
UNIT 6 POPULATION DYNAMICS

Structure

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6.1 INTRODUCTION

In Unit 1, we learnt that public nutrition is concerned with improving nutrition situation of population. Units 3 and 4 focused on various nutrition problems existing in India and other developing countries. Unit 5 highlighted the economic cost of malnutrition. In this unit, we are going to study about human population who eventually suffer from these problems.

Why do we want to study about human population? We want to study about this because we want to know what changes are taking place in human population. For example, what are trends in population growth? What changes are taking place in structure and composition of human population? As a public nutritionist, we want to know about these aspects because this would help us estimate various needs of population such as food and health care needs, plan programme strategies and work towards solving the nutrition problems. In this unit, we are going to study about all these aspects.

Objectives

After studying this unit, you will be able to:

- explain the concept of demography, demographic transition and demographic cycle;
- highlight the population trends and structure in India;
- describe the implications of important vital statistics on population growth and trends;
- list the factors affecting population growth;
- discuss the concept of population control in India; and
- explain the implications of population growth on quality of life.

6.2 DEMOGRAPHY, DEMOGRAPHIC TRANSITION AND DEMOGRAPHIC CYCLE

We know that population of different countries in the world is always changing. For some countries like India and China, the population is increasing at a very fast rate, while for others e.g. U.S., it is increasing at a slower rate, in some countries it is even declining e.g. in Sweden and Hungary. All the countries of the world pass through different stages in population growth and accordingly exhibit changes in population growth. In this section, we will learn about the different stages of population growth and how they affect the changes in population scenario. We will familiarize you with certain concepts which are frequently used in the study of population. These concepts are – demography, demographic transition and demographic cycle. Let us start with demography.

What is demography?

The scientific study of human population is termed as ‘Demography’. It focuses attention on three readily observable human phenomena:

- a. Changes in population size (growth or decline),
- b. The composition of the population, and
- c. The distribution of population in space.

There are five major demographic processes, which are continually at work within the population namely, fertility, mortality, marriage, migration and social mobility. You would realize that these processes determine the size, composition, distribution and development of the population.

The health of the population depends upon the dynamic relationship between the number of people, the space, which they occupy, and the skill that they have acquired in providing for their needs. There are continuous changes occurring in the structure, and composition of the population of most of the countries of the world. *So then, where do we get all the information related to population?* In India, we get our demographic statistics mainly from population censuses, National Sample Surveys, registration of vital events and demographic studies. July 11 is celebrated as the World Population Day. On July 11, 1999, the population of the world reached the mark of six billion people.

This brings up to the next issue of demographic transition. Let us get to know about demographic transition:

What is Demographic Transition?

The whole process of change with regard to population size and characteristics is called *demographic transition*. In order to understand this term better, let us learn about demographic cycle.

What is a Demographic Cycle?

It is a cycle which evolves as population grows in size. The history of world population suggests that there is a demographic cycle of five stages through which a nation passes. These stages of demographic cycle are enumerated herewith.

a) *First Stage*

High Stationary - This stage is characterized by high birth rate and a high death rate neutralizing each other and hence the population remains stationary. India was in this stage till 1920.

b) *Second Stage*

Early Expanding - The death rate begins to decline but birth rate remains high, thereby resulting in increase in population.

c) *Third Stage*

Late Expanding - The death rate declines further and birth rate begins to fall. The population continues to grow because births exceed deaths. India appears to be in this stage at the moment where there is high growth with definite signs of slowing down.

d) *Fourth Stage*

Low Stationary - This stage is characterized by low death rate and low birth rate, as a result of which the population becomes stationary. This is also called the *zero population growth*. Most of the developed nations have undergone demographic transition shifting from high birth and high death rates to low birth and low death rates and are currently in this phase.

e) *Fifth Stage*

Declining - There are more deaths than births resulting in decline in population. This is also called the *negative growth phase*. Some countries like Sweden and Hungary have entered this stage. Socially, this stage of demographic transition is not desirable as it results in total changes in age structure, leading to progressive aging of the population.

Thus, we have learnt so far that different countries are at different stages of demographic cycle and accordingly exhibit changes in the population growth. India is at the third stage where the population is still growing although the rate of growth seems to be slowing down. You may probably be aware that in India we face a lot of problems due to excessive growth in population. *So what are the negative effects of excessive growth in population?* Let us review these.

Continuous and excessive growth of population is interpreted as major ill of contemporary national societies, both developing and industrialized. In the former case, rapid population growth is seen as a major barrier to the processes of development. In the latter, people are seen as polluters, herding into vast and expanding cities like Mumbai or Delhi and destroying natural environments.

Unlike the developed nations where they have witnessed demographic transition, the situation of most of the developing societies, have few favourable attributes. Many countries, particularly in Asia have a high man-land ratio i.e. population density. The density of population in India as per 1991 census was 273 and as per 2001 census is 324. With 2.4% of the world land area, India is presently supporting 16% of the world population. Currently about 80% of the world's population is living in the developing countries. Out of the 90 million people added every year, all but six million will live in developing countries. One third of the population lives in China and India. India has the second largest population in the world. The total population of the country was 846.3 million on first March 1991 and as per 2011 census it has crossed 1 billion mark and is 1.21 billion and now as per 2018 estimates population of India has reached to 1.35 billion.

