improvement in socioeconomic conditions will lead to reduction in fertility, not before that.

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Berelson suggests thresholds		
Indicator	Threshold value for Crude Birth Rate:	
	30 per thousand population	20 per thousand population
Adult literacy (percent)	70	95
School enrollment, age 5-10 years (percent)	55	69
Life expectancy (years)	60	69
Infant mortality rate (per thousand)	65	32
Non-agricultural labor force (percent)	55	80
Per capita GNP (US \$)	450	1000
Females, never married, age 15-19 years (percent)	80	100

And Bernard Berenson, a famous demographer use the following threshold level. For birth rates to reach a level of 30 per 1000, adult literacy must be around 70, school enrollment 55, life expectancy 60, infant mortality 65 and so on and for birth rate of 20, the values of these indicators should be this but this is debatable. Many countries have started reducing their birth rate to lower levels, much before achieving this threshold level of values. There are no fixed indicators for the decline of mortality and fertility.

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But vital rates have fallen, mortality and fertility in different circumstances and broadly speaking, one may say that some minimum level of change in standard of living is required before people start thinking of planning family size. But it is not possible to fix any particular value of the indicators and there is no agreement regarding, which variables must be given top priority in applying threshold hypotheses, whether education or life expectancy or urbanization or infant mortality rate or what the question is not easy to answer. Is it education, income, urbanization, age of marriage, women's empowerment or what that determines beginning of demographic transition?

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## Optimum population theory

- For some the theory of optimum population initially developed by Marshall, Sidgwick, Cannan and Gini provides a more realistic alternative to Malthusian and Marxist theories.
- According to this theory due to law of diminishing returns and limited substitutability of factors of production, as population grows the long run tendency of per capita income is to decline.
- For the reason of economy of scale initially for some time per capita income may also rise as population grows but beyond reaching a certain size further growth of population would lead to reduction in per capita income.
- This size is the optimum size of population. Beyond this there is surplus population. Below this there is shortage of population (UN, 1973). Some scholars use welfare measures other than per capita income but the logic of optimum population is the same.

Now, you have some questions. We can take one or two questions before I go to the next theory. Sir, when you talk about demographic transition theory and see that this stage 2, shows population explosion. So, is it good for nation for going through this stage and if it is good.

Demographic transition theory is a factual theory. It is not bothered, whether growth of population is good or bad. It only say that in response to factors of economic development, industrialization and urbanization death rates start falling and so, if period of high growth rate of population commences, eventually when birth rate has also declined, then we have a 0 population growth again.

But whether this growth of population is good or bad, generally the agreement is that the growth of population in the developed countries. When they were passing through this transition stage 2 was good. Their population was small density of population was small, they were industrializing at fast rate and they needed labor. So, for economy of scale in their type of population, perhaps this growth of population was good and this was a slow growth rate of population.

In developing countries, where economic resources were scarce, capital was scarce, already there was so much of poverty, unemployment and economical past and then, the growth rate of population was sudden. 3, 4; 3 percent, 4 percent, in our country we never had 3 percent but, in our country also we went up to 2 point something. Demographic transition is silent on whether this **this** much of growth of population will be good or bad

and by issue whether in India or less developed countries, growth of population was good or bad has been a debatable question. Certainly, in the short run, rapid growth of population is bad because it reduces your investment, savings investment; you have to spend more on consumption and therefore, investment which is converted into growth rate of national income by using some incremental capital output ratio, that is affected.

But in the long run, when children born today, enter the labor force after say age of 20 or so, it is possible to think of positive contribution of population growth also. We are more of human capital and if you can give them skill, if you can provide them resources, equipment to work, then you can also the benefit of their contribution.

Sir, the theory do you think, it says that the transitional theory is based on the fact. Do you think that we are not ignoring one of the important fact that all societies are not moving together. (( )) that all societies are moving from a culture to industrial society. So, we cannot implement it in all society.

This is a drawback of this theory.

