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1. Learning Outcomes

After studying this module, you shall be able to

- Know about historical trends in Population growth
- Learn different views on demographic transition of Malthus, Karl Marx, W S Thompson, Frank W Notestein and their criticisms
- Understand the different stages of demographic transition
- Know about the adverse effects of high population growths

2. Introduction

The study of human resources and their welfare is the central point of all economic activities as they are both means and the ends. All other resources would remain idle without their effort. Therefore their size and quality is of utmost importance in economic development of a country. The history of modern economic growth shows that the growth of population was one of important factors in the rapid growth rates of the presently developed countries like England, France and Germany as it contributed to both the supply of and demand for more production. As Simon Kuznets states that modern technology which developed during the epoch of Modern Economic Growth also had an effect on accelerating the rate of growth of population with the advent of new industries under industrial revolution, the rising population provided labour force for these industries. Since population requires more goods and services for their use, it provided ready market for the goods produced by the new industries.

Although in under-developed economies of the Twentieth (20th) Century where population is already large in relation to their resources, a rapid growth of it may not be conducive to development in the same way as had happened in the presently advanced nations yet the perception regarding its retarding effect is changing. The rising number has a competitive advantage in the form of cheap labour force which can contribute to economic development at a lower cost.

As the trends in population growth have reversed, it is estimated that while US, China, Japan and Russia will be short of labour in the near future, India will have the surplus in the working age group and will thus have a competitive advantage in labour cost. The availability of large number of people in the working age group, more popularly known as 'demographic dividend' will ensure that there is a steady supply of labour to work in economic activities. But this dividend can give results only if more

investment is done on education, health and skill development. It also requires that the technology used must ensure the increased opportunities of employment, otherwise as economic survey puts it "However if we fail to create skills, we would be facing a demographic nightmare."

The developing economies of today have the advantage that they can learn from the experience of the presently advanced countries in reducing this period of high rate of growth of population and can use this opportunity of surplus labour in achieving a high economic status. These human resources should be so utilized that not only an optimum use is made of them but they are used in improving the quality of life. This will automatically help in bringing about population stabilization.

3. Population and Economic Development

Since population and its growth have both a positive and a negative impact on economic development it is necessary to study the relationship between economic development and population growth. This has remained the focus of discussion and analysis from as early as 18th Century.

3.1 Malthusian view

The earliest insight was provided by T.R. Malthus in 1798 when he expressed the problems and suffering faced by mankind of rising population. By examining the relationship between food supply and population, he concluded that

a) While population increases in a geometric progression of 1, 2, 4, 8, 16…… making the number double every 25 years due to their biological needs. It results in their continuous multiplication,
b) Food supply increases in an arithmetic progression like 1, 2, 3, 4, 5…..This slow growth is due to the limits put by natural resources over which man has little control.
c) The race between population and food supply is lost by food supply which will result in famines, hunger, starvation and disease and deaths.
d) The nature would bring about an equilibrium between the two by natural calamities like earthquakes, floods, droughts etc. unless man himself puts positive checks to control the growing number.

Thus Malthus believed that growing population would contribute to a rising supply of labour that would inevitably lower wages. He feared that a continued population growth would land itself to poverty.

But Malthusian theory of population has been criticized on many accounts:

(a) The theory is based on the law of diminishing returns. With capital accumulation, advanced technology and the improvement in the methods of production, it has been possible to postpone the application of this law. In fact Malthus should have compared the growth of population with not only food supply but with the total production

(b) The comparison between subsistence level and the birth rate is not justified by the western experience

(c) There is no proof that population increases exactly in geometric progression and food in arithmetic progression. The real growth of both cannot slow this type of precision.

(d) His religious beliefs checked him to think of the widespread use of contraceptives. In fact many other checks might be used which do not fall under Malthusian poor classification of preventive and positive checks

(e) The theory is giving undue emphasis on the limitation of supply of land. The crop rotation, fertilizers and change in methods of cultivation, all contribute to increased food supply.

Thus such a gloomy picture does not sustain as Kingsley Davis has admitted that the doctrines of Malthus are not empirically valid, although they are theoretically significant.