Thus, it is interesting to note that in the developing nations, as a result of applications of public health measures and improved medical care mortality rates have taken a steep downward trend, whereas, the birth rates have not declined correspondingly, thus causing mushrooming in population growth. The rampant population growth has been viewed as the greatest single obstacle to the economic and social advancement of the majority of people in the underdeveloped world, which is true for India.

We will now study how and in what way the population is growing in India. i. e. what are the population trends in India.

6.3 POPULATION TRENDS IN INDIA

In the population trends, we will study about the pattern of population growth in India. We will examine the population trends in terms of :

How the overall growth in population has occurred in India?,

How the urbanization is affecting the population growth pattern in urban versus rural areas?, and

What are the interstate variations in population growth rate?.

Let us review these trends one by one.

How the overall growth in population has occurred in India?

The growth of population in our country is a recent phenomenon. The population had been fluctuating and growing very slowly until about 1921. The year 1921 is called the 'big divide' because the absolute number of people added to the population during each decade has been on the increase since 1921. The growth of population is a result of declining general mortality, infant mortality and increase in expectation of life at birth. The period from 1921-51 was one of slow but steady growth. During the next five decades, mortality declined by nearly 57% from 22.8/1000 in 1951-61 to 7.3/1000 in 2001-11. The birth rate also declined during these years but at a much slower pace reaching a level of 22.5/1000 in 2011 from 41.7 in 1951-61. The decadal growth of population of India from 1901 to 2011 is shown in Table 6.1 and Figure 6.1.

Table 6.1: Population of India, 1901-2011

Census Year	Total Population (in million)	Average Annual Exponential Growth Rate (Percent)
1901	238.4	-
1911	252.1	0.56
1921	251.3	- 0.03
1931	279.0	1.04
1941	318.7	1.33
1951	361.1	1.25
1961	439.2	1.96
1971	548.2	2.20
1981	683.3	2.22
1991	846.3	2.14
2001	1027.0	1.93
2011	1210	1.64
2025 *	1388.9*	

* Projections

Source : Report of the Technical group on population projections May 2006, National Commission on Population Registrar General of India.

As you can note from Table 6.1, India's population has grown approximately four times in the last century viz. from 1901 to 2011. We were 238.4 million in 1901 and as per 2011 census we have increased to 1210 million people. Further, the absolute addition to the population in the decade 2001-2011 was about 181.46 million which is almost

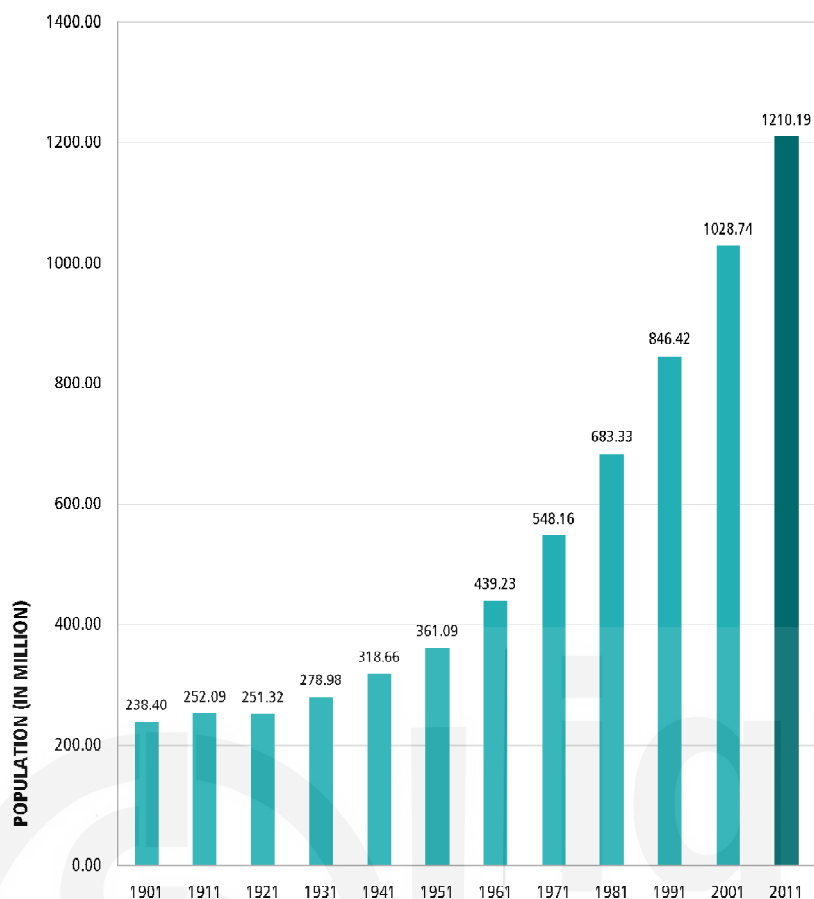


Figure 6.1: India - Decadal growth of population 1901-2011

equal to the population added during the three decades 1931-61. The average exponential growth rate of population has registered the sharpest decline from 2.72% during 1971-81 to 1.64% during 2001-2011. Figure 6.1 shows that decadal growth has been rising steadily since 1921. As per census 2011, the total population of India is 1210.8 million with a decadal growth rate of 17.7%.