This is a drawback of this theory that you cannot generalize on the basis of experience of north western European countries. Even in north-west Europe, different countries experience transition in different ways. Actually, this demographic transition theory does more justice to experience of England and Wales. Not even to not all north European north western European countries, France did not confirm to this pattern and in France decline in death rate and decline in birth rate were almost the simultaneous process.

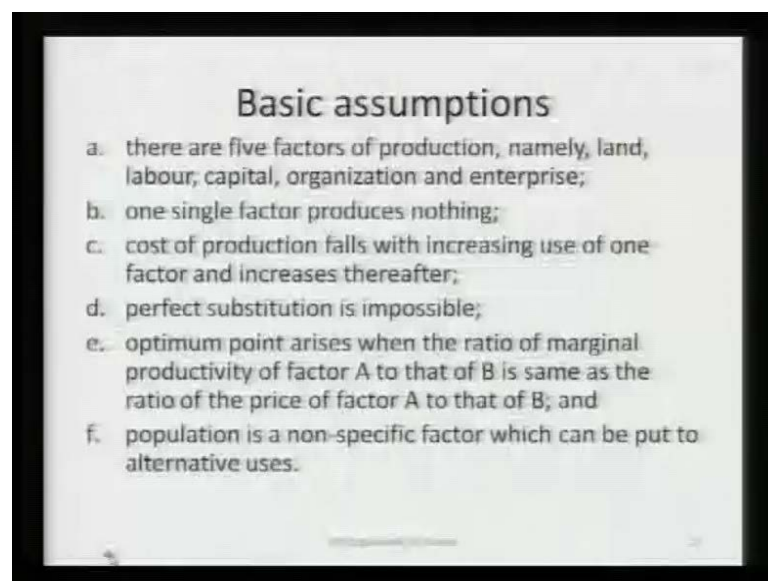
So, there was never any time when their population was growing at any high pace. You know demographic transition theory assume that first there will be reduction in death rate and then, reduction in birth rate will follow. But in France, both of this things happen simultaneously and so, obviously different countries are following different models, not all countries in the same region also have the same pattern.

And sir because these are natural processes one cannot direct that in a particular channel or direction means death rates, birth rates. These are natural processes. So, obviously demographic transition should take place at different levels.

Here the **the** purpose of theorizing them sociologically is to say that there may be biological processes but they are determined a lot by socioeconomic cultural and psychological factors. So, from that perspective birth and death, birth and death are biological phenomena but for us, for sociologists they are social facts and we sociologists at least in what is called functional approach or systems approach like to explain one fact in terms of other facts. So, we try to explain changes in birth and death rates in terms of education, economic development, empowerment of women, urbanization and so on. This is what.

So finally, because there has been a debate on debate along theoretical lines, debate along it is not clear what factors explain transition. So, some people have suggested to, you know your question whether growth is good or bad. That question can be answered better in terms of what we call optimum population theory.

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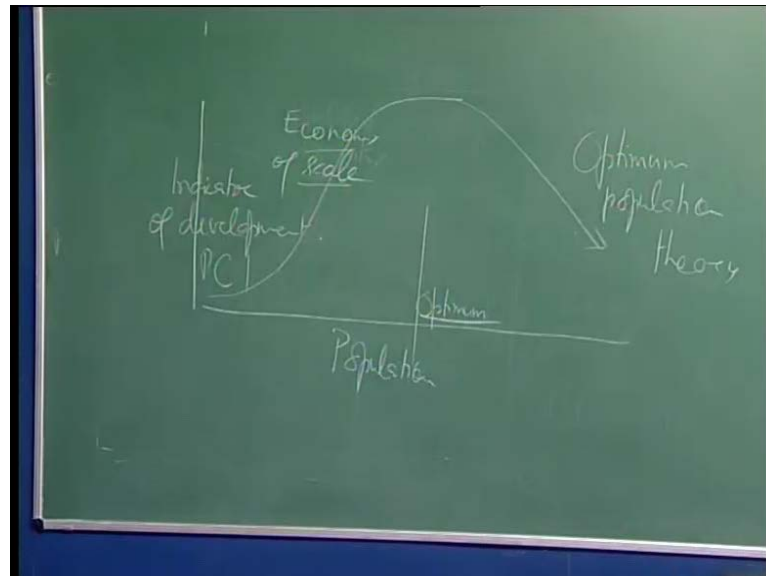


