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Chapter 1

POPULATION GEOGRAPHY

POPULATION

In sociology and biology, a population is the collection of people or individuals of a particular species. A population shares a particular characteristic of interest most often that of living in a given geographic area.

CAUSES OF POPULATION CHANGE/FACTORS OF POPULATION GROWTH

There are two factors that result in an increase in the size of a population. First, there is natality, which is the number of individuals that are added to a population over a period of time due to reproduction. The second factor that can cause a rise in a population is immigration, whereas, Mortality and emigration result in decrease of population. The detailed description of each cause of population change is hereunder:

1. BIRTHS

Births are usually measured using the birth rate (number of live births per 1000 of the population).

2. DEATHS

Deaths are usually measured using the death rate (number of deaths per 1000 of the population).

3. MIGRATION

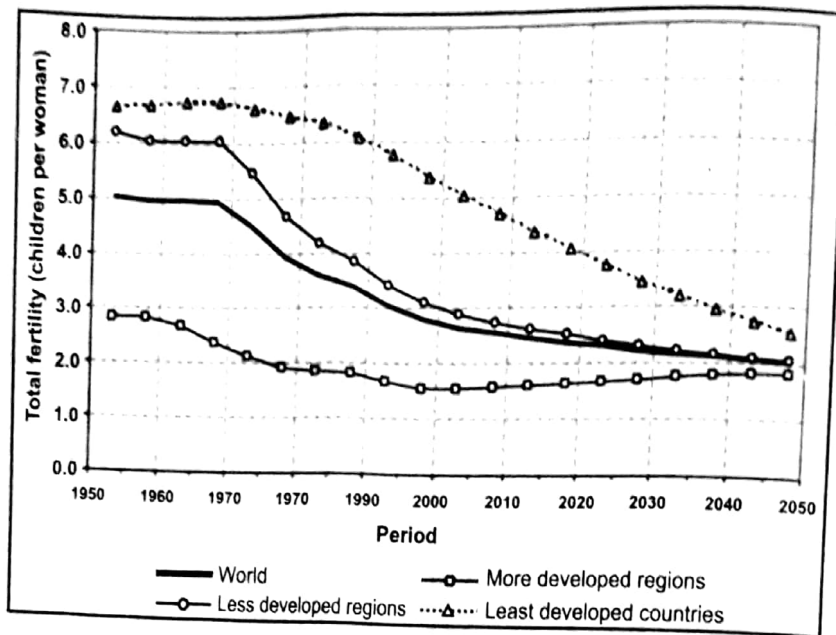
When people move from one place to another, the place they move from is called the Place of Origin and the place they move to is called the Place of Destination. The place of origin shows a decrease in population while the population increases in the place of destination.

4. TOTAL FERTILITY RATE

(TFR) is the average number of children born to a woman. Today, the TFR average for the developed world is 1.5.

5. EDUCATION

Education plays a vital role in determining the levels of both birth and death rates in a country and hence the level of population growth. Simple programs in hygiene can impact upon death rates, while family planning education can reduce birth rates.



Total fertility trajectories of the world and major development groups, 1950-2050.
(Source: United Nations Population Division, World Population Prospects)

COMPONENTS OF POPULATION CHANGE

The main components of population change are births, deaths, and migration. Following concepts help in comprehending the idea of population change:

1. GROWTH OF POPULATION

Change of population in a particular area between two points of time is known as growth of population. For example, if we deduct the population of Pakistan in 2000 (141 million) from population of 2016 (201 million) then we shall get the growth of population (60 million) in actual numbers.

2. NATURAL INCREASE

Births and deaths are natural causes of population change. The difference between the birth rate and the death rate of a country or place is called the natural increase. The natural increase is calculated by subtracting the death rate from the birth rate

$$\text{Natural Increase} = \text{Birth Rate} - \text{Death Rate}$$

3. POSITIVE GROWTH OF POPULATION

This happens when the birth rate is more than the death rate between two points of time or when people from other countries migrate permanently to a region.

4. NEGATIVE GROWTH OF POPULATION

If the population decreases between two points of time, it is known as negative growth of population. It occurs when the birth rate falls below the death rate or people migrate to other countries.

5. NET MIGRATION

"Net migration" is defined as the difference between the number of people moving into an area and the number of people moving out of that area/country".

POPULATION DENSITY

Population density is the average number of people per square kilometre. It is a way of measuring population distribution and shows whether an area is sparsely or densely populated. Population density is calculated using the following formula:

$$\text{Population density} = \frac{\text{total population}}{\text{total land area in km}^2}$$

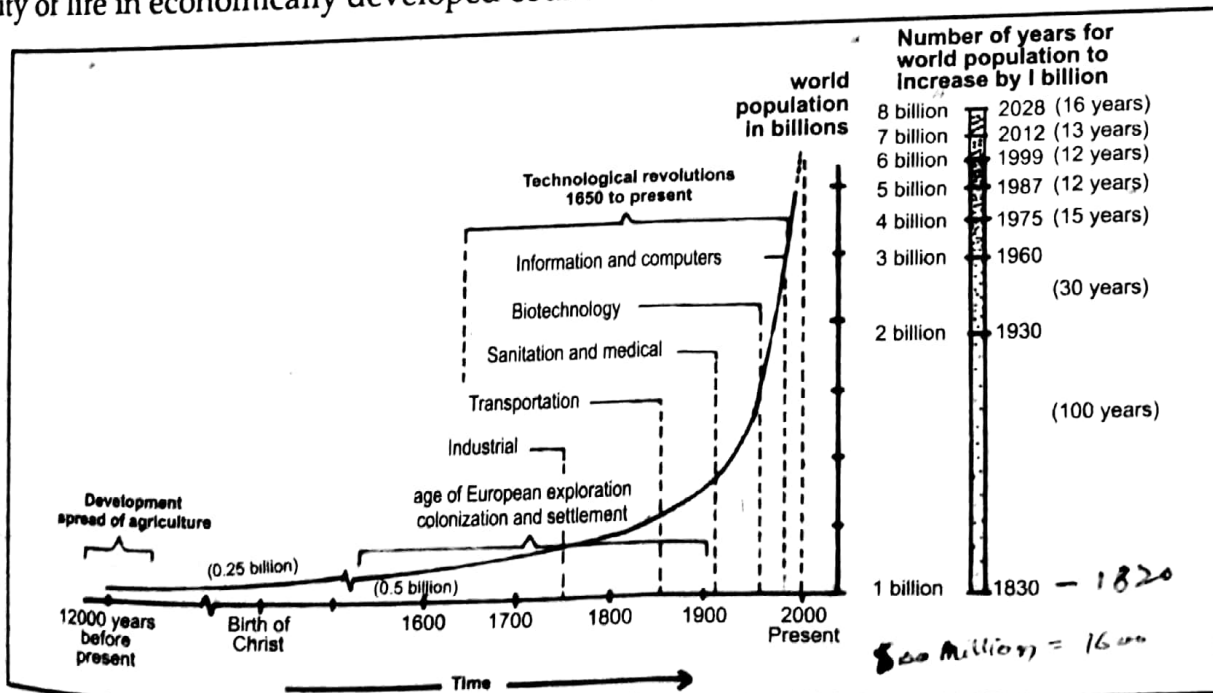
The Population density in Pakistan is 240 in 2016. Due to uneven distribution of population, its density in Pakistan varies dramatically, ranging from scarcely populated arid areas, especially in Balochistan to some of the highest urban densities like Karachi and Lahore.