You must have heard or read about “urbanization” in T.V or newspaper. Let us find what do we exactly mean by urbanization and how this affects population trends.

How the urbanization is affecting the population growth pattern in urban versus rural areas?

Urbanization is *the process whereby larger and larger proportions of population live in urban areas*. Urbanization can result by two ways. First, by accretion of population to already existing towns and second, by the transformation of a rural area into an urban area.

As per 2011 census, out of the total population, 377 million people were residing in urban areas and 833 million in rural areas. There has been a sharp increase in the urban population, during 2001-2011, which has increased about 3.35% proportion of urban population in the country.

Growing urbanization is a recent and unstoppable phenomenon, in developing countries. With the advances in industrialization, more and more people are being attracted towards the industrial centres. The migration of people from countryside to urban areas constitutes a social crisis, which ultimately affects the quality of life of people. Our country faces the emerging problem of growing urban slum population. Rural folks migrate to cities in search of employment and better social status. These migrants settle in cities in places where sub-optimal infrastructure for housing, electricity and sewerage system is available. Generally, slum populations have more young people

and children and fewer elderly than the population as a whole. Slums on the whole have lower sex ratios than the cities in which they are located. Slum dwellers are very poor rural migrants, primarily from lower caste or disadvantaged communities, who are pushed to the cities through caste, kinship and village networks. You would realize that it is this group of people who are the most disadvantaged from nutrition, health point of view. Thus, from our discussion so far, it must be clear, how population is rising at a faster rate in cities compared with rural areas. Different states in India have different growth rates of population and that affects population trends in India. Let us next review the interstate variations in population growth in our country.

What are the interstate variations in population growth rate?

There is a wide variation in the growth rate of different states, during 1991-2001 among the major states, four states Bihar, J & K, Jharkhand and Chhattigarh recorded annual growth higher than 2.0%.

Figure 6.2 shows decadal growth of population in different states over the intercensal period 2001-2011. You would note from Figure 6.2 that the highest decadal growth rate of population was recorded in Dadra & Nagar Haveli (56%) and lowest in Nagaland.