According to this optimum population theory, there are some basic assumptions of the theory that there are five factors of production labor, capital, organization and enterprise. one single factor produces nothing. Cost of production falls with increasing use of one factor and increases thereafter.

Perfect substitution of one factor by another is impossible and optimum point arises, when the ratio of marginal productivity of factor A to that of B is same as the ratio of price of factor A to that of B. This is the equilibrium condition in economics literature.

This is the point at which equilibrium of various factors and population would be obtained and population is a non-specific factors, which can be put to alternative uses.

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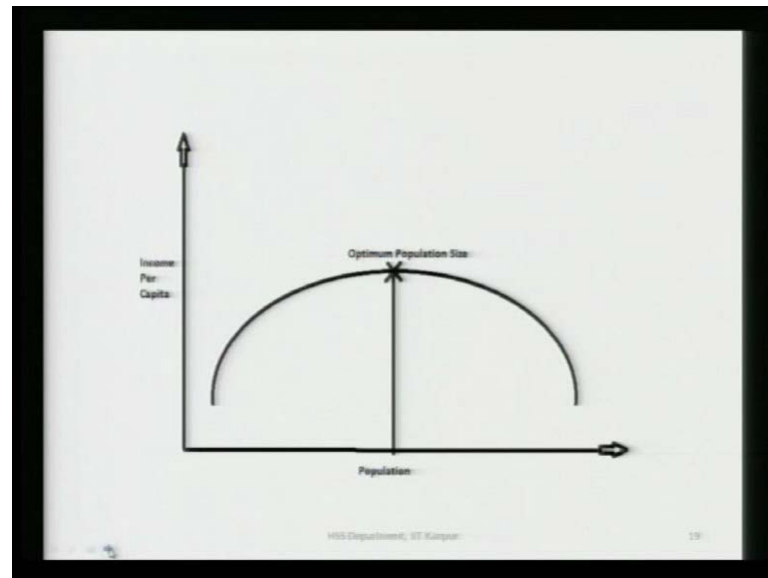


Now, in its simple, what optimum population theory says that if you draw a relationship between population and an indicator of development. Whatever your indicator of development is, it may be say per capita income. Then initially as population increases, your per capita income also increases. You can say there are increasing returns in terms of income there are increasing returns of population and your per capita income is increasing. Population is increasing and per capita income is also increasing. We are benefiting from economy of scale. Population is increasing, per capita income is also increasing and there is economy of scale.

But beyond a certain limit, you see this economy of scale is also observed in case of urban and rural areas. Why are large cities growing faster because there is economy of scale. Urban areas metropolitan areas Bangalore, Bombay, Delhi; these cities are growing faster than medium size or small towns because there is economy of scale. So, a certain amount of population is necessary, a desirable condition for growth of income. But beyond a certain level, further increase in population can lead to and normally leads to reduction in welfare or reduction in per capita income. Same way it can talk about other indicators of development.

So, according to optimum population theory optimum population theory, there is some size of population at which you derive maximum benefit in terms of per capita income or other indicators of development.

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This is optimum size of population and beyond this further increase in population is undesirable because then, further increase will lead to reduction in the welfare.

