

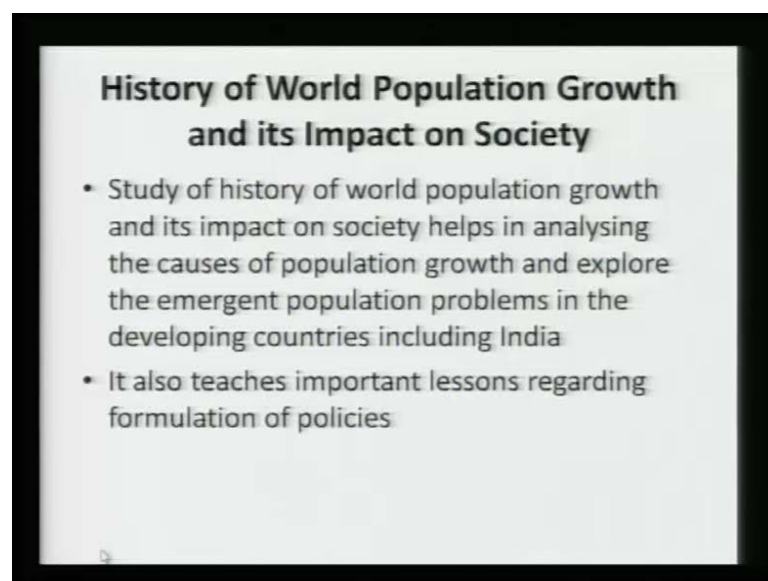
**Population and Society**  
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**Lecture No. # 14**  
**World Population Growth**

So friends, we are going to start a new topic today, and this relates to world population growth. In the last module, we have discussed mathematical and statistical models, which are commonly used in population studies. And in this module, we will deal with **more** more of substantive issues like, what is happening to population growth of the whole world. Later on in subsequent modules, we will talk about population of India and specific populations of certain sub categories.

So, in this I am going to tell what is the size of world population, this is the first question any student of population studies, who wants to know about world would like to ask first, what is the size of world population? What is the rate of growth at which world population is increasing? What is the history of world population growth? How did population growth increase or decrease? What is happening to world population right now, if there any pattern can we have a kind of theory in terms of which rise or fall in world population growth can we explained, this is all that we are going to do. And today, we will specifically be talking about population in ancient societies.

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Now, the history of world population growth and its impact for society, its **its** impact on different dimensions of society is an important topic. This study of history of world population growth, and its impact on society helps in analyzing the causes of population growth and explore the emergent population problems in the developing countries, including India.

It also teaches some important lessons regarding formulation of policy. What I mean is, that when we talk about population of India, you know we students of population in India are certainly more concerned about population of India. But history of population of India cannot be seen in isolation. It has to be placed in the context of world population growth.

There are many countries in the world, which have actually passed through the kind of growth we are experiencing today. Why did that growth occur in those countries in certain historical periods? What were its social correlates? What was its impact on society at large? And how was population growth in those countries controlled? Now, these are some things, **if in** if we have answers to these questions, we can also apply solutions learned from on the experience of world population growth to our own country.

So learning about world population growth will help us that way in explaining, what is happening in population of India? What are its causes? And what is likely to happen in the future, if history of world population growth is a guide and this also will tell us, what can be done to check population growth in India with which actually we are all concerned. The most important question of population traditionally in India has been, how to control excessive rate of growth of population and therefore, we can draw lessons from how was population growth controlled in western countries or in other less developed countries, in which historical periods and related issues.

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## Population in Ancient Times and Middle Ages

- The present population of the world is close to 6.8 billion and it is growing at the rate of 1.2 percent per year with a doubling time of nearly 60 years.
- The rate of growth of population is, however, not a fixed quantity.
- For a long time world population remained stable.
- It was mostly in the second part of the eighteenth century that the world population started growing with an increasing rate, reaching a peak in the second part of the twentieth century.
- Since then although the population size is growing the rate of growth has been declining.

Population in ancient times and middle ages. In this lecture, we will particularly talk about population in ancient times and in this next lecture then, we will talk about population in middle ages and then, third lecture of this module will be devoted to population in contemporary world.

The **the** present population of the world is close to 6.8 billion. You know, in 2010 we are 2010 and the population of the world is close to 6.8 billion and it is growing at the rate of 1.2 percent per year, means birth rate minus death rate expressed in percentage form per year is 1.2. So, this population of 6.8 billion is growing at the rate of 1.2 percent.

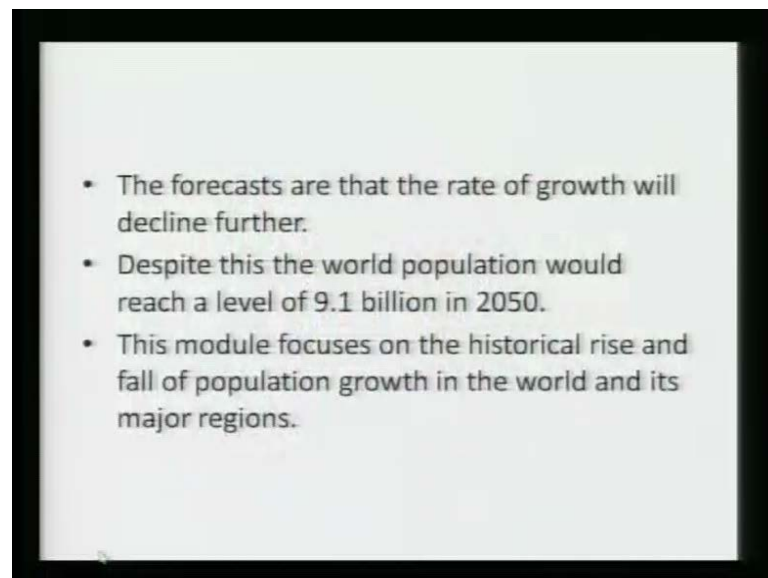
In the **first** very first lecture, I had talked about doubling time. If a population is growing at a rate  $r$ , then its doubling time is 70 divided by  $r$ . So, if  $r$  is 1.2, every year on every 100 percents there is an increase of 1.2 percents, then it means the population will double in 60 years time. That means population of 6.8 billion in 2010 is likely to become 13.6 billion in year 2070, provided the rate of growth does not change.

The rate of growth of population is however not a fixed quantity. For a long time world population remained stable. You know, in the last lecture, I mentioned that man appeared on this planet Earth about 5 lakh years ago and for 5 lakh years ago, the world population remained more or less stable or stationary. It was only during last couple of centuries that world population started increasing. So, it is not that human population was always growing at rate 1.2 percent, it is an interesting history, that the population of world remained stationary for a very, very long period of time.

It was mostly in the second part of the 18th century, say 1750 that the world population started growing with an increasing rate. So, 750 around 750 population started increasing and not only started increasing but the rate of growth of population also started increasing, which reached a peak sometime in the second part of the 20th century. Say, let us call it 1950. So, there population started growing around 1750 and it started increasing at faster and faster rate and then in the second part of the 20th century, rate of growth reached the peak and after that rate of growth starts declining, population is growing; rate of growth is declining, population is growing. So, the present rate of growth of population 1.2 is not the peak rate experienced by world population. It is much below the peak rate. Now, rate of growth is declining and we can expect that the rate of growth will decline further.