3.2 Karl Marx

Karl Marx has also expressed his views on demographic transition. His theory of population is christened as the theory of surplus population According to him there can be no natural or universal law of population and every historical mode of production has its own special law of population. For him, population theory is peculiar to the capitalist system of production. For Marx, the problem is inherent in the capitalist system and not in food modernization.

Marx did not believe that all hardships with which the people were suffering were due to man's tendency to grow in numbers faster than his production of subsistence would permit. He insists that man's tendency to press on the means of subsistence is due to the evil of capitalism. Therefore he held that poverty and unemployment were not due to increase in population but due to the capitalist mode of production which fails to provide jobs. Thus surplus population was the consequence of the real problem of uneven distribution of wealth and its failure to provide jobs to all.

According to Marx, the increase in world population was not due to an increase in fertility but was the result of capitalist policies. He believed that by installing labour saving machines, a capitalist wants to maximize his surplus which will spread unemployment, wage, decrease and an increase in poverty. For Marx, food production declines due to uncertainty about the ownership of land.

Thus Marx believed that in a socialist society reproductive behavior would develop a complete harmony between the individuals and the society.

Marxian theory of demographic transition has also been criticized. For critics (a) Surplus emerges in capitalism but this does not mean that there is no need to check population is socialism

(b) If economic inequality is the only cause of difference in birth rate then why birth rate differs amongst various groups in socialism where distribution is equal.

(c) The necessity of family planning has also been felt in socialist economies.

(d) Although he has criticized Malthus, his theory is not very reasonable.

3.3 W.S. Thompson

In 1929 W.S. Thompson published two papers on International population dynamics, a book "Danger Spots in World Population" and an article "Population' in The American Journal of sociology. In the latter, Thompson elaborated an early version of demographic transition theory. He placed all countries into three groups based on the trends in their rates of natural increase. He assumed that countries would Progress from Group C (High birth rates and High death rates) to Group B (High birth rates and declining death rates) to Group A (Low birth rates and low death rates) as they became increasingly industrialized. In his book 'Danger Spots in World Population', Thompson used this framework to identify regions experiencing population problems and to derive policy recommendations. For Japan, there is a Period of rapid population expansion, he suggested to expand by the acquisition of more territory. But the theory did not generate interest among western policymakers. His population problem was first published in 1930. In 1944 he turned his attention again to international population trends in 'Plenty of people" which contained an updated version 1929.

3.4 Frank W Notestein

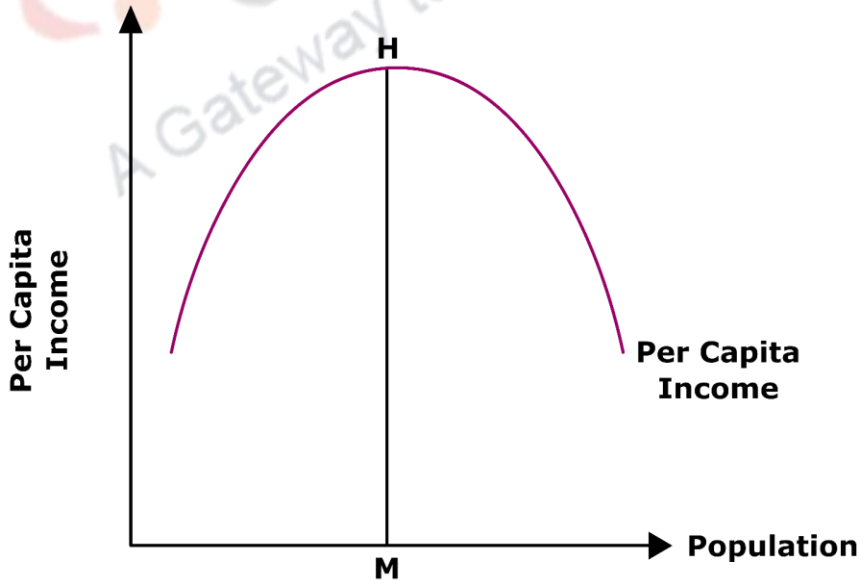
Frank. W. Notestein – 'Population – The Long View' in Food for the World ed Theodore. W. Schultz Chicago made a revolution world-wide in his classic elaboration of transition theory in 1945. Population would become a 'transition of growth' ones as modernization began to affect their fertility. When urbanization and industrialization became common place, fertility would reach low level and the population would enter into the stage of 'incipient decline'. At this time, Notestein clearly saw the possibility that not all 'High Growth Potential' population would experience this vital revolt, especially those under colonial domination. Many of these were experiencing public health advances and improved agricultural productivity that lowered their mortality and not the urbanization

and industrialization that would lower their fertility. He also suggested that the period of population expansion, in some cases could end in catastrophes and increased mortality.