The population density of a country has very little to do with its level of economic development. For example, both Bangladesh and Japan are very densely populated, but Bangladesh is a **LEDC: Less Economically Developed Country**, that has low levels of development based on economic indicators such as gross domestic product (GDP). Most countries in the southern hemisphere (e.g. countries in southern Africa, southern Asia and South America) are LEDCs, while most countries in the northern hemisphere are More Economically Developed Countries. Japan is a **MEDC: More Economically Developed Country** that has high levels of development, based on economic indicators, such as gross domestic product (GDP). Most countries in the northern hemisphere are MEDCs, e.g. UK, USA, Canada, Europe while most countries in the southern hemisphere are Less Economically Developed countries.

FACTORS AFFECTING POPULATION DENSITY

1. DEVELOPMENT OF TECHNOLOGY

The development of steam engine supplemented and then replaced human and animal energy. It provided the mechanised energy of water and wind. Mechanisation improved agricultural and industrial production. Scientific and technological advancements enhanced quality of life in economically developed countries.



The world, at the beginning of twenty-first century, recorded over 6 billion population. It had quadrupled from 1.6 billion just in one century. In fact, human population increased more

than ten times during past 500 years.

2. IMPROVEMENT IN MEDICAL FACILITIES

Improvement in medical facilities and sanitation changed global population dynamics quickly and dramatically. Inoculation against epidemics and other communicable diseases, suppression or elimination of many disease vectors and improvement in sanitation contributed to the rapid decline in the death rates in virtually all parts of the world.

3. PHYSICAL FACTORS

The physical characteristics play a dominant role in the distribution and density of population on the earth's surface. Relief, climate, soil, natural vegetation, water, mineral resources are some of the important physical factors. Impact of some important physical factors on population distribution is being discussed below:

a. Climate

✓ This is probably the greatest deciding factor, which in turn influences the types of vegetation (desert, grassland, or forest), the kinds of crops that can be cultivated, and the animal kingdom and overall suitability of the region for human habitation. The severe climate repels the population while suitable or moderate climates attract population.

b. Topography of an Area

The suitable major landforms support more population than rugged and difficult terrains. That's why there are more population clusters in lowlands and plains than the high altitude mountains. The levelness of the plains eases the cultivation, communications and overall development. The world's most densely populated districts are, in fact, the coastal plains and the basins and alluvial deltas of great rivers, which are usually served by a good network of communications.

c. Vegetation

The presence of vegetation is an indicator that the land is arable and cultivable, the barren lands cannot sustain vegetation.

d. Soil

This is a factor that is usually closely related to climate, though not always. A well-developed, mature soil in either the tropics or the temperate regions with a fair balance of precipitation and evaporation is suitable for agriculture, which in turn supports the peasant population.

4. CULTURAL FACTORS

✓ The culture of people also plays an important role in the population distribution. Traditions and behaviours associated with common ancestry, religion and language tend to influence population concentrations and dispersals. For example, in 1947 sub-continent witnessed a large migration on eve of creation of Pakistan.

5. ECONOMIC FACTORS

People may move from an area as a result of one or more push factors, such as, difficult economic conditions, unemployment, religious, ethnic or political intolerance, conflicts and wars. On the other hand, pull factors, such as improved economic opportunities, may attract people to a

place. A combination of such push and pull factors is evident in the settlement patterns that has emerged in the world today. More than one million Irish migrated to North America after the 1846 Potato Famine in their homeland. Movement of a large number of computer professionals from India to the USA and other developed countries is also one of such examples.

a. Socio-Economic Factors

Factors such as the availability of jobs and comparatively high wages can contribute to high population density through migration. For example, from 2004 the UK has seen an influx of migrants from countries that have recently joined the EU, such as Poland. Further, the Kobe-Osaka region of Japan is thickly populated because of the presence of a number of industries.

b. Minerals

Mineral deposits are very unevenly scattered over the globe. Their presence in commercially exploitable quantities either in form of metallic ores (e.g. tin, copper, zinc, lead, aluminium, iron, etc.) or fuel (coal, petroleum, etc.) is a vital factor in the location of industries which in turn supports a high population density.

c. Urbanisation

Cities offer better employment opportunities, educational and medical facilities, better means of transport and communication.