Since then, although the population size is growing; means since 1950, although the population size is growing, the rate of growth has been declined. The forecast are that the rate of growth will decline further and despite this United Nations projections are that the world population would reach a level of 9.1 billion in 2050.

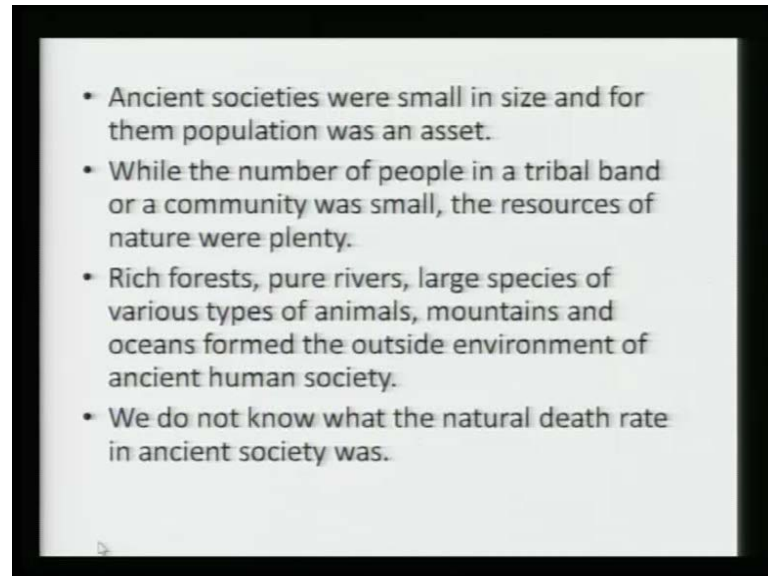
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So, earlier I said that population grows at rate of 1.2 percent per year, then in 60 years time means by year 2070 we would **become** become double the present size 13.6 billion. No, much before 13.6 we will **we will** stop somewhere around say 10 billion. In 2050, world population is going to reach a level of 9.1, because the rate of growth of world

population is declining. Now, this module focuses on the historical rise and fall of population growth in the world and its major reasons.

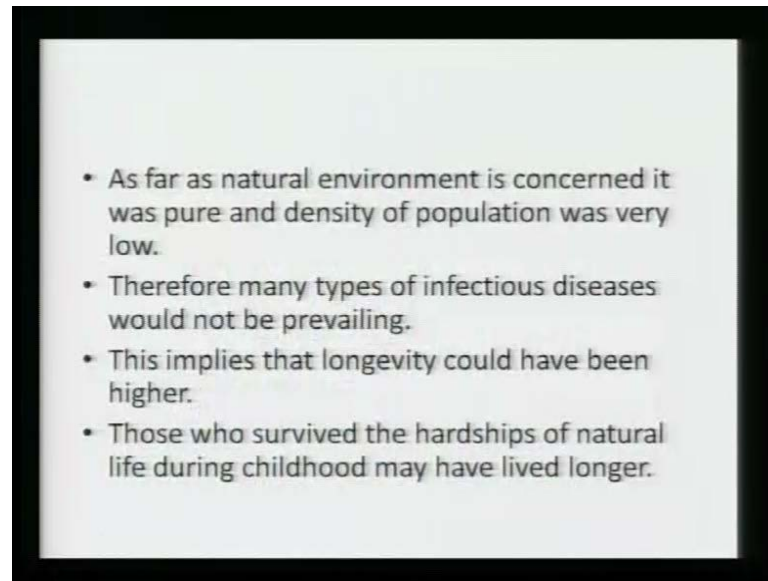
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Ancient societies were small in size and for them population was an asset. While, the number of people in a tribal band or a community was small, the resources of nature. So, let us first look at what was the situation in ancient society. Ancient societies were small in size and for them population was an asset. While, the number of people in a tribal band or a community was small, the resources of nature were plenty. So, there was no population pressure, density of population was very small.

They had rich forest, pure rivers, large species of various types of animals, mountains and oceans **formed the**, which formed the outside environment of human society. We do not know what the natural death rate in ancient society was; but it must have been a small death rate. Though, periodically death rate must have risen because of epidemics and related issues that is **(( ))**.

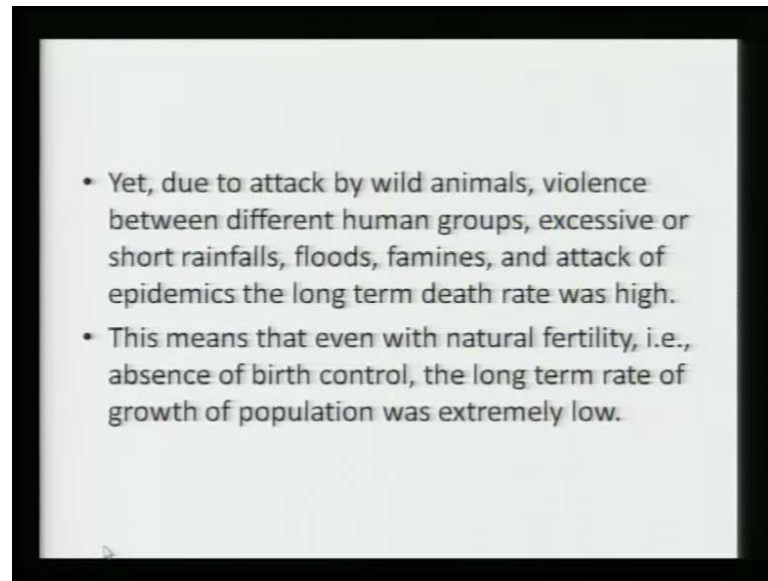
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- As far as natural environment is concerned it was pure and density of population was very low.
  - Therefore many types of infectious diseases would not be prevailing.
  - This implies that longevity could have been higher.
  - Those who survived the hardships of natural life during childhood may have lived longer.

As for as natural environment is **concerned** concerned, it was pure and the density of population was very low. Therefore, many types of infectious diseases would not be prevailing. Today, when somebody discusses birth and death rates in ancient society, there is a tendency to say that in ancient society death rate must have been high because of infectious diseases; but there are many demographers, who think that because a pure environment, low density of population and plentiful resources, tree, pure rivers mountains; infectious diseases were less, malnutrition was less and if a year is free from epidemics or natural catastrophe, then the death rate must have been small.

This implies that longevity or the average time for which a new born child could live, longevity could have been higher and those who survive the hardships of natural life during childhood may have lived longer.