There is another theory put up by Cannon and others who also try to establish a relationship between population and other resources with the levels of national and per capita income. The theory states that every increase in population is not bad. So long as rising population helps in better and fuller utilization of available resources and is helpful in raising national and per capita income, it cannot be considered bad.

The optimum population is that which generates maximum income per capita. This theory is based on the relationship between population size, the availability of resources and level of income. As increased human resources supply additional labour which can exploit more natural resources this would increase the flow of goods and services and thus the income levels. It is only after reaching the highest level when income per capita starts decreasing with the increase in population that the problem of excess population has to be considered. Thus there will be an optimum level of population, according to the theory, which would be required to use all natural and man-made capital resources. The level of population which is below this and is not able to exploit all the available resources is called under-population.

The number of people which go beyond the optimum level fail to increase income per capita and put a burden on the existing optimally utilized resources this situation is that of over-population. Thus the degree of disequilibrium is measured as M= A-0/0, where M is the degree of maladjustment, A actual and O optimum population. The position of optimum population can be shown with the help of the following diagram.



Optimum population is that size which can facilitate maximum per capita income in the economy given the resources and technology. In the above diagram OM is that population size which is optimum as it is providing MH income per capita which is the highest under the given situation. Any change in the availability of resources or technology or both will shift the optimum level of population.

Since the relationship between population growth and economic development is two way, we can study the effects of economic development on population and that of rising population on economic development.

4. Stages of Demographic Transition

The theory of demographic transition shows the relationship between economic development and population growth. According to E.G. Dolan, " demographic transition refers to a population cycle that begins with a fall in the death rate, continues with a phase of rapid population growth and concludes with a decline in birth rate." Accordingly there are three stages of population growth along with the economic growth of an economy.

A. First Stage – In this stage when the economies are primitive agrarian economies both birth rate and death rate are high. Birth rate is high due to various economic, social and religious factors. Poverty goes in favour of larger families as children contribute at an early age and are source of security in the old age. Illiteracy and ignorance make them indifferent to restrict the family size. Even religion and superstitions also help in high birth rate. A high infant mortality rate is also responsible for a high birth rate.

On the other hand, lack of medical facilities poor diet, many diseases and absence of education by making their outlook unscientific and a bad sanitation etc keep the death rate also very high.

Thus a high birth rate is matched by an equally high death rate keeping population stable over a long period.

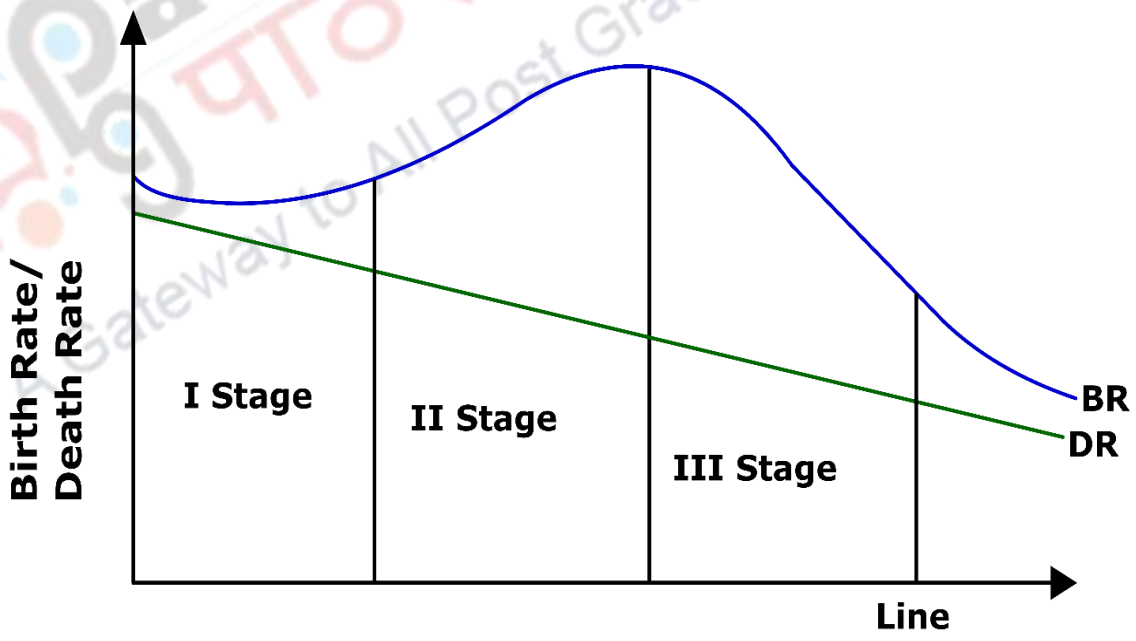
B. Second Stage – The second stage of demographic transition is a stage of rapid growth of population as the death rate starts declining while birth rate still remains high. Development in agriculture, industry etc. generates higher incomes, the standards of living improve, and medical and health facilities improve. Special efforts are made to check the contagious disease. Dietary conditions and sanitation improve. All these developments bring down the death rate.