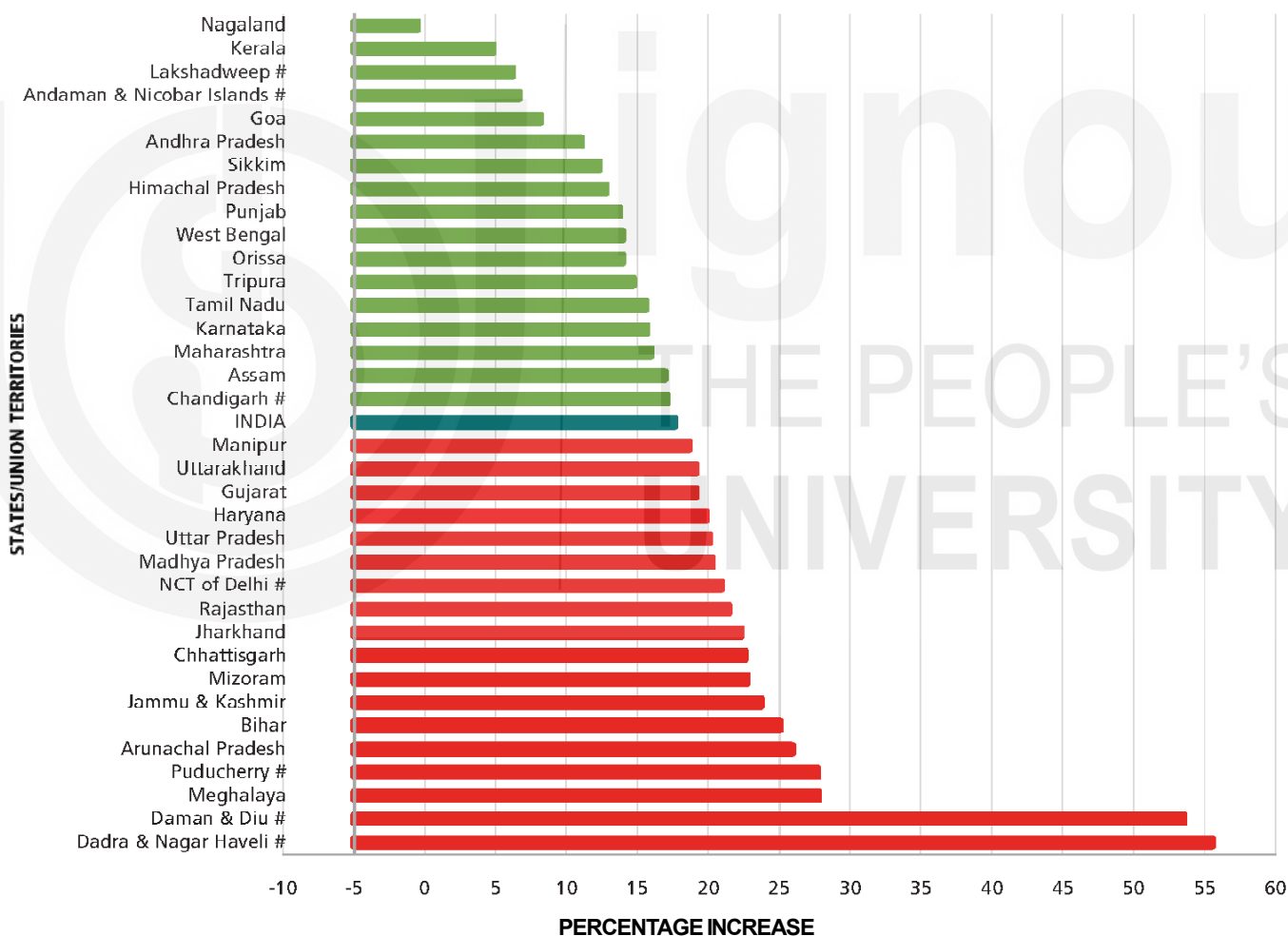


Figure 6.2 : Decadal growth of population 1991-2011

Therefore, over the period of ten years from 1991-2011, some states have shown higher population growth rates than others.

In this section, we studied about how and in what way population has grown in India as a whole and the pattern of its growth within India. i.e in urban, rural, as well as,

in different states. In the next section, we will study about the structure of population in terms of age, sex and fertility behaviour. But before that, let us check what we have learnt so far.

Check Your Progress Exercise 1

1. What do you understand by the term 'Demography'? What are the aspects it focuses on?

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2. List the stages of the demographic cycle through which a nation passes?

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3. Why is the year 1921 called the 'big divide'?

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We will now study about *population structure*. Under this, we will study about structure of population in terms of age and sex composition. We will also study about fertility behaviour because fertility behaviour affects the age and sex composition of the population. For example, in our society there is a preference for a male child. At times, after the birth of a daughter, couples continue to have children until they have a son. All these factors will have an effect on age and sex composition of the population and also the health/nutrition status.

6.4 POPULATION STRUCTURE

The structure of population can be viewed as to how the population is composed of in terms of age and sex. The structure of population can also vary depending upon when and how many children women have i.e. their fertility behaviour. So, we can study the population structure in terms of sex composition, age composition and fertility behaviour. Let us begin with sex composition of the population.

6.4.1 Sex Composition of the Population

Sex composition of human population is one of the basic demographic characteristics, which is extremely vital for any meaningful demographic analysis. The sex composition of the population is affected by sex ratio at birth, differentials in mortality conditions of males and females and sex selective migration. You must have read in the newspaper or heard over T.V., radio that the sex ratio is declining in India. So, what do we mean by *sex ratio*? Let Us find out.

What is Sex Ratio?

Sex Ratio is defined as "*the number of females per 1000 males*". Sex ratio is an important social indicator to measure the extent of prevailing equity between males and females in a society at a given point of time. The sex ratio in India has been generally adverse to women, the sex ratio has also declined over the decades. *Sex ratio is a crucial indicator of women's health status and survival*. In India, ever since 1901, almost every census has recorded a decline in the sex ratio, except for a slight abatement of the trend during 1940's consequent to the world war and a small improvement from 1971 to 2011. Table 6.2 depicts the sex ratio in the country from 1901 onwards.

Table 6.2: Sex ratio in India 1901-2011

Year	Females/1000 Males
1901	972
1911	964
1921	955
1931	950
1941	945
1951	946
1961	941
1971	930
1981	934
1991	927
2001	933
2011	943

There is a considerable variation in the sex ratios between the States and Union Territories. In 2011, Kerala had the highest sex ratio of 1084 followed by Puducherry (1038). The lowest sex ratio of 618 was observed in the Union Territory of Daman & Diu. Along with some Asian neighbours like China, Bangladesh, Sri Lanka and Nepal, the sex ratio in India is lowest in the world. You must be curious to know why the sex ratio is falling in India.

Let us now review this.

Why is sex ratio falling in India?