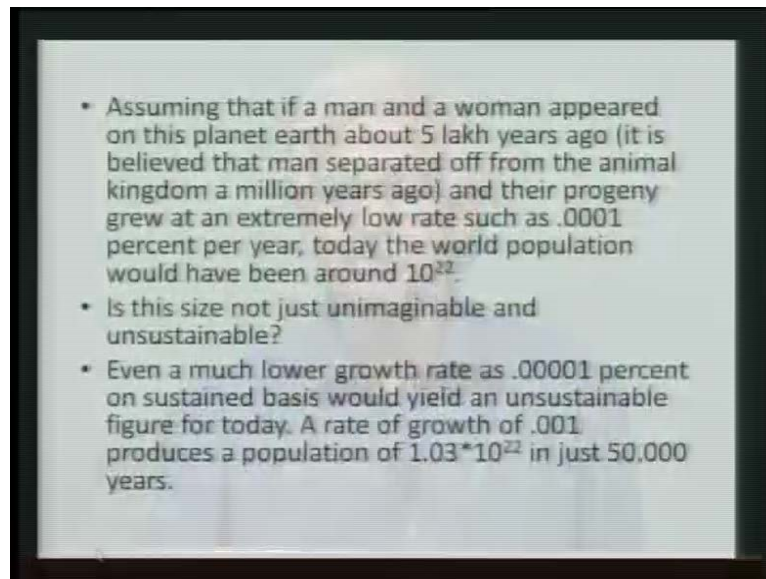
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Yet, due to attack by wild animals, violence between different human groups, excessive or short rainfalls, floods, famines and attack of epidemics, the long term death rate was high. So, death rate was high, not because of infectious diseases, not because of malnutrition. It was high because of some other sudden and periodic reasons, wild animals, violence between different groups, wars conflicts or sometimes shortage of rain falls, floods, famines and attack of epidemics.

This means that even with natural fertility, means absence of birth control the long term rate of growth of population was extremely low. So, although there was no family planning, no contraception, no government policies, perhaps no strong governments either but because death rate fluctuated and increased from time to time. There must have been some periods in which birth and death rates were low or birth rate was high, death rate was low. But periodically because of wars, conflicts, violence, shortage or excessive rainfall, flood, famine and epidemics death rate increased to very high levels and the long run tendency therefore, was to remain long term tendency for the population growth was to remain at an extremely low level.

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Now, going by calculations assuming that if a man and a woman appeared on this planet Earth about 5 lakh years ago, it is believed that man separated of from the animal kingdom a million years ago and their progeny grew at an extremely low rate, such as 0.0001. I sort of calculated what would happen if I assume that 2 persons appeared on this planet Earth 5 lakh years ago and they grow at a very very small rate of growth like 0.0001 percent per year, then the world population growth would have been around 10 to power 22. In a such a large number, which is unimaginable and unsustainable.

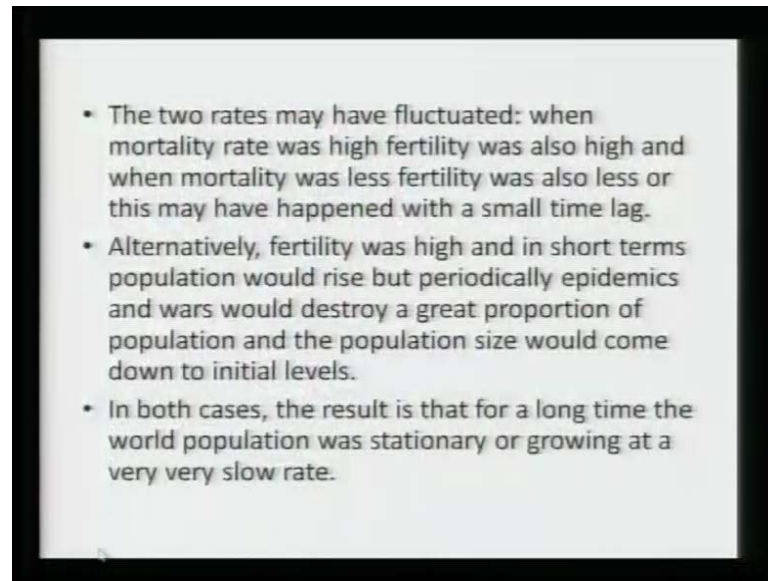
That means even in very low rate of growth of 0.0001 would not have been possible for lakhs of years, that means population was stable stationary. As I said that in normal years death rates must have been lower but because of periodic nature of violence, wars epidemics and floods and famines from time to time death rates increased and therefore, long run tendency of population was to remain at the same level.

So, is this size of 10 raised to power 22, not just (( )) unimaginable. Even today with population of 6.8 billion, we are nowhere near this. Actually, even a much lower growth rate as 0.00001 percent on sustained basis would yield an unsustainable figure for today, a rate of growth of 0.001 produces a population of 1.03 into 10 raised to power 22, in just 50 thousand years. You can calculate these numbers by using that exponential formula  $p = p_0 e^{rt}$ , which I gave you in the very first lecture. So, that means the rate of growth of population was almost 0, it was not even 0.0003 or something of that order, which I assumed in calculating figure for today.



Population growth depends on three factors, as you know fertility, mortality and migration. When we are discussing the world population trends, we may ignore the component of migration. This imply that in the past when population grew at extremely slow rate, either the long term death rate was very high or the fertility could not keep pace with the mortality. Reproduction rate was only as high as death rate.

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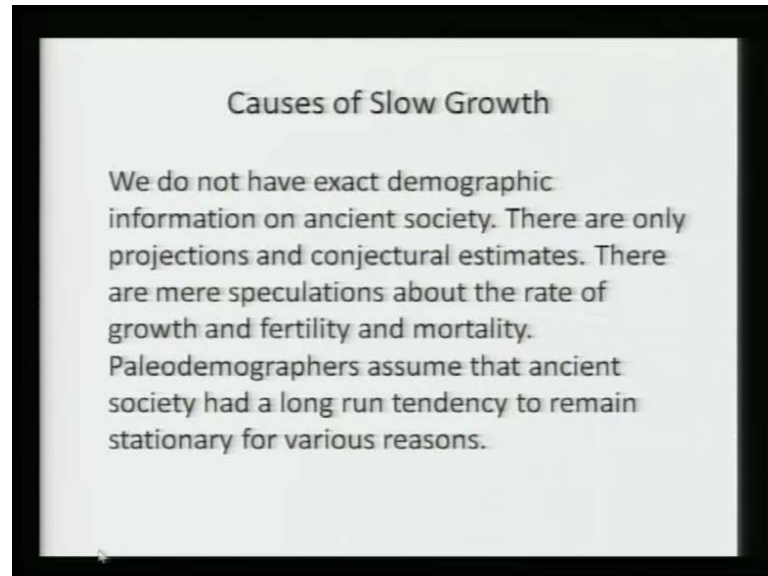
The two rates may have fluctuated. When mortality rate was high, fertility rate was also high and when mortality was less, fertility was also less or this may have happened with a small time lag. So, in normal years when mortality is low, fertility could have been higher but in the following years mortality when reverses its direction, then fertility also reverse its direction.