But, birth rate remains high as the reduction in birth rate can come only when people are educated and conscious to keep the family size small. Thus in the second stage birth rate remains high while the death rate begins to decline. This accelerates the growth of population as the high growth potential of the first stage is realized in the high actual growth in the second stage. This is known as the period of 'Population Explosion'.

C. Third Stage – In the third stage of demographic transition, the birth rate declines significantly. With the process of industrialization, there is growth of towns and population shifts to urban areas. The spread of education and urbanization makes people conscious of high standards of living which helps them in recognizing the merits of smaller families. With development, more facilities are available due to which there is further decline in death rate. Thus low birth rate and low death rate lead to a stage of stationary population and quality of life is given a priority to the size of the family.

This leads to a situation of stationary population with low birth rate and low death rate. These stages of demographic transition are shown in the following diagram.

The different stages of demographic transition can be explained with the help of following diagram.



The above diagram shows that in Stage I both birth rate and death rate are at high level and there is a narrow gap between the two which keeps the net growth of population at a low level. In Stage II, there is a sharp decline in the death rate which the birth rate

curve is at a higher level creating a large gap between the two creating a situation of population explosion. In Stage III birth rate declines sharply and death rate is also at a low level resulting in a slow rate of growth in population which ultimately settles at the lowest growth rate as both birth rate and death rate stabilize at the lowest level.

However, an increase in population beyond an optimum level can become a major constraint in the process of economic growth. Growth process and its rates in an economy are mainly the function of rates of savings and investment. A high rate of growth of population leads to more expenditure on consumption. However, if a large part of population falls in the age group which is known as dependent age group (either in the age group of children or old age people), their contribution to the earning levels is zero while they do consume goods and services. This would reduce the rate of saving in the economy which would in turn reduce the rate of investment, capital formation and thus the growth rate. Besides it will also cause a change in the pattern and composition of investment which would again require more investable funds. Since economic development requires an increase in productivity which is related to the availability of more capital, rising population puts obstruction in the path of development.

It is not only that the rising population restricts the rates of savings and capital formation but has its harmful effects on other aspects. E.g. a high rate of growth of population results in

a) widespread unemployment
b) Increases pressure on land particularly in Agro-based economies.
c) Leads to low levels of per capita income and thus low standard of living.
d) It generates an increased burden of unproductive population.
e) It has an adverse impact on economic and social infrastructure of the economy.
f) It also leads to environmental degradation both in terms of over-exploitation of natural resources and increase in environmental pollution.

5. Population Growth and Environment

The ever growing population particularly in the less developed nations is not only putting pressure on the availability of food and existing infrastructure like health, education, housing, water, electricity etc but is severely affecting the eco system. The relationship between population and environment is complex. A lot of information is available about the relationship between population and its impact on environment which can be taken into account briefly.

a) In 1972, Donella, H. Meadows and Dennis L. Meadows in 'Limits to Growth' tried to investigate four major trends of global concern – accelerating

industrialization, rapid population growth, widespread malnutrition, depletion of non-renewable resources and deteriorating environment. All these trends are inter-related.