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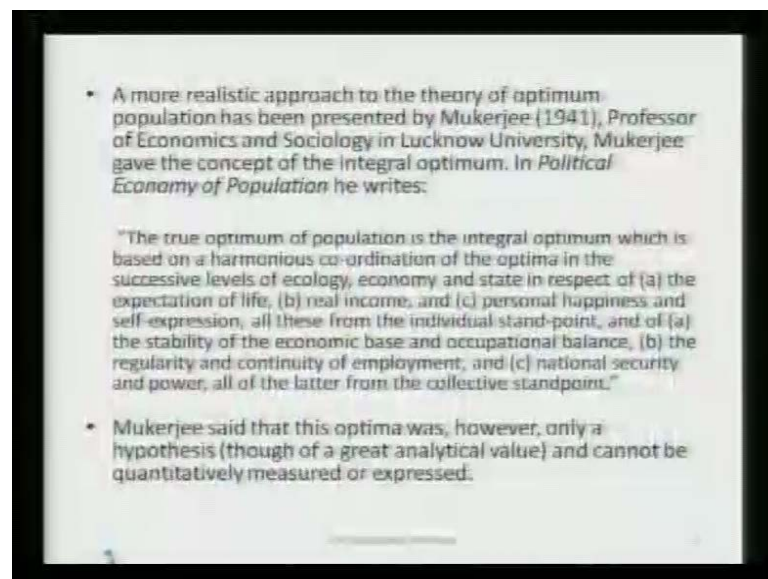
- Myrdal and Gottlieb criticize this theory on various grounds.
  - Myrdal has expressed that the optimum theory is associated with neo-Malthusianism and demand for a smaller population on policy grounds.
  - Gottlieb (1945) stressed that it is impossible to compute an optimum number that maximizes social welfare.
  - The optimum population size depends on a variety of factors such as resources, level of technology, structure of economy, model of ownership, and international situation and, therefore, it changes as time passes. Moreover, the optimum population size would depend on the criterion used for maximization of welfare.
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Now, this theory has also been criticized. Myrdal Gunnar Myrdal, the famous writer of Asian drama. Myrdal says that the optimum theory is associated with new Malthusian and

demand for a small population on policy ground, then Gottlieb have stated that it is impossible to compute an optimum. How do you compute? is India's population optimum today or it must rise a bit further? Or we have already crossed optimum, how do you determine such? How do you determine such numbers? Or how do you answer such questions? Then optimum population size depends on a variety of factors, such factors are resources, level of technology, structure of economy, model of ownership, means means of production, class relations, international situation and and they change with time.

Moreover, the optimum population size would depend on the criterion used for maximization of welfare. Suppose, you say that on the basis of per capita income, this is the optimum size of population. On some other basis, like infant mortality or life expectancy there may be another optimum. So, that is another problem.

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Let me finish today by a quotation from professor Mukerjee of lucknow school. That true optimum of population is the integral optimum, which is based on a harmonious co-ordination of the optima in the successive levels of ecology, economy and state in respect of A the expectation of life. So, he is identifying, do you remember Radha Kamal Mukerjee of Lucknow. radha This is a quote from Radha Kamal Mukerjee. So, he is indentifying various indicators in terms of which optimum must be established. The expectation of life, real income real; real income means income adjusted to changes in

prices. If prices only are changing, if there is inflation inflationary trend, then small increment in income can be due to **is neutralize** the neutralized by change in prices, real income, personal happiness and self expression. All these from the individual standpoint and of the stability of economic base and occupational balance the regularity and continuity of employment and see national security in power. All of the latter from the collective standpoint.

So, if you think from individual standpoint, if you thinks from collective standpoint. Radha Kamal Mukerjee has made discussion of optimum population much more difficult by introducing the concept of individual standpoint, collective standpoint and various dimensions of development life expectancy income, happiness. How do you measure happiness? Self expression, how do you measure self expression? And at the macro level, economic base, occupational balance, what is occupational balance and national security in power.

Mukerjee said that this optima was however only a hypothesis. Though of a great analytical value, and cannot be quantitatively measured or expressed. I think we stop here today. If there is any **any** more questions, we can take up one question. So, we stop. Thank you.