Alternatively, fertility was high and in short terms population would rise but periodically epidemics and wars would destroy a great proportion of population and the population size would come down to initial levels. We have written records bubonic plague in Europe in cities, you know record show that when plague breaks out, then in a few days time, in a few weeks time as much as 50 percent of the whole population can wipe out.

So, it may have been the case that for some time for 10 years, for 20 years or for 50 years population grew but then because of epidemics or other natural catastrophe pestilences, then the population come backs to original size due to high death rate. In both cases, the

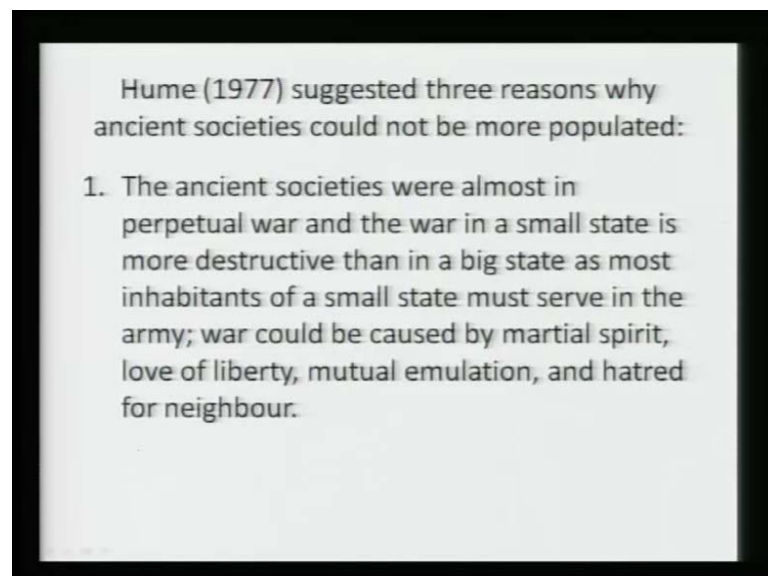
result is that for a long time the world population was stationary or growing at a very very slow rate.

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More on causes of slow growth, we do not have exact demographic information on ancient society, there are only projections and conjectural estimates. There are mere speculations about the rate of growth and fertility and mortality paleodemographers means demographers dealing with old societies. Assume that ancient society had a long run tendency to remain stationary for various reasons.

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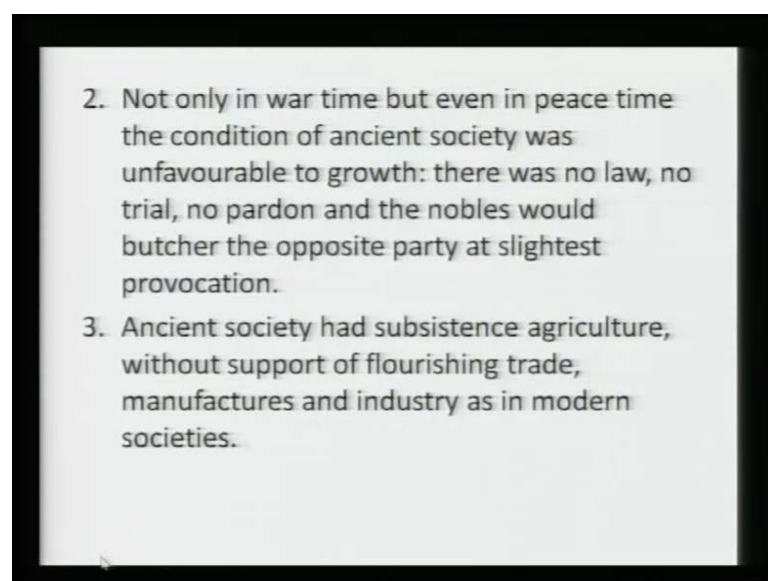


Hume suggested three reasons, why ancient societies could not be more populated. One, the ancient societies were almost in perpetual war and the war in its small state is more devastating, more destructive than in a big state. As most inhabitants of a small state must serve in the army. War could be caused by martial spirit, love of liberty, mutual emulation and hatred for neighbor.

All great saints, philosophers, religious reformers like Gautama Buddha, who lived 2005 years ago, you know talk about hatred and conflicts and jealousy and wars, violence and these are actually the factors, which may have produced high death rate. Not only in war time but even in peace time, the condition of ancient society was unfavorable to growth. There was no law, no trial, no pardon and the nobles, **novels** kings, rulers, landlords, masters, kshatriyas; they would butcher the opposite party at slightest provocation, this could have been another reason.

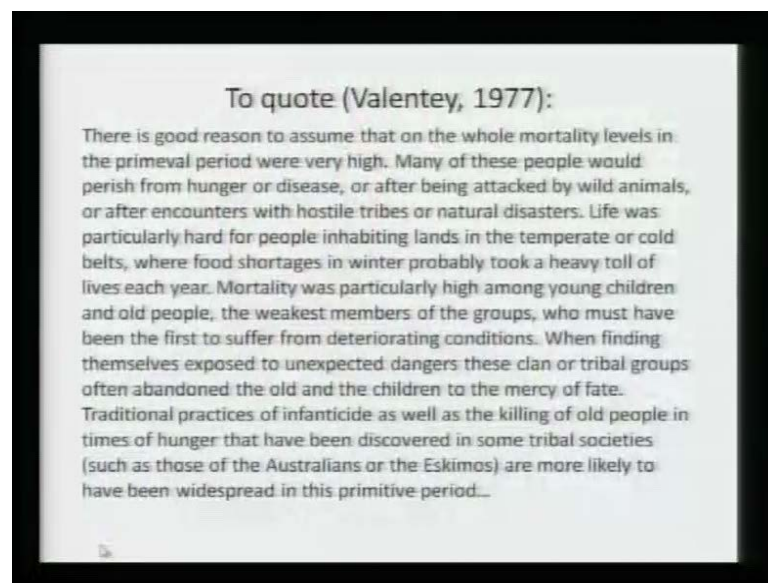
There is an interesting theory, when we talk about demographic connection theory, there is an idea that actually in developments in medical science have played a lesser role in long term reduction in mortality rates. A greater role has been played by rise of nation states. Rise of nation states, development of a strong political nation leading to a reduced violence between different sub national groups, could have been a major factor in mortality improvement.

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2. Not only in war time but even in peace time the condition of ancient society was unfavourable to growth: there was no law, no trial, no pardon and the nobles would butcher the opposite party at slightest provocation.
  3. Ancient society had subsistence agriculture, without support of flourishing trade, manufactures and industry as in modern societies.

Ancient society had subsistence agriculture without support of flourishing trade manufactures and industry as in modern society. So, that means people were constantly dependant on rainfalls or natural produce. Sometime there are good years, sometime there are bad years. Since, there is no trade, no manufacturing, no storage facilities. So, in good years people will be happy and fertility can also rise and in bad years death rate is high, fertility is low and there are more diseases and death.