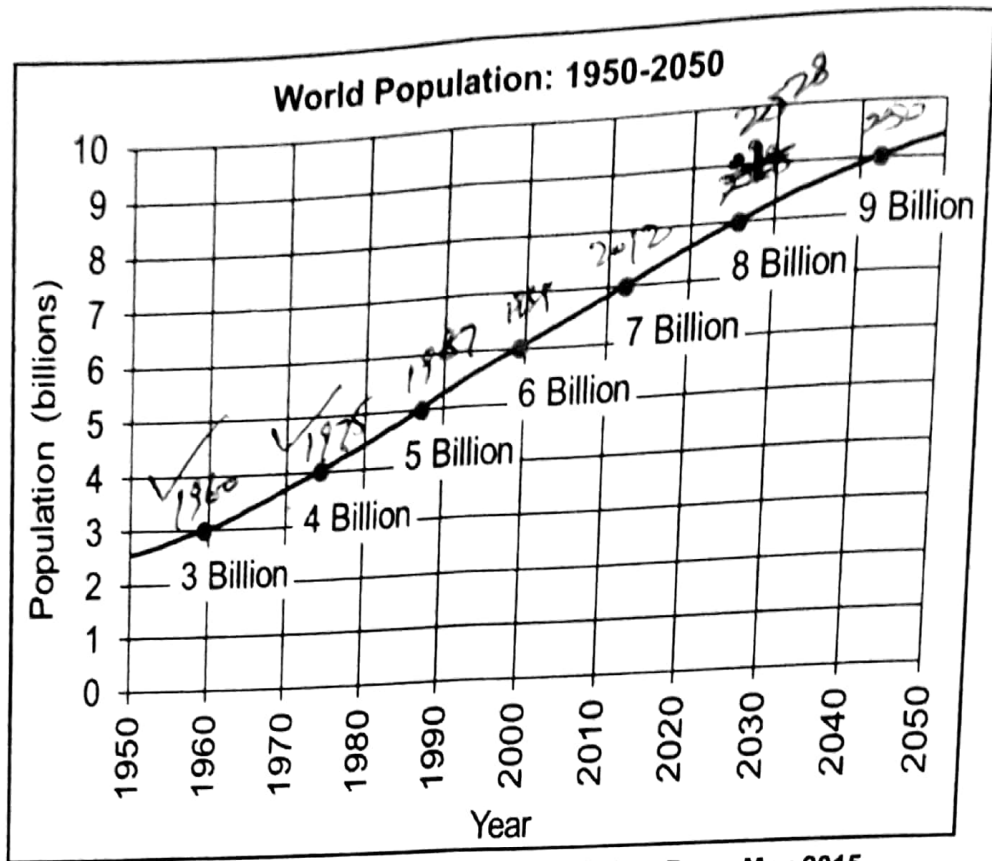
6. POLITICAL FACTORS

Today, perhaps more than ever before, political unrest and war result in significant population movements. Events during the past decades, for example, have created tens of millions of refugees. Among the most notable events are the Persian Gulf War; Civil Wars in Democratic Republic of Congo (Zaire), Ethiopia, Sudan and Chad; ethnic reprisals and revolutions in Rwanda and Sri Lanka, Military Coups in Haiti; the dissolution of the USSR and the creation of 15 independent nations, and the fragmentation of Yugoslavia and Czechoslovakia into several republics based on ethnic differences; and China's impact on the Tibetan population, etc. Further, unrest in KPK and FATA areas of Pakistan has also resulted in phenomenon of Internally Displaced Persons (IDPs). Pakistan saw one of the largest internal displacements in the summer of 2009; with over 2.3 million people fleeing their homes at the peak of the fighting in Malakand, Swat and surrounding areas. Besides, political control and policies of national governments have also fostered population growth, decline or migration. Internal Displacement Monitoring Centre (IDMC) noted that Pakistan had recorded 140,000 newly displaced persons in 2013 alone. The total number of IDPs in India in 2013 was at least 526,000.

WORLD POPULATION

According to United State Census Bureau (USCS), in May 2016, the world's population has reached over 7.33 billion. In line with population projections, this figure continues to grow at rates which are unprecedented, although the rate of increase has almost halved since its peak, which was reached in 1963, of 2.2 per cent per year. The world's population, on its current growth trajectory, is expected to reach nearly 9 billion by the year 2050.

The United States Census Bureau issued a revised forecast for world population that increased its projection for the year 2050 to above 9.4 billion people (which was the UN's 1996 projection for 2050), up from 8.9 billion people.



Source: U.S. Census Bureau, International Data Base, May 2015

HISTORY OF WORLD POPULATION

At present, the world's population is growing quickly, though this has not always been the case.

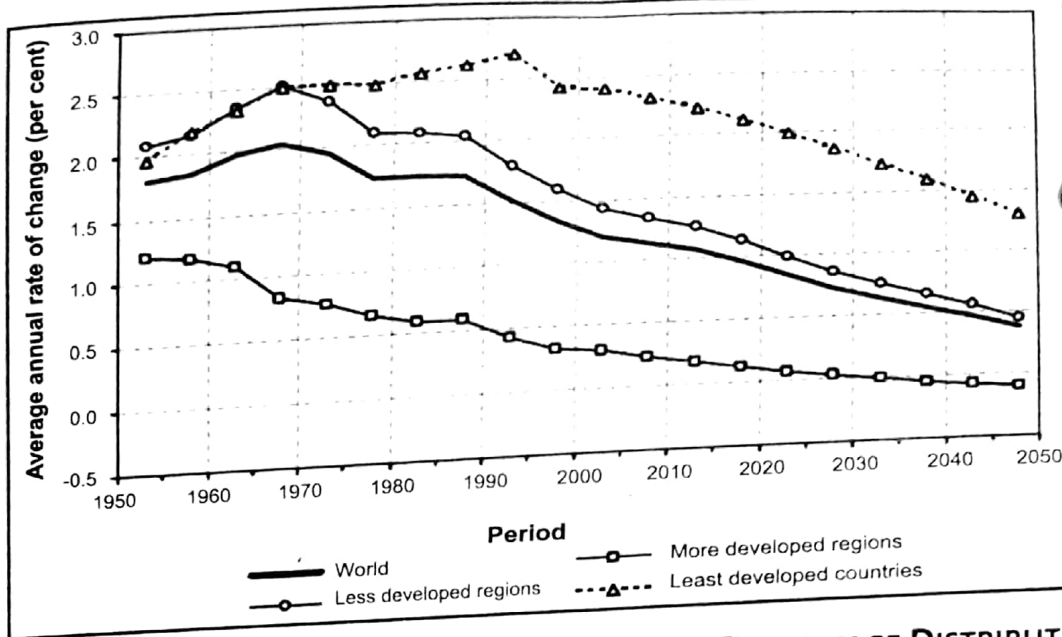
- Until the 1800s, the world's population grew slowly for thousands of years.
- ✓ In 1820, the world's population reached one billion.
- In the early 1970s, the world's population reached three billion.
- The United Nations Population Fund designated October 12, 1999, as the approximate day on which world population reached 6 billion. This was about 12 years after world population reached 5 billion, in 1987.
- The global rate of population growth is now one billion every 15 years.