The text is currently available in its third edition Meadows et all, 'The Limits to Growth' – The 30 years update Chelsea Green Pub Co. 2004.

b) Paul. R. Ehrlich a Professor of Biology Stanford University, Stanford, California (U.S.A.) tried to establish a relationship between population and Environmental problems. The information is adopted from a paper presented before The President's Commission on Population growth and the American Future on 17th Nov., 1970 titled Impact of Population Growth. Erlich also presented a paper on Human Population and Environmental Problems in 1974 which was based on an address given to Third International Congress of the World Wild life Fund in Bonn (W. Germany in Oct, 1973.

c) Ester Boseup in her Paper, (1965). The Conditions of Agricultural Growth – The economies of Agrarian change under population pressure presents a dynamic analysis embracing call all types of Primitive Agriculture. It is a classic work on agricultural intensification and challenges the assumption of Malthus theory on Population.

d) John Coldwell in Towards a Restatement of Demographic Transition Theory-1976 which has been published by Population council- Population and Development Review Africa, Asia, Southeast Asia has elaborated the importance of education and status of women in influencing population growth.

e) B.L. Turner and A.M. Shajaat Ali in Induced Intensification – Agricultural change in Bangladesh with implications for Malthus and Boserup – 1986.

Based on Time Series data 1950-1986 the results compiled with evidence show that agricultural growth involved intensification thresholds, provide clubs about Malthusian and Boserupian interpretation of Bangladesh suggesting that small holding agriculture should continue for growth.

g) Ms. Carole L. Jolly in her article 'Four theories of population change and Environment' in A Journal of Interdisciplinary Studies Vol 16 No1 Sep 1994 has also explained the relationship between population and Environment.

The impacts of human societies on the environment are a function of three major inter-connected element; population size, consumption or affluence and technology.

Society's environmental impacts take two major forms. First, the resources are consumed in the form of land, water, soils, food and services from eco system, and second we emit wastes from our consumption activities in the form of air and water pollution, toxic materials and greenhouse gases. Some wastes threaten human health while others abrupt natural eco system functions. The eco system has a limited ability to

tolerate the extraction of its productive capacity and withstand pollution without getting damaged. This would require that the increasing number of people should not take from nature more than it is able to regenerate and does not pollute nature beyond its ability to assimilate.

It is clear that as people get hungrier, their behavior relative to the environment is not going to become more sensible from the point of view of the long-term carrying capacity of our planet. Instead it is going to become more reckless. The growing numbers and their mindless and ruthless exploitation of natural resources is continuously degrading the physical environment which includes the whole complex of climate, soil, water and biotic factors.

To feed the growing numbers, there is a need for more farming of land. For getting cultivable land there is an indiscriminate felling of trees and conversion of forests into cultivation. The progressive depletion of forests leads to an ecological collapse. Increasing floods, soil erosion, siltation of dams and changes in the micro climate are some of the dangerous consequences of deforestation. Frequent floods and untimely rains cause heavy damage to life and property.

As a result of more area under cultivation, the size of grazing land is reducing. The indiscriminate grazing leads to desert like conditions in many areas. Depletion of vegetative cover and over-grazing is hardening the soil preventing forest regeneration.

Not only land even the biodiversity of the economies is affected. Within each eco system, there are various species. Conserving all these species is important. Any adverse effect on environment is bound to affect biodiversity which is the basis of all eco systems on earth.

The growing population needs space to build houses, factories, roads and highways which may further put pressure on land. This may lead to use of substandard land for agriculture and to loss of wild life and natural ecological reservoirs which might not be compensated by the gain.

Some other kinds of assaults that human beings are making on the life support systems of our planet are generally not recognized as parts of the environmental problems. For instance, although air pollution and water pollution are considered environmental problem as these are affecting health and life expectancy. But the more serious impact of these is their effect on the climatic system of the planet which has more lethal effects.

The Climate of earth is determined by the incoming energy from the sun and outgoing every radiated from the earth. Some gases in the atmosphere affect the incoming and outgoing process and warm earth's surface which is called the greenhouse effect. This effect has resulted in global warming and can be the cause of severe climatic changes.