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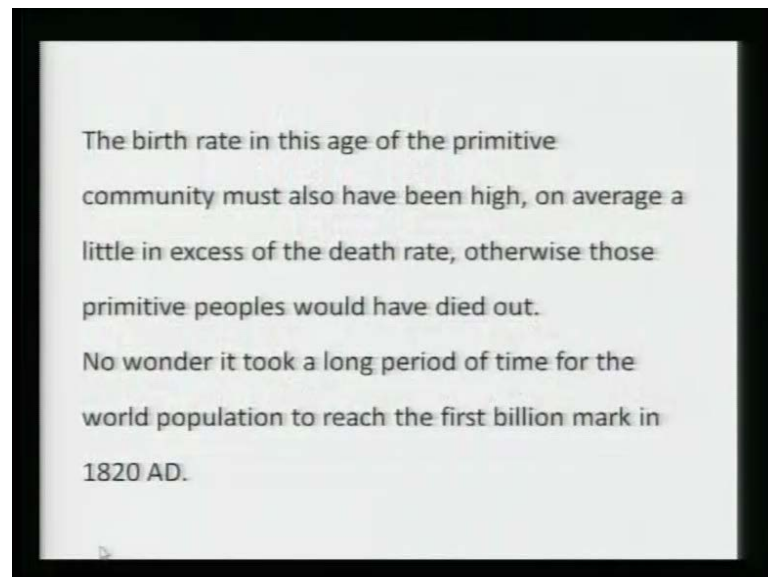
To quote valenty, there is good reason to assume that on the whole mortality levels in the primeval period were very high. Many of these people would perish from hunger or disease or after being attacked by wild animals or after encounters with hostile tribes or natural disasters. Life was particularly hard for people inhabiting lands in the temperate or cold belts, where food shortages in winter probably took a heavy toll of lives each year. Mortality was particularly high among young children and old people, the weakest members of the groups, who must have been the first to suffer from deteriorating conditions.

When finding themselves exposed to unexpected dangers, these clan or tribal groups often abandoned the old and the children to the mercy of fate. China is particularly known for child exposure and traditional practices of infanticide. India too had infanticide, female infanticide we call. Traditional practices of infanticide as well as the killing of old people in times of hunger that have been discovered in some tribal societies

such as those of Australians or the Eskimos are more likely to have been widespread in this primitive period.

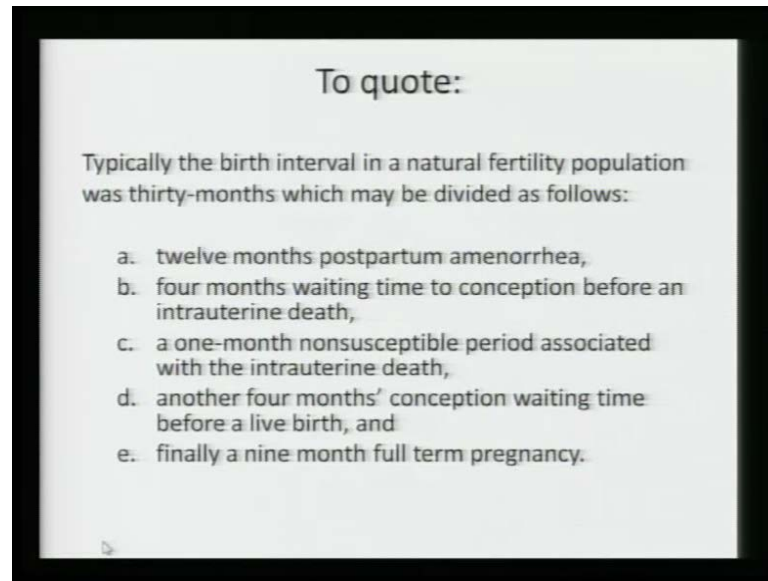
Most students of sociology must have seen Haralambos's book *Sociology: Themes and Perspectives*, in which he says that in several tribes when there is a shortage of food you know they will just abandon the old people and at times they will kill infants, especially female infants and there are also instances when they not only kill female infant but also eat them up. So, this was ancient society. So, that to some extent explains why death rates were high.

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The birth rate in this age of primitive community must also have been high. This is normally what when death rates are high, then for survival of human society it is natural that birth rate is also high. On average a little in excess of the death rate. Otherwise, those primitive people would have died out, and we would not be existing today. Our birth rate birth rates must have been slightly higher than the death rates. No wonder it took a long period of time for the world population to reach the first billion mark in 1820 AD. So, first billion in the history of world population was reached in 1820 AD. Bong arts argued that in the high fertility societies, birth rate too was not as high as could have been under sheer biological reproductive efficiency.

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To quote, typically the birth interval in a natural fertility population was 30 months, which was divided as follows. 12 months postpartum amenorrhea, you know bong arts is explained. First, we have seen that in ancient society population was stationary and death rate was very high. Not necessarily every year but periodically. So, there are good years and death rate is low but then there are periods of very high death rates, which bring down population size to original or a small level.

Bong arts said that not only this in ancient society, even fertility was not as high as it could have been. Certainly, they did not practice family planning but absence of family planning does not mean that they produce to their maximum capacity. Bong arts said some very interesting arguments to make. You see when we look for figure of maximum possible fertility around us, we find that the maximum fertility ever observed in any population in the world is observed for hetrite tribe in United States, living at the border of United States and Canada and in 1950 fertility of hetrite's was 8.9 children, means on the average 1 woman among hetrites produce 8.9 children in lifetime and this is despite the fact that the hetrites are the fastest growing tribe in the world between 1870 and 1950.

That means in only 80 years time hetrites increase 24. This is 1 of the fastest growing tribe and even there the average number of children is only 8.9. We do not have any

instance of population where a higher fertility rate was observed than this. So, in entire lifetime a woman maximally produce 8.9.

In India, in some writing **some** Gandhi was a very careful writer and you must have observed this read about this **some** Gandhi said that in India, in traditional India average fertility was 6.1. Among hetrites, it is 8.9. In India 6.1. May be Gandhi was wrong and it was 1 child or 2 children more than this. But then average fertility in entire lifetime is about it.

We have some data in **in** IIT Kanpur in collaboration with Michigan university, conducted a large scale study in and around Kanpur division, Kanpur, Allahabad divisions in 1972 and in rural areas average fertility in entire life was found to be around 8. So, 8 or 9 seems to be the upper limit of natural fertility even when no family planning methods were used.

What are the reasons? Bong arts said that the reasons are that although a woman can marry at age 15 and remain in reproductive period up to 45, that means she spends around 30 years in reproductive period and assuming that there is a pregnancy period of 9 months, the theoretical limit to number of children, upper limit would be around 40. That a woman theoretically a woman can produce, say 40 children in lifetime but she produces only 8.9. What are the reasons? The reasons are that first of all, due to cultural reasons not all women are entitled to produce children.