When the Industrial Revolution began, the world population was growing at about 0.12 per cent a year, but the rate accelerated dramatically to 1.0 per cent by 1930 and to 2.1 per cent by early 1960s. The fast growth rate of population was a cause of concern for the world. Many developed countries were quick to respond. The developing countries are gradually trying to, check this rapid growth. During past four decades, the growth rate has slowly declined and the current growth rate is 1.4 per cent. 1.4%

The trend of declining growth rates is likely to continue, though it varies significantly between developed and developing countries. In developed countries, population growth has slowed down to 0.1 per cent a year. In many developing countries also the rate of growth is declining but it is over 1 per cent. It is assumed that over 98 per cent of the total population increase (about 2 billion) will take place in the developing countries during the next 25 years. Accordingly, the developed countries which currently have 20 per cent of world population will have only 15 per cent by 2025.

1-4%

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(1) 1st Agricultural Revolution
Neolithic Revolution
10,000 BC

(2) 2nd Agricultural Revolution
(1750-1900)
AD

(3) 3rd Agricultural Revolution
Green Revolution
1960

WORLD HISTORICAL AND PREDICTED POPULATION IN MILLIONS - PERCENTAGE DISTRIBUTION IS WITHIN BRACKETS

Region	1900	1950	1999	2008	2050	2150
World	1,650 (100)	2,521 (100)	5,978 (100)	6,707 (100)	8,909 (100)	9,746 (100)
Africa	133 (8.1)	221 (8.8)	767 (12.8)	973 (14.6)	1,766 (19.8)	2,308 (23.7)
Asia	947 (57.4)	1,402 (55.6)	3,634 (60.8)	3,800 (60.4)	5,268 (59.1)	5,561 (57.1)
Europe	408 (24.7)	547 (21.7)	729 (12.2)	577 (8.6)	628 (7.0)	517 (5.3)
Latin America	74 (4.5)	167 (6.6)	511 (8.5)	577 (8.6)	809 (9.1)	912 (9.4)
Northern America	82 (5.0)	172 (6.8)	307 (5.1)	337 (5.0)	392 (4.4)	398 (4.1)
Oceania	6 (0.4)	13 (0.5)	30 (0.5)	34 (0.5)	46 (0.5)	51 (0.5)

Globally, the growth rate of the human population has been declining since peaking in 1962 and 1963 at 2.20% per annum. In 2009, the estimated annual growth rate was 1.1%. The CIA World Factbook gives the world annual birth rate, mortality rate, and growth rate as 1.915%, 0.812%, and 1.092% respectively. The last one hundred years have seen a rapid increase in population due to medical advances and massive increase in agricultural productivity made possible by the Green Revolution. 1960

Some countries experience negative population growth, especially in Eastern Europe mainly due to low fertility rates, high death rates and emigration, as well as abortion. In Southern Africa, growth is slowing due to the high number of HIV-related deaths. Some Western European countries might also encounter negative population growth. Japan's population began decreasing in 2005. The United Nations Population Division expects world population to peak at over 10 billion at the end of the 21st century.

DOUBLING TIME OF WORLD POPULATION

Another way of comparing population growth rates is by calculating the time it takes for a population to double using the current annual growth rate. In Table below, the time taken by the world population as a whole has been given. Note how fast the doubling time is reducing. There is great variation among regions in doubling its population.

Period	Population	Time in which Population Doubles	Period	Population	Time in which Population Doubles
10,000 B.C.	5 million		1650 A.D.	500 million	1,500 years
1850 A.D.	1,000 million	200 years	1930 A.D.	2,000 million	80 years
1975 A.D.	4,000 million	45 years	2012 A.D.	8,000 million	37 years

10 MOST POPULOUS NATIONS

The following table shows 10 most populous nations till June 2016, which are ranked by U.S. Census Bureau.

S.#	Country or Area	Population in Millions	S.#	Country or Area	Population in Millions
1	China	1,373.69	2	India	1,266.34
3	United States	323.89	4	Indonesia	258.61
5	Brazil	205.86	6	Pakistan	201.17
7	Nigeria	186.16	8	Bangladesh	171.28
9	Russia	142.47	10	Japan	127.10

POPULATION DISTRIBUTION

Population density map observes the high densities in the Indo-Gangetic and North China Plains, the Sichuan Basin, the Nile River delta, Southern Japan, Western Europe, the Indonesian Island of Java, Central America (especially El Salvador, the Americas' most densely populated nation), and the United States' BosWash megalopolis.

Asia accounts for over 60% of the world population with almost 3.8 billion people. People's Republic of China and India alone comprise 20% and 16% of the world population respectively. Africa follows with 840 million people, 12% of the world population. Europe's 710 million people make up 11% of the world's population. North America is home to 514 million (8%), South America to 371 million (5.3%), and Australia 21 million.

THE PATTERN OF WORLD POPULATION DISTRIBUTION

The planet earth, which man inhabits, is very vast. The surface area of the earth is 510.072 million sq. km. and estimates by the United States Census Bureau put the population over 7.33 billion in May 2016.

If you cast a glance on the world map showing the distribution of population, you will come to know that the distribution of the world's population is not the same all over the world.

1. Densely Populated Parts of the World

These are found in the industrial West and agricultural East and include:

a. Industrial North West Europe

Here are found the most advanced and the most heavily industrialized countries of the world e.g. Great Britain, France, Germany and Denmark. Reasons for their very high population densities are development of industry due to the availability of mineral resources such as coal and iron.