The females initiate their lives right from birth at a disadvantage. When one looks at the sex ratio in Indian children, it decreases from 977.60 in 0-4 years age group to 940.97 at 5-9 years and then 897.95 at 10-14 years of age. To understand this demographic distortion, various explanations are available like the sex selective feeding and child rearing practices, sex selective female abortions, female infanticide and female selective mortality. The age specific mortality over 1972-2001 shows that though the rate has been falling for the population on the whole, the female deaths remain consistently higher. Also, when one looks at the age specific sex ratios, there are two depressions where the sex ratio drops well below the average for the following periods – first in the late childhood and adolescence and second during 30 to 40 years of age and 50-60 years of age, reflecting their perils of the reproductive periods and long periods of heavy work under adverse circumstances.

We discussed above that due to discriminatory practices against women, sex ratio is falling in India and that is influencing the sex composition of the Indian population. We are gradually moving towards having more men and less women as a part of our population. Let us now study about age composition as it influences the structure of the population.

6.4.2 Age Composition

The age structure of a population is best represented as shown in Figure 6.3. This type of representation is called an 'Age Pyramid'. Figure 6.3 gives the age structure of Indian population in 1990 and 2025 (as projected).

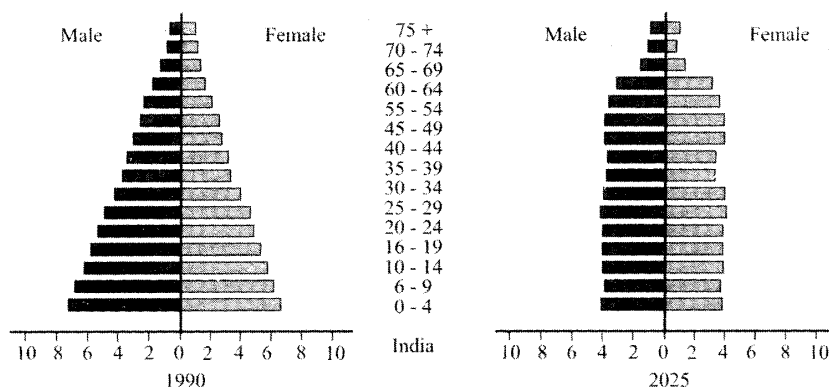


Figure 6.3: Age structure of population (Male and Female), 1990-2025 (percentages)

The age pyramid of India in 1990 as shown in the Figure 6.3 is typical of under-developed countries, with a broad base and a tapering top. In the developed countries, the pyramid generally shows a bulge in the middle and has a narrower base, reflecting a higher proportion of productive working population and a lower proportion of dependents. So, who comprises dependents as per census? The child population (0-14 years) and elderly population (65 years and above) comprise dependents. The age group 0-14 years for children is further split into 0-4, 5-9 and 10-14 years, keeping in mind their different health and social needs.

There is another term which we need to know about, that is dependency ratio. The ratio of the combined age groups 0-14 years plus 65 years and above to the 15-65 years age group is termed *dependency ratio*. In India, the age structure of the population is changing so the dependency ratio is likely to decrease. The proportion of the population in the working age group of 15-59 years is likely to increase by 2025.

There is another transition known as “ageing transition” which is happening in our country. A sharp decline in death rates and an increase in life expectancy in post independence period is resulting in demographic transition, which can be called ‘ageing transition’. In 1989, there were 37.1% and 4.3% people in the age category 0-14 years (children) and >64 years (elderly), respectively and 58.6 in the productive age category of 15 to 64 years. But by 2025 there will be 24.1% and 7.5% in 0-14 years and >64 years, respectively and about 68.4% in 15-64 years age group. Thus, the numbers of aged will approximately double registering more than four-fold increase in absolute numbers. Considering that the elderly are subjected to highest incidence of sickness along with young children and also higher levels of morbidity, it may pose as an economic burden for the country. This ultimately will result in reordering of the priorities with respect to health care. The working adult population will have to sustain and support the increasing elderly population.

In our discussion above we have described how the population structure in India is changing with respect to the age of the people. In the years to come, we will have more elderly people comprising the population compared to what we have now.

Next, let us study about fertility behaviour, since this also affects structure of population.

6.4.3 Fertility Behaviour

Actual bearing of children is termed as ‘fertility’. A woman’s reproductive period is roughly from 15 to 45 years – a period of 30 years. Information on fertility in India indicates that an average woman gives birth to an average of six or seven children, if her married life is uninterrupted. This has great implications on the nutrition and health status of women in our country.

The high fertility in India is attributed to universality of marriage, lower age at marriage, low level of literacy, poor level of living, limited use of contraceptives and traditional ways of life. Some of the factors which affect fertility are:

1. *Age at marriage* - The age at which a female marries and enters the reproductive period of life has a great impact on her fertility. National data from Registrar General of India suggests that females who marry before the age of 18 gave birth to a large number of children than those who married later in life. Demographers have estimated that if marriages were postponed from the age of 16 years to 20-21 years of age, the number of births would decrease by 20-30 percent. Although, the mean age at marriage for girls has moved to 18 years in many states, but in rural areas of Madhya Pradesh, Rajasthan and Uttar Pradesh a substantial proportion of marriages continue to take place when the girl is around 15 years of age. This makes the girl child in India 'at risk' to disease and malnutrition.
2. *Duration of married life* - Demographic studies indicate 10-25 percent of all births occur within 1-5 years of married life; 5-55 percent of all births within 5-15 years of married life. Births after 25 years of married life are very few. Therefore, family planning efforts should be concentrated in the first few years of married life in order to achieve tangible results.
3. *Spacing of children* - Studies have shown that when all births are postponed by one year, in each age group, there was a decline in total fertility. Spacing of children may have a significant impact on the general reduction in fertility rates. The other big advantage is that we can also reduce the infant and child mortality. New observations from Demographic and Health Surveys (DHS) programme (2002) show that children born 3 to 5 years after a previous birth are healthier at birth and more likely to survive at all stages of infancy and childhood through age five than children born before 3 years of age.
4. *Literacy* - Women's literacy is one of the critical factors that determines and enables them to achieve their reproductive goals. Literacy improves awareness and enables women to access services, this improve their own well being, survival of their offspring and access to contraception. According to NFHS-4 (2015-16) survey the total fertility rate are 1.75% among the urban women's. In the rural areas the fertility rate estimated are quite high with a figure of 2.4%.
5. *Economic status* - Operational research studies support the hypothesis that economic status bears an inverse relationship with fertility. The total number of children born declines with an increase in per capita expenditure of the household. People in the high economic group view having children as an investment, whereas for poor people children are an asset and source of extra income.
6. *Caste and Religion* - The NFHS-4 (2005-16) Survey, reported a total fertility rate of 2.62 among Muslims as compared to 2.13 among Hindus. Whereas, the total fertility rate amongst Christians was found to be 1.99. Among Hindus, the lower castes appear to have a higher fertility than the higher castes.
7. *Nutrition* - There appears to be some relationship between nutritional status and fertility levels. Virtually, all well-fed societies have low fertility and poorly fed societies high fertility.
8. *Family planning* - It is an important factor in fertility reduction in a number of developing countries, family planning has been a key factor in declining fertility. Family planning programmes can be initiated rapidly and require only limited resources, as compared to other interventions for reduction in fertility.
9. *Cultural preference for son* - In our Indian society, the cultural preference for sons is strong and many couples have another child soon after the birth of a daughter and continue having children until the birth of a son. This phenomena has been termed by some demographers as "son syndrome".
10. *Other factors* - Fertility is affected by a number of physical, biological, social and cultural factors such as place of women in society, value of children in society, widow remarriage, breast feeding, customs and beliefs, industrialization and urbanization, better health conditions, housing opportunities for women and local

community involvement. Attention to these factors requires long-term government programmes and large amount of money.

So we have learnt how different factors affect a women's fertility behaviour. Depending upon how many children a woman has and at what time during her reproductive life, it will affect the structure of the population over a period of time.

Reading through this unit, we came across certain terms like birth rate, death rate and fertility rate etc. These terms are a part of the vital statistics. It is important for us learn about vital statistics because they are frequently used in the study of population. Let us now study about certain vital statistics in detail.

6.5 VITAL STATISTICS AND IMPLICATIONS OF VITAL STATISTICS IN POPULATION GROWTH

Vital statistics are *data concerning the important events in human life such as births, deaths, marriages, migrations, etc within a population*. We can monitor the data on vital statistics over a period of time and estimate the trends and structure of population growth. Before we explain the implications of this data in population growth, we will familiarize you with the definitions of some of the important indicators related to birth, death, disease and fertility. These are briefly summarized in Table 6.3.

Table 6.3: Commonly used terms in vital statistics

Density of population	– Number of persons living per square kilometer area
Infant mortality rate (IMR)	– Number of deaths of infants under one year of age per 1,000 live births
Mortality rate/Death rate (CDR)	– Annual number of deaths per 1,000 population
Birth rate (CBR)	– Number of live births per 1,000 estimated mid year population in a given year.
Fertility rate	– The number of children that would be born per woman, if she were to live to the end of her child bearing years and bear children at each age in accordance with prevailing age specific fertility rates.
Sex ratio	– Number of females per 1000 males.
Life expectancy at birth	– The number of years new-born children would live, if subject to the mortality risks prevailing for the cross-section of population at the time of their birth.
Net reproduction rate (NRR)	– Average number of daughters that would be born to a woman if she experiences the current fertility and mortality pattern throughout her reproductive span (15-49 years).
Maternal mortality rate (MMR)	– Number of death of woman from pregnancy related causes per 100,000 live births.
Under 5 mortality rate (U5MR)	– Defined as the number of children dying below five years / 1000 live births.
Urban population	– Percentage of population living in urban areas as defined according to the national definition used in the most recent population census

We will now look at some of these different indicators and their implications on trends and structure of population growth. We begin with birth and death rates.