Similarly, the problem of ozone depletion which is the result of concentration of chlorine results in an increase in solar ultra violet radiation which can cause skin cancers.

Besides the high yield agriculture is dependent on the ability of plant geneticists to breed and select new variety of crops which can tolerate the new strains pests and meet changed climatic conditions. So if the genetic diversity of our crops is lost we shall not be able to select out new ones as climatic conditions change.

Another problem which has emerged from the high rate of growth of population is the treatment of solid waste generated during the process of development. Open dumping and uncontrolled land filling is going on in most of the developing nations. The industrial waste is being thrown in rivers which are resulting in rivers becoming contaminated with toxic chemicals and heavy metals. This has reduced the capacity of rivers to support aquatic life. This is the most serious problem for those who do not have access to clean drinking water in developing economies.

Thus one can see and feel the direct effects of growing human population in reducing the carrying capacity of the planet-just when it is most essential to increase it. If people do not change their behavior, then like many other species that have overshot the carrying capacity of their environment, mankind will also pay the price. As human population growth outstrips the possibilities of increasing food production, the destruction of both habitat and environment is expected to extend to devastating proportions.

Besides population growth, it also adversely affects the following:

a) **Mining --** Uncontrolled population growth requires more mineral resources. While large mining enterprises involve change of agricultural land into townships, roads, railways and dockyards etc. surface minings removes vegetation and top soil. Besides additional land is required to dispose of mining wastes. The dust raised by mining activity pollutes the air and finally settles on land to make it unproductive. It also affects the water resources adversely and leads to more deforestation. Thus mining activities degrade the quality of life.

b) **Water Resources –** Rapid growth of population in the absence of a proper water conservation policy can not only lead to water pollution which can harm the whole eco system but can also lead to underground water depletion. It also leads to the destruction of water bodies which can be a good source of water conservation. Discharge of industrial wastes into rivers is not only a health hazard for human beings but has also reduced the capacity of rivers to support aquatic life.

Man is thus already changing the face of the earth and weather patterns in the direction which could have widespread ill effects. As more and more areas are paved

with concrete and wider cultivable land is lost through degradation and soil erosion, the effects on environment are bound to be catastrophic.

6. Summary

The availability of large number of people in the working age group, more popularly known as 'demographic dividend' will ensure that there is a steady supply of labour to work in economic activities. But this dividend can give results only if more investment is done on education, health and skill development. It also requires that the technology used must ensure the increased opportunities of employment.

- Malthus believed that growing population would contribute to a rising supply of labour that would inevitably lower wages. He feared that a continued population growth would land itself to poverty.
- According to Marx, the increase in world population was not due to an increase in fertility but was the result of capitalist policies. He believed that by installing labour saving machines, a capitalist wants to maximize his surplus which will spread unemployment, wage, decrease and an increase in poverty. For Marx, food production declines due to uncertainty about the ownership of land.
- W.S. Thompson placed all countries into three groups based on the trends in their rates of natural increase. He assumed that countries would Progress from Group C (High birth rates and High death rates) to Group B (High birth rates and declining death rates) to Group A (Low birth rates and low death rates) as they became increasingly industrialized.
- When urbanization and industrialization became common place, fertility would reach low level and the population would enter into the stage of 'incipient decline'. At this time, Notestein clearly saw the possibility that not all 'High Growth Potential' population would experience this vital revolt, especially those under colonial domination. In some cases, it could even end in increased mortality.

- There are three stages of demographic transition:
  First stage: High birth rate and high death rate
  Second stage: High birth rate and low death rate
  Third stage: Low birth rate and death rate

The best hopes for the world would lie in reversing over-development as well as by deploying advanced and clean technologies by the developing economies in their early stages of industrialization. The economies tend to become higher polluting during early stages of economic development because they adapt inexpensive technologies that are relatively inefficient and more polluting. The more developed nations on their part have got to end the insane growth of consumption. The under-developed countries would have to be persuaded to follow a different path of development and to reduce birth rates as early as possible. No doubts that environmental measures in general are very costly and produce results only in the distant future. But a balance has to be created between short period and long period if the economies have to sustain the growth rate. The growth process must strike a balance between the needs of the present generation with the requirements of the future generations.