Industrial North-eastern USA and South-eastern Canada

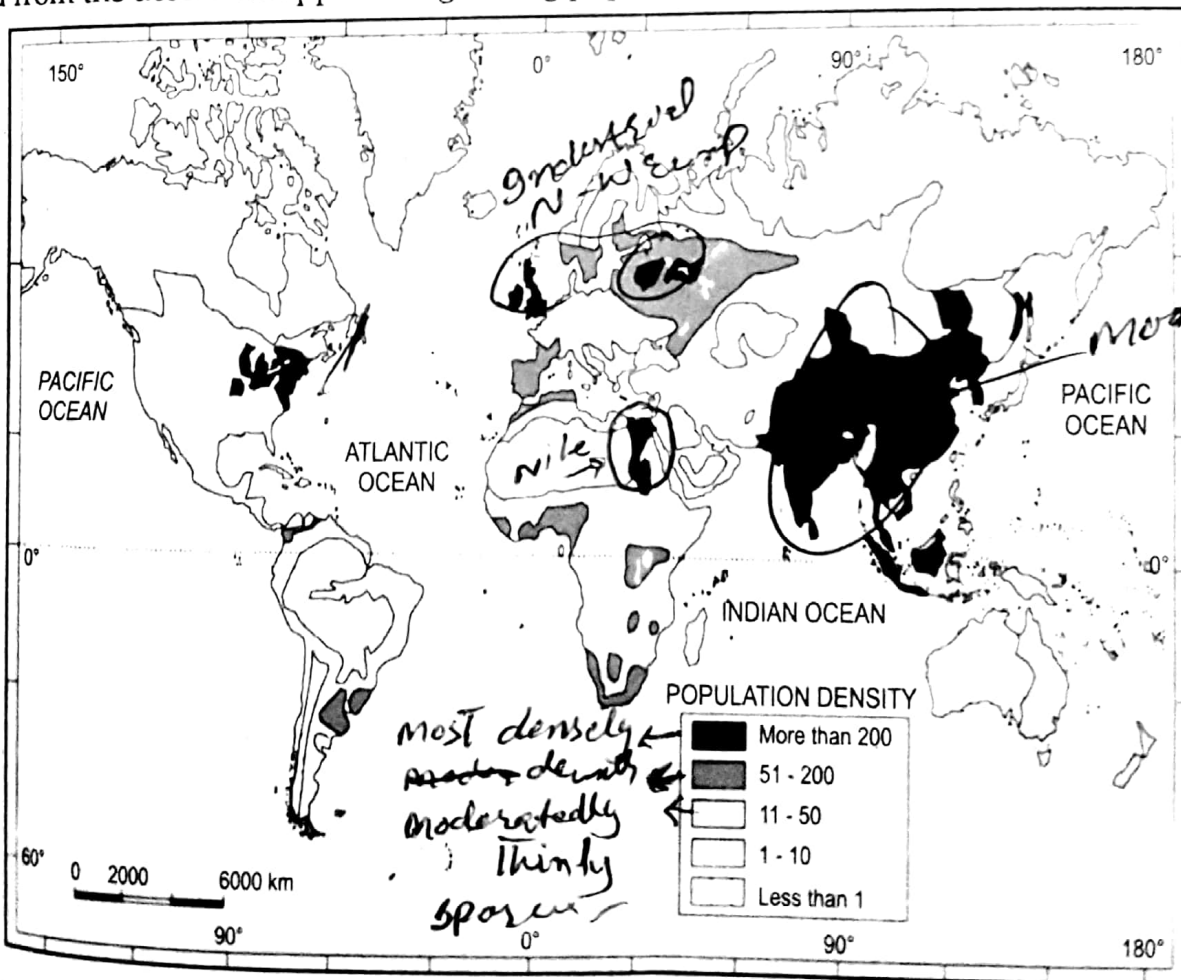
This is the great industrial belt of United States and Canada stretching from the shores of the Great Lakes through Pittsburgh to New York and the Atlantic seaboard. The density decreases gradually southwards and westwards into the agricultural areas of Mississippi Basin and the Gulf States.

Agricultural Monsoon Asia

This is the largest area of continuous high population density. It includes populous countries as China, Japan, India, Bangladesh, Sri Lanka, Indonesia (Java particularly) and the coastal plains and deltaic regions of continental and insular South Asia. In no part of the world is the land so intensively tilled and people so closely packed together as in these parts of Monsoon Asia.

Nile Valley and Delta

This is another area of unusually high density, and has been so since the establishment of the Egyptian civilization. The waters of the Nile have converted this part of the barren Sahara Desert into fertile cotton and paddy lands. The Nile floods annually, which enables the Egyptian peasants to practice a form of basin irrigation. Large quantities of salty water are held back for crop irrigation. Today with multi-purpose dams, e.g. Aswan, more and more land is being claimed from the desert to support the growing population.



Moderately Dense Areas

The areas where the density of population is moderate and the major occupations of the population are herding and agriculture are moderately dense areas. Extensive agriculture is

practiced here. The areas include Prairies in North America and Pampas in South America. The farm size in these areas is greater than anywhere in the world and the per unit area population of the peasants is lower than those areas where intensive agriculture is practiced. However, there are some patches or clusters of high-density settlements around some major cities in these areas.