Birth and death rates

You studied earlier in this unit that in India, the birth rate is showing a declining trend i.e. reaching a level of 20.4 (SRS 2016)/1000 population in 2016 from 41.7 in 1951. On the other hand, mortality has declined in India from a figure of 109 death per 1000 live birth from 1992-93 to 50 death per 1000 live births in 2015-16. (NFHS-4, 2015-16). This has resulted in considerable increase in life expectancy at birth for both the sexes. The life expectancy at birth has improved from 41.6 years in 1951 to 67.6 years in 2017 for males and corresponding values for females are 40.6 years and 70.1 years. You would also note that there are regional diversity in birth rates between rural and urban areas and amongst states in India.

Let us find out about this diversity.

Regional diversity - There are great differentials in the crude birth rate (CBR) between rural and urban areas, in rural areas rates are higher (20.7%), as compared to urban area (17.5%). As per NFHS-4 (2015-16) data, birth rates are high in states like Bihar 27.0, Meghalya 24.6, Uttar Pradesh 22.6, Manipur 21.2 and Nagaland 21.4. Whereas, Kerala (11.2) and Sikkim (11.4) recorded with the lowest crude birth rates. The factors associated with low birth rates in Kerala is the high literacy rate (97.9%) of the females and likewise high birth rates in Bihar are due to the poor literacy rates (49.5%) amongst the women.

Let us review the implication of net reproduction rate on population structure.

Net Reproduction Rate

You studied earlier that Net Reproduction Rate (NRR) is the average number of daughters that would be born to a woman if she experiences the current fertility and mortality pattern throughout her reproductive span (15-49 years). NRR is a demographic indicator. NRR of 1 is equivalent to attaining approximately a 2-child norm. Demographers believe that the goal of NRR 1 can be achieved only if at least 50 percent of the eligible couples are effectively practicing family planning. According to the National Health Policy (1983), the long-term goals were to reach NRR of 1 by 2000 A.D., which corresponds to achieving birth rate of 21, death rate of 9 and growth rate of 1.2. The NRR in India is estimated to be 1.06 (World Population Prospectus, 2017). A crucial factor responsible for high fertility (3.6 in 1992 and 2.2 in 2015-16) in India is the young age of marriage for girls (19.20 years in 1984). But now the trend is changing slowly and early marriages has been declined over time. The median age at first marriage for women increased from 17.2 years in 2005-06 to 19.0 years in 2015-16.

There are considerable regional variations with Kerala reporting the highest mean age at marriage of years for females. Also, it is higher in urban areas than in rural areas.

Let us review maternal mortality ratio.

Maternal Mortality Ratio

Childbirth, without proper antenatal care and attention during and after delivery has a high risk. The actual risk of an Indian woman dying from a maternity related cause could be far more than the developed world because of her larger number of pregnancies (five or six compared with one or two in the developed nations). Maternal mortality rate in India is estimated to be 130 per 1,00,00 pregnant women (SRS, 2016). The major causes of death in childbirth include postpartum haemorrhage, eclampsia in last stages of pregnancy, infection from an untreated perineal tear and obstructed labour.

All these clinical causes of maternal mortality are related to maternal age, number of births and malnutrition, particularly anaemia. A woman giving birth to children at the optimum age of 20-35 years faces much lower average risk than women below 20 and over 35 years. It is also observed that maternal illness and deaths are significantly

more with the fourth pregnancy onwards. The type of care received at childbirth is often critical for the health and survival of both the infant and the mother.

Let us now review how infant mortality rate (IMR) and child mortality rate (U5MR) affects the trends in population growth.

Infant mortality rate (IMR) and Child mortality rate (U5MR)

IMR and U5MR are sensitive indicators of a country's development and reflect the quality of life. The infant and under-5 mortality rate in rural areas of our country is substantially more than in the urban areas where most of the health facilities are available. A large number of biological, medical, social and economic factors influence these two rates. The high rate also points to the downward spiral of the interplay between malnutrition and infections. Infant mortality rate in India is 34 per 1000 live births (SRS, 2016). It is higher in rural areas (41) as compared to urban areas (25). But one encouraging factor in IMR is its trend of gradual decline, say from 53 in 2008 to 34 in 2016. The decline is seen in both urban as well as in rural areas.

You would also note large differences in the IMR and U5MR amongst the states. Major states having high child mortality rate are Uttar Pradesh (64), Chattishgarh (54), Madhya Pradesh (51), Assam (48), Bihar (48) and Jharkhand (44). On the other hand, the state of Kerala, has achieved an IMR of 7, a figure comparable to that of any industrialized country. In Kerala, female literacy is high, medical, educational, transportation and communication facilities are available within 2 km, for a much large proportion of population while in Bihar and Rajasthan female literacy is low and there is inadequate development of health care, education, transportations and communication facilities. Thus, a high infant and child mortality reflects the poor state of public health, hygiene and environment sanitation in any country. Figure 6.4 illustrates the key infant mortality rates by demographic characteristics, 2015-2016 as reported by National Family Health Survey (NFHS-4). You can see that infant mortality rate is very high when mother is between the age of 40-49 years of age and has previous birth interval of less than 2 years.