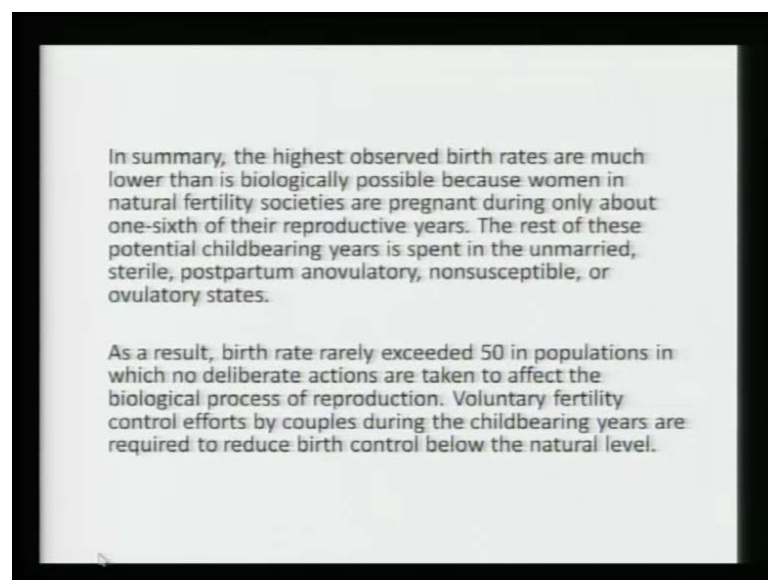
Married women produce children and not all women between 15 and 45 are married. Bong arts estimated that including unmarried women at the younger reproductive ages and widow, divorced, separated. deserted at the older ages. He find that roughly 25 percent of the time of women in reproductive period is not available for reproduction. So, not all women are reproducing, 25 percent are not reproducing because they are not in marital unions.

Then **then** nearly 20 percent time goes in sterility. There are three types of sterility. Adolescence sterility before menarche or during the early reproductive period, when menstrual cycles are irregular, there is a period of adolescence sterility. Then there is a secondary sterility that women become fertile but after a certain age different women at different ages become sterile again and there are some women, who never produce a child in reproductive period. They are called women, who are primarily sterile.

So, if you consider adolescent sterility, primary sterility, secondary sterility then you can say that 20 percent of the remaining time, first 25 percent time is gone because they are not in marital union. 20 percent time is gone because they are sterile. Then after child birth, there is some time during which there is no chance of conception. We call it postpartum anovulism anovulatory period, during which there is no chance of conception. A woman does not release egg and after this **after this** non ovulatory period then ovulation starts, but sometime there is fetal wastage. A woman becomes pregnant, but in 1 week, 2 week, 3 weeks time there is abortion spontaneous abortion, then again there is some non susceptible period and when a woman becomes pregnant then it **it** takes about nine months.

In all on the basis of all these, John Bongaarts calculates that 12 months, there is a 12 months postpartum amenorrhea, 4 months waiting time to conception before an intra uterine death, 1 month non susceptible period associated with the intra uterine death, another 4 months conception waiting time before a live birth and finally, a 9 month full term pregnancy. This all in summary **the**. So, what he says that you see if you look at 30 years time, you know **thirty fifteen** suppose a woman can produce a baby at 15 and can produce babies till 45, in 30 years time the break up could be as follows.

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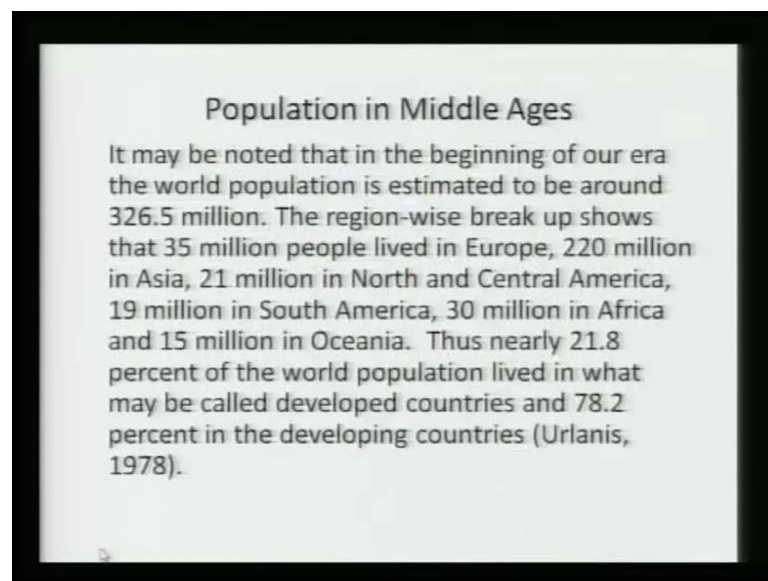
Out of 30 years, on the average 7.5 years are spent as unmarried. Either she is unmarried in the beginning or then she becomes widow or divorced or separated or deserted. 5



years are wasted in sterility, on the average out of 30 years 5 years are spent as a sterile period. 7.0 in postpartum anovulatory period, 4.75 years in ovulatory period, 0.5 non susceptible intra uterine death and only 5.25 in pregnancy and because they **they** spent 5.25 in pregnancy, so the outcome is about 7 children. So, in 15 to 45 they produce only about 7 children.

In summary, the highest observed death birth rates are much lower than biologically possible because women in natural fertility are pregnant during only about one-sixth of their reproductive years. Out of 30 years reproductive time, they are pregnant only for 5.25 years, the rest of these potential child bearing years is spent in unmarried, sterile, postpartum, anovulatory, non susceptible or a ovulatory states. As a result, birth rate rarely exceeded 50 in populations, in which there is no deliberate actions to effect biological process. We do not have populations in which birth rate ever exceeded 50 per 1000 population.

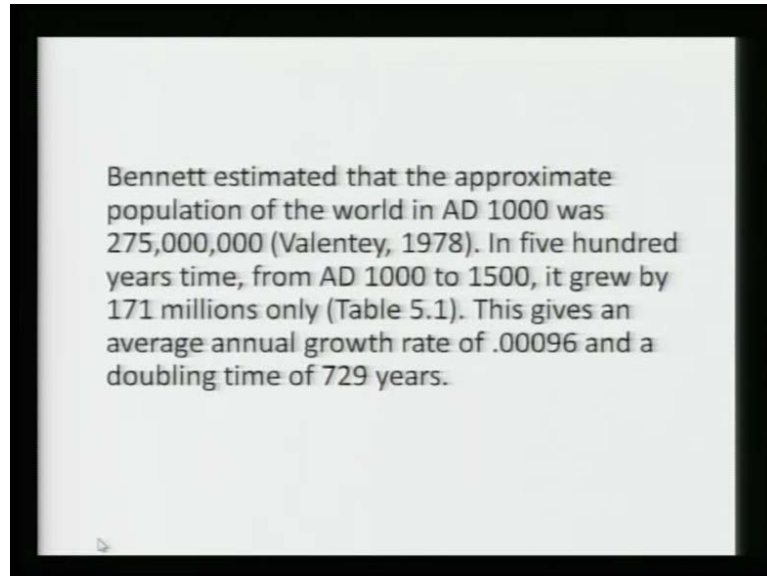
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Now, population in middle ages, it may be noted that in the beginning of our era the world population is estimated to be around 326.5 million. Region wise break up shows that 35 million lived in Europe, 220 in Asia, 21 in north and central America, 19 in south America, 30 million in Africa and 15 million in Oceania. Thus nearly 21.8 percent of the world population lived in what may be called developed countries and 78.2 percent in the developing countries. Now, the share of developing countries is increasing. It is already

about 30 percent and it is increasing further, because today developed countries are not growing or growing at a slow pace, while developing countries are growing faster. This was not the situation earlier.