3. Sparsely Populated Areas

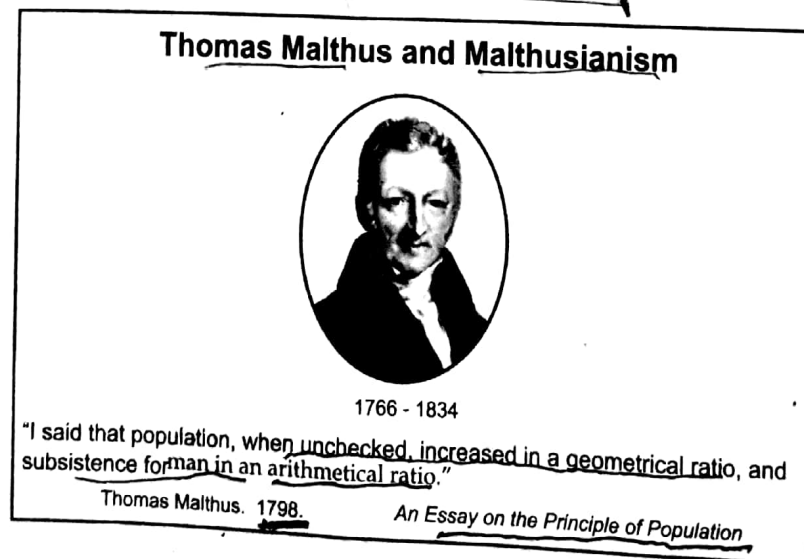
There are many parts of the world which have unsuitable geographical conditions for the population clusters. These include Arctic and Antarctic Polar Regions, Northern Belt of Coniferous forests, Hot Deserts, Tropical forests and Equatorial rain forests. On the marginal areas or in the oasis of major hot deserts, there are patches of population who are nomadic herders by occupation. In the Amazon basin, groups of food-gatherers and hunters roam in search of food. The population density of these areas is less than ten persons per sq.km.

THEORIES OF POPULATION GROWTH

1. Malthus Theory of Population
2. Population Pyramid Model
3. Demographic Transition Model

1. MALTHUS THEORY OF POPULATION

Thomas Robert Malthus was a British economist and a demographer, whose famous Theory of Population highlighted the potential dangers of overpopulation. Malthus put forth his ideas in six editions of his famous treatise 'An Essay on the Principle of Population'. In the first edition of his treatise, Malthus put forth his views that opposed the belief of scholars like William Godwin who were optimistic about population growth in England. During the Industrial Revolution, England experienced a steep increase in its population. In his book "The Enquirer", William Godwin promoted population growth as a means for human beings to attain equality. According to him, an increased population would create more wealth that would provide food for the whole humanity. Scholars of such school of thought believed that both man and society could be made perfect. In contrast to this viewpoint, Malthus interpreted overpopulation as an evil that would reduce the amount of food available per person.



The Theory

In his famous treatise 'An Essay on the Principles of Population', Malthus stated that:

"The populations of the world would increase in geometric proportions while the food resources available for them would increase only in arithmetic proportions."

In simple words, if human population was allowed to increase in an uncontrolled way, then the number of people would increase at a faster rate than the food supply. A point would come when human population would reach the limit up to which food sources could support it. Any further increase would lead to population crash caused by natural phenomena like famine or disease.

Assumptions

Malthus took into account two main assumptions:

1. Food is an essential component for human existence.
2. Humans have the basic urge to multiply.

Explanation

Malthus' theory was based on the assumption that the power of population to multiply is much greater than the power of the earth to provide subsistence for man. In his own words, "passion between the sexes is an inevitable phenomenon", hence, when unchecked, population would grow at such a high rate that it would outstrip food supply. According to him, disease, food shortage and death due to starvation, were nature's way to control population. He proposed that human beings may adopt measures like infanticide, abortion, delay in marriage and strict following of celibacy to check population growth.

Relation between Population, Wages and Inflation

Malthus described the whole scenario as a "vicious cycle" of population growth and its effects. He proposed that the boom in population will result into excess of labour force ready to work at the available wage rate, giving them the income to buy food for their family. This will lead to an increase in the overall demand for food outstripping its supply. Hence, the prices will rise and inflation will set in. This inflationary pressure will worsen the situation of the already distressed poor section of the society leaving the rich unaffected. The poor will work more to improve their situation and will also consider reducing the population growth so that they have fewer mouths to feed. However, this will only last till the population equals the food supply and the inflation ceases; after which, overall standard of living will rise and so will the population explosion reaching the same point, hence called the vicious cycle.

Proposed Solutions

In his first edition of the essay, Malthus proposed two main solutions to the problem of population explosion, namely:

Positive Checks

This method results in increase in death rate. He described this as God's way of restoring the Natural Order. It includes famines, hunger, epidemics, war and other natural miseries which cause large-scale deaths. Although it helps in controlling the population growth, it brings with it widespread misery and pain. Hence, it is not regarded as an ideal solution to population problem.

Preventive or Negative Checks

This method refers to human effort in reducing the birth rate. It is more practically and logically applicable. Abortion, postponement of marriage, birth control and celibacy are few measures that were advised to be strictly followed in order to help solve the problem.

In his second edition of the same essay, Malthus laid more emphasis on:

Moral Restraint

This is regarded as a universally-applicable solution keeping up with the ideologies of virtue, economic gain and social improvement. According to this principle, one should refrain from marriage till the time he is capable of supporting a family with food, clothing and shelter. Until then he should follow strict celibacy.

Impact

Malthus' theory had great influence on both Charles Darwin and Alfred Wallace, who are the co-founders of the modern evolutionary theory. In his own words, Darwin acknowledged that he was already aware of the 'struggle for existence' among different species of plants and animals. However, it was only after he read Malthus' work that he realized that animals in their struggle to survive retained the favourable features that would help them adjust to the environment, and lost those that were of no use to them. Thus, the Theory of Natural Selection was born.

Criticism on Malthus Theory of Population Growth

Some critics like Karl Marx, argued that Malthus failed to recognize the potential of human population to increase food supply. He is accused by many to have failed to comprehend man's ability to use science and technology to increase food supply to meet the needs of an increasing population.

Thinkers from the field of social sciences have criticized Malthus for his belief that the human society could never be made perfect. He opposed all political, social and economic reforms that did not aim at controlling birth rate. His own methods of checking population growth were criticized for being impractical.

The Malthusian theory of population has been the subject of a keen controversy. Following are some of the grounds on which it has been criticized:

1. **In the first place**, it is pointed out that Malthus's pessimistic conclusions have not been borne out by the history of Western European countries. The gloomy forecast made by Malthus about the economic conditions of future generations of mankind has not been realized in the Western world. Population has failed to grow as rapidly as predicted by Malthus and production has increased tremendously because of the rapid advances in technology. As a result, living standards of the people have risen instead of falling as was predicted by Malthus.
2. **Secondly**, Malthusian theory of population is based upon the law of diminishing returns as applied to agriculture. It is on the basis of this law that Malthus asserted that food production could not keep pace with population growth. By making rapid advances in technology and accumulating capital in larger quantity, advanced countries have been able to postpone the stage of diminishing returns. By making use of fertilizers, better seeds, tractors and other agricultural machinery, they have been able to increase their production greatly. In fact, in most of the advanced countries, the rate of increase of food production has been much greater than the rate of population growth.

The remarkable progress of the recent green revolution in many under-developed countries has further tended to falsify Malthus's contention.

3. Malthusian theory of population compared the population growth with the increase in food production alone. Malthus held that because land was available in fixed quantity, food production could not rise faster than population. But he should have considered all types of production and he should have compared the growth of population not merely with the increase in food supply but with the increase in the total wealth of a country. England did feel the shortage of land and food. If England had been forced to support her population entirely from her own soil, there can be little doubt that England would have experienced a series of famines by which her growth of population would have been checked. But England did not experience such disaster. It is because England industrialized herself by developing her natural resources other than land like coal and iron and accumulating man-made capital equipment like factories, tools, machinery, mines, ships and railways. This enabled her to produce plenty of industrial and manufacturing goods which she then exported in exchange for foodstuffs from foreign countries.
4. Malthusian theory of population held that the increase in the means of subsistence or food supplies will cause population to grow so that ultimately means of subsistence or food supply will be in level with population and everyone would get only bare minimum subsistence. In other words, according to Malthus, living standards of the people cannot rise in the long run above the level of minimum subsistence. But as already pointed out, living standards of the people in the Western world have risen greatly and stand much above the minimum subsistence level.

Is Malthusian Theory Valid Today?

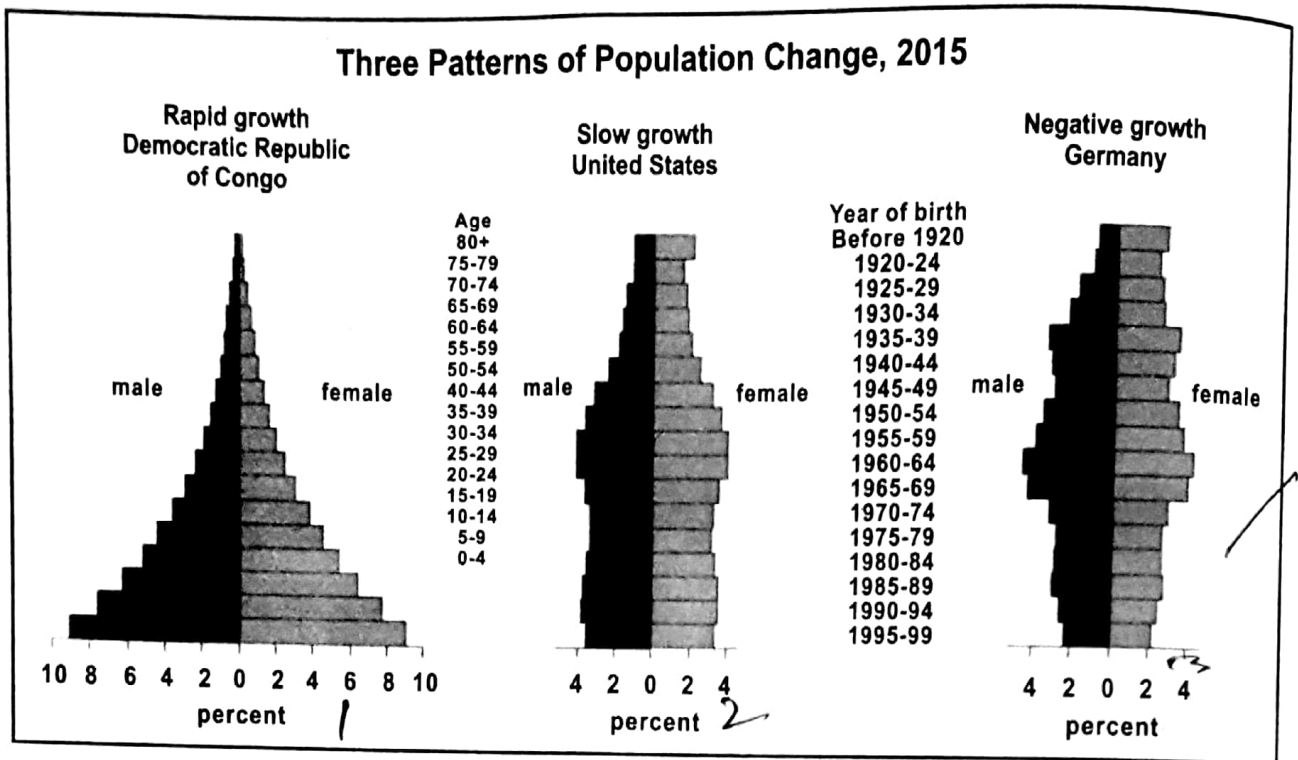
We must, however, add that though the gloomy conclusions of Malthus have not turned out to be true due to several factors which have made their appearance only in recent times, yet the essentials of the theory have not been demolished. This is true even today.

2. POPULATION PYRAMID MODEL

Population Structure and Population Pyramids

Population structure is usually shown using a population pyramid. A population pyramid can be drawn up for any area, from a whole continent or country to an individual town, city or village. The shape of a population pyramid can tell us a lot about an area's population.

- It gives us information about birth and death rates as well as life expectancy. ✓
- A population pyramid tells us how many dependants are living in an area. Dependants are those people who rely on others for support (social and economic support) e.g. old and young depend on those of working age. There are two groups of dependants; young dependants (aged below 15) and elderly dependants (aged over 65).
- Dependants rely upon the economically active: economically active people are those who are of working age.
- Many LEDCs have a high number of young dependants, whilst many MEDCs have a growing number of elderly dependants.
- Looking at the population structure of a place shows how the population is divided up between males and females of different age groups.



The shape of the population pyramid reflects the characteristics of the population. The left side shows the percentage of males while the right side shows the percentage of women in each age group.