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Bennett estimated that the approximate population of the world in 1000 AD was 275 and 6 zeroes. In 500 years time, from AD 1000 to 1500, it grew by 171 millions only. This gives an average annual growth rate of 0.00096 and doubling time of 729 years. Look at the world population growth. So, world population in millions, today we are in billions.

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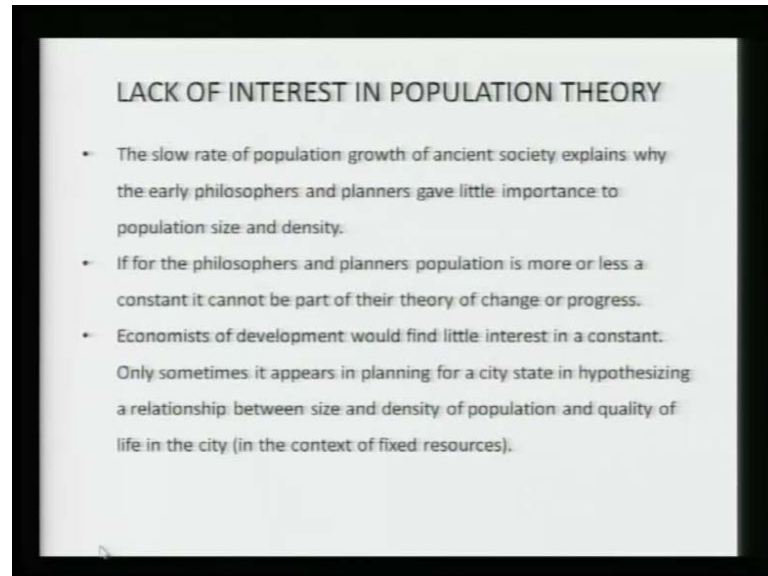


TABLE 5.1: WORLD POPULATION, 1000-1500 AD

Year	Population (in million)
1000	275
1100	306
1200	348
1300	384
1400	373
1500	446

World population in millions in 1000 AD were 275, eleven hundred 306, by 1500 million by 1500 AD the world population in millions reached only 446.

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And that explains why there was a lack of interesting population theory. The slow rate of population growth, you find in much writings during renaissances or you know in writings of economist, philosophers, intellectuals. In 17th century, 18th century there is very little discussion of population. Even in 19th century, very few intellectuals, philosophers, economist talked about population factors explicitly. The first essay which created any sensation and which made population an issue was published first time in 1798 by Malthus, an essay on the principle of population.

So, this slow that means what i have said today that the rate of growth of population in ancient society was extremely slow. The reasons were high death rates. Not necessarily every year, but periodic high death rate due to war, violence, conflicts, lack of means of transport and communication, lack of political organization and birth rates were also low. Birth rates did not reach the maximum limit. The maximum limits as bong arts said that the maximum limit could be if a woman marries at 15 and remains married and productive till 45, there is 30 years time and the theoretical upper limit of every number of children should be 40, but the maximum fertility ever observed in a tribal population was found in hetrite population and that was hardly eight 8.9 children in 1950 and this is

in the population, which grew at the fastest rate between 1870 and 1950, heuristics grew by 20 times.

So, in India we believe that the total fertility rate must have been between 6 and 8. Despite the fact, there are many social reasons, cultural reasons, one can as a socialist can look into social, cultural reasons why fertility was not at its peak and the reasons were unmarried status, sterility, postpartum, anovulatory period, ovulatory period, then non-susceptible, intra uterine death and only out of 30 years 5 years were available for pregnancy.

And since, population was not growing at all or growing at extremely slow rate, there was no need for intellectual, philosophers, economists, sociologists to talk about population growth as a serious variable in their systems and if for the philosophers and population planners population is more or less a constant, it cannot be part of their theory of change or progress.

Economists of development would find little interest in a constant. You do not use constants in your theories. Constant in the sense that variables if there is something which has a constant value, then you do not require to pay attention to that in building your theory. So, population was a constant kind only. It was an exogenous variable for systems, not endogenous variable.

Sir, I have this question that I heard your lecture regarding world population growth as you have said that and I found that you are concentrating a lot on ancient societies. Maybe in the first lecture and subsequently we move on to other periods of world history but what is my concern here is that even if number 1 is that this is first is a comment that I would like to make that when we were discussing world population growth, the whole idea that there is growth in population is but a known ubiquitous fact but what is interesting for us would be the patterns of growth with respect to geographical areas and hence, area of interest.

So, maybe I could have been you done better could have related something on that, but then what I am asking is if with even take into consideration the fact that you have discussed only ancient societies, then in ancient societies as you very well mentioned that it was a state of what (( )) says about this state of nature and all of mankind and if it was the state of nature and hence, the propensity to which events like political warfare

could impact population growth, then it has a not to do with an era of theodicy that prevailed in that situation. So, may be a comparative study of different civilizations hence present like Indus valley, Greek or Babylonian something of that sort. I think that they had could definitely give us some clues just to what in the ancient society, where reasons for the rise of population growth in different ways in different areas. May be if could some you could have effect something on that.

Sir, I tried to look into the ways in which you have tried to explore the whole phenomenon, world population growth and I found that what is important for us to understand is not the fact that world population growth is, but a given fact because it is but **it is but** what ubiquitous that world population growth had to happen by default. It is not by design only. Hence, I would have been much more interested to see as to what is of importance for us is the ways, in which world population growth varies from one to the other area or with respect to the cultural ethos of that place and that becomes very important in our analysis up till now, that is which has been with respect to world population growth in ancient societies and if that is the question, then in ancient societies where there has been a predominance and a major clout of political influence or what you said as the state of nature of man of because they were all fighting beings and there was lot of dwels between them.

So, if that was the reason then I think there must have been some philosophical writing because that is where that is how we know when we study Indian society we find indological writings come to a rescue a lot to understand social phenomenon, because **they were** those were the only authentic account, though not scientific. So, hence I think if you could reflect something as to, if not in a statistical way, then what ideas do we form about world population growth with respect to ancient societies. But taking into account, political events through the writings of some philosophers.

Aditya, you have asked a very interesting question. Actually today, my focus was on nature of growth in ancient society. I said two things. One, that man appeared, perhaps man appeared on this planet Earth 5 lakh years ago, it may be 5 lakh, may be 6 lakh, that is not so important around that time and for a greater part of human history, the population of the world remain almost stationary. That it was first time in 1820, that the world population reached the first billion mark and since, population was almost

stationary in all parts of the world. So, it did not attract the attention of philosophers, economists, intellectuals and others, planners or reformers.