- ✓ 1 A Progressive Population: A wide-base and rapid tapering shows an increasing birth rate and high death rate.
- 2 A Stationary Population: A regularly tapering pyramid shows unchanging birth and death rates over a long period of time.
- 3 A Regressive Population: A narrow base and narrow top pyramid shows declining birth rate and low death rate.

The age-sex pyramid of Congo, as you can see, is a triangular shaped pyramid with a wide base and is typical of less developed countries. These have larger populations in lower age groups due to high birth rates. If you construct the pyramids for Bangladesh and Mexico, it would look the same.

3. DEMOGRAPHIC TRANSITION MODEL

In the middle of the twentieth century, Demographic Transition Theory became the dominant theory of population growth. The Demographic Transition Model literally means 'Population Change Model'. This is a very useful model, showing how dynamic population is.

It has been a long time since this model was developed, and some countries have begun to exhibit characteristics beyond stage 4.

The Stages of the DTM

Each of the stages of the DTM exhibits specific characteristics:

Stage 1 (High Stationary Stage)

Both high birth rates and death rates fluctuate in the first stage of the population model giving a small population growth (shown by the small total population graph). There are many reasons for this:

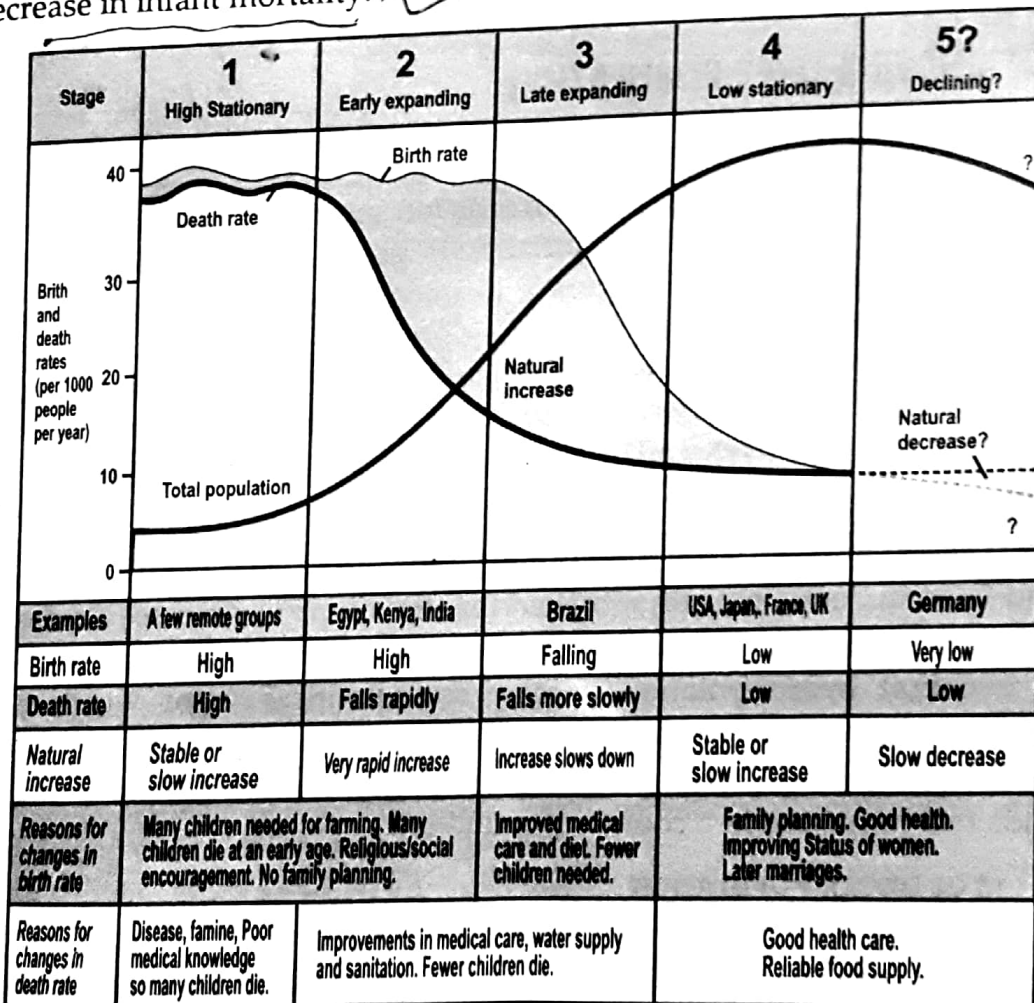
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- Many children die in infancy (high infant mortality) so parents tend to have more children to compensate in the hopes that more will live
- Religious beliefs (e.g. Roman Catholics and Hindus) encourage large families ✓
- High death rates, especially among children because of disease, famine, poor diet, poor hygiene, little medical science.

Stage 2 (Early Expanding Stage)

Birth rates remain high, but death rates fall rapidly causing a high population growth (as shown by the total population graph). The reasons for this could be:

- Improvements in medical care i.e. hospitals, medicines, etc.
- Improvements in sanitation and water supply
- Decrease in infant mortality.



Stage 3 (Late Expanding Stage)

Birth rates now fall rapidly while death rates continue to fall. The total population begins to peak and the population increase slows to a constant. The reasons for this could be:

- Increased access to contraception. ✓
- Industrialisation and mechanisation means fewer labourers are required.
- The desire for material possessions takes over the desire for large families as wealth increases.

- Equality for women means that they are able to follow a career path rather than feeling obligated to have a family.

Stage 4 (Low Stationary Stage)

Both birth rates and death rates remain low, fluctuating with 'baby booms' and epidemics of illnesses and disease. This results in a steady population. The population once again attain the stationary level. A few European countries like Belgium and Netherlands have reached this level of zero population growth.

Stage 5 (Declining Population Stage) (Zero population Growth Regime)

A stage 5 was not originally thought of as part of the DTM, but some northern countries are now reaching the stage where total population is declining and where birth rates have dropped below death rates. One such country is Germany, which has taken in foreign workers to fill jobs. The UK's population is expected to start declining by 2021.