So, since population is stationary, it is stationary for all, in Hindu world, in Christian world, in Islamic world, in Asia, in Africa and Latin America, in developed countries, today's developed countries, today's less developed countries. Till the second part of 18th century, world population was stationary everywhere and that is perhaps one reason, why the issue of population growth has not been related much. Actually, not at all, to the kind of questions of theodicy or cultural factors you are asking.

Cultural factors became an important issue only during last 50 years or so, when in certain countries death rates declined, actually in in certain countries only birth rates declined, not in others, while death rates declined in all the countries. That means decline in death rate does not require a cultural explanation, death rates decline universally in all the countries of the world. There were, there remain still remain, There still remain differences in life expectancy between different countries; developed, developing, Islamic, Hindu, Christian, Buddhist there are differences but those differences are not so significant, as the differences in birth rate.

So, the issue of culture or the role of anthropologist or role of sociologists, who are particularly interested in religion, culture civilization becomes important in explaining why in second part of 20th century some countries had high birth rate and some countries had lower birth rates. Before this, in ancient society or till 1820, I mentioned that 1820 is the date when world population reached the first billion. Since, everywhere condition was similar.

Two new points what I which I was making. We will come to cultural issue, when we talk about medieval society because it is or more than medieval during last 200 years, when death rates started declining but birth rate did not decline or they declined in some countries not in others. That time culture comes to play some role but not before that.

Two points which I have, I think two fresh points which I have made today, that when I was a student we were told that in ancient society birth rates were high, death rates were high and we all believed that your birth that death rates were extremely high and to counter extremely high death rates, birth rates were also extremely high. What I said today is that death rates were not always high in ancient society. In in an in ancient

society, there were many good things also pure rivers, mountains, forest, good fruits, good agriculture, highly fertile land, low density of population. So, as compared to today ancient's time was much better in dealing with infectious diseases or food production or or the problem of malnutrition, perhaps there was no problem of malnutrition.

And as such life expectancy could have been better if there were no periods of epidemics, wars, violence or natural catastrophe, this is one thing that death in an. In normal years death rate of ancient society could have been as low as in modern times or may be even lower but because of periodic nature of natural catastrophes and political violence the the long term tendency of death rate was (( )) high level.

Second new point was that fertility was high, certainly high but high does not mean the maximum or the upper limit of reproduction, no society, no ancient society ever had fertility at the upper limit of reproduction and here we find that culture culture of all countries culture, in all countries irrespective of religion Hindu, Muslim, Christianity all cultures played a vital role in maintaining fertility at levels much much below the maximum possible levels and that was by putting checks on marriages or or there like in India, there was a culture that at least initially even after marriage, women will be spend lot of time, years at the parental place and then there were religious restrictions on coital frequency. According to one estimate of United Nations in India, there were more than 100 days there were more than 100 days, when uh.

Sir, I actually your discussion reminded me of a very interesting line that we always we participate in always public speaking competition, we get this line called are we happier than our grandfathers or not, so or is this present generation better or not, so I mean but that is on a lighter thing but the question what I am trying to what comes to my mind at this juncture is that, in the in your last slide you mentioned something about that why economists where even if there were anyways no not a lot of interest among economists but even if they were interested, they were trying to see a strong cities are grew with respect to population and and with respect to variables like employment and other economic variables.

So, if the if we keep that in mind, because we also know that cities not only a very modern phenomenon, we had ancient Hellenic cities or the Greek cities and hence, it brings us it it makes us presume that the whole idea of organized habitation in cities must

be giving a filling to population growth or it is nothing like that that or there or do we have any information as to there were any variations of population growth in the country side and the city which is not necessary technological city or a modern city. In that sense but the where the administrative head was there or whether it is a ford city of something of that sort. So, is there something can we think that there were some patterns in seen in those ways, which were responsible for population growth in city and the country side in the ancient society itself.

This is a difficult question because and I do not know whether I can give satisfactory answer to this or not. You see there are almost no studies on relationship between urbanization and demographic transition. There are studies on demographic situation in cities, ford cities or other cities you are mentioned in that respect also knowledge about demographic situation of ford cities in almost nonexistent. This is an area in which new researchers can venture and find very interesting facts in **in** Indian ford cities, in western ford cities.

What we know about cities is that, in western countries when urbanization started, when industrialization, urbanization economic development, they started then at least in the initial period, while the rate of growth of urban areas was very high that was mainly because of migration of people from country side, because in urban area there were more job opportunities in industries and rural areas due to inequality, exploitation, feudalism, slavery people want to escape those situations and move towards urban areas.

So, rate of growth of urban population was high but in those days death rates of urban areas were actually higher than death rates of rural areas. Today, urban areas have lower death rates than rural areas and that is because of better health facilities, hospitals, awareness, literacy, government facilities, more money, civil society factor but initially in **in** urban cities, you know except employment there was nothing else, there was more poverty. This is how sociology started. You know that one reason or one factor behind shaping sociology is study of poverty and unemployment and inequality in urban areas in industrial **industrial** societies. So, those **those** cities had high rate of growth of population, not because of lower mortality, not because of lower death rate but despite higher death rate due to migration, rural to urban migration they **they** had high growth rate.



Today's cities have lower death rate and high growth rate partly because they have lower death rates and partly because of migration. There some studies show that in countries like India, today there is 50 percent contribution to urban growth of rural to urban migration and 50 percent of natural increase in urban areas themselves. In **in** earlier times death rates, high death rate played a negative role in urban increase and it was rural to urban **urban** migration, which actually played more than 100 percent role in urban growth.

So, is that **is that** means as you **as you** are saying very properly that the nature of city changing from one era to other and also had a change, similar change in the demographic factor. I mean this basically what you are trying to put across that the nature of city changes because city today refers to something else and that time it was only to employment, education. It was more crude in its nature and hence, could not effect population growth to that extent because today cities matter in much more that of other variables immediately. This is, is this something that you are just saying.

You are right. Because all cities in all parts of the world are not of similar type with respect to socioeconomic and demographic situation; demographics of ford cities, demographic of industrial cities, demographic of religion or pilgrimage cities, demographics of administrative towns or demographics of capital cities they are all different and when it comes to urbanization actually, this study of urbanization and demographic transition is particularly difficult because when you come to define urbanization conceptually, it is not only growth of cities, urbanization as such is a process of population concentration. So, when population started settling down in villages when nomads, tribals, moving bands started settling down in rural areas we say that urbanization started.

So, if you want to relate urbanization to demographic transition, then the subject will become more complex but you are right it would be an interesting study to see, if what we call city. There are different types of cities they have their own functional specialization and are there are differences in demographics of different types of cities having different functional types ford cities, pilgrimage, administrative, capital cities, industrial or service cities there are in **in** context of, in Indian context we also talked of rural type of cities or urban population different types of cities but this is an interesting question. May be we need to pay attention to this fact. Thank you.