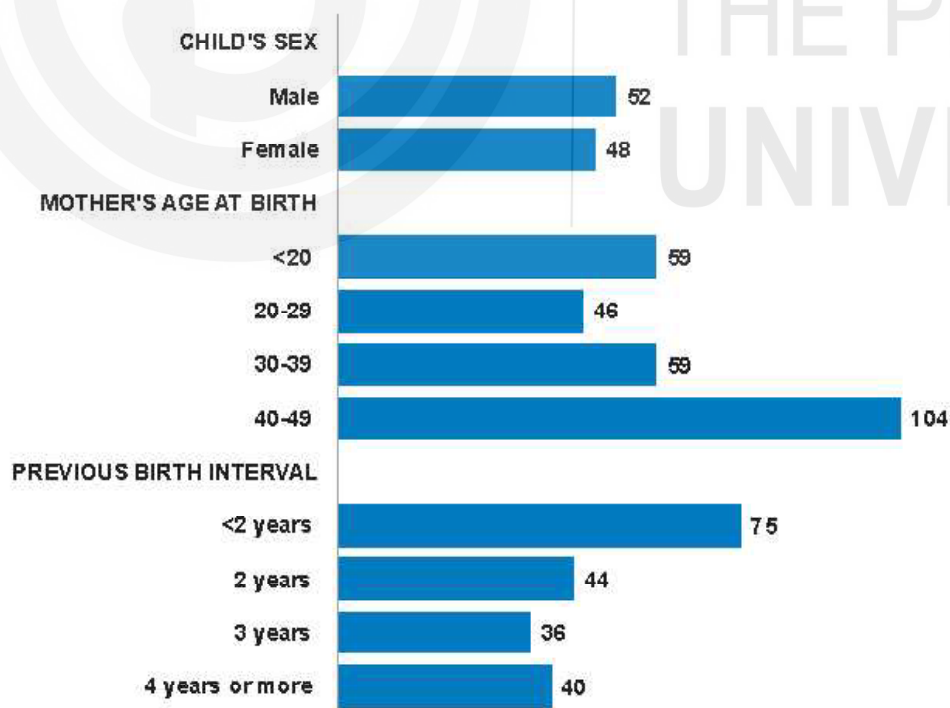


Figure 6.4: Infant Mortality Rate by Demographic Characteristics (2015-16)

We hope from our discussion above you may have got good idea of how the monitoring of data on vital statistics can help in assessing and estimating the trends in population growth and structure. Let us take a break here and recapitulate what we have learnt so far. Answer the questions given in check your progress exercise 2.

Check Your Progress Exercise 2

1. What does a broad base and a tapering top of the 'age pyramid' of a country indicate?

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2. Define the following:

- a. Dependency ratio.

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- b. Net reproduction rate (NRR)

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3. Define sex ratio. What does an adverse sex ratio indicate?

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4. List the factors which affect high fertility in India.

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In the section above, we studied about different types of vital statistics and their use in estimating population growth and structure. You are now aware that India's IMR, U5MR and maternal mortality ratio are very high when compared to other developing countries. India needs to greatly improve on these indicators to improve the quality of life of its people. Government of India has initiated many policy and programmes, aimed towards improving the health and welfare of mother and child in the country. We will learn about the National Policy and programmes on health and population next.

6.6 POPULATION POLICY

In this section, we will briefly review a series of population policy initiatives by Government of India, beginning 1976 till to date. Population policy refers to *policies intended to decrease the birth rate or growth rate*. Statements of goals, objectives and targets are inherent in population policy. In April 1976, India framed its first 'National Population Policy'. It called for an increase in the legal minimum age at marriage from 15 to 18 years for females, and from 18 to 21 years for males. The 1976 policy was modified in 1977 by the then New (Janata) Government. The new policy statement reiterated the importance of the small family norm, but ruled out all forms of compulsion and changed the programme's title to 'Family Welfare'. The statement however, endorsed the previous government's decision to raise the minimum age at marriage and the *birth rate target* of 25 per 1000 population by 1984 (which was not achieved).

The National Population policy was then revised in year 2000 with an aim to address the family planning, the broadest possible dimensions which includes not only health and family welfare but also child survival, basic reproductive and child health care, women's status and employment, literacy and education, socioeconomic development and anti-poverty programmes. The long term goal of the policy is to achieve a stable population by 2045. Some of the highlights of the policy are as follows:

- Address the unmet needs for basic reproductive and child health services, supplies and infrastructure.
- Mark school education upto age 14 free and compulsory, and reduce drop outs at primary and secondary school levels to below 20 percent for both boys and girls.
- Reduce infant mortality rate to below 30 per 1000 live births.
- Reduce maternal maternity rate to below 100 per 1000 live births.
- Achieve universal immunization of children against all vaccine preventable diseases.
- Promote delayed marriage for girls, not earlier than age 18 and preferably after 20 years of age.
- Achieve 80 percent institutional deliveries and 100 percent deliveries by trained person.
- Achieve universal access to information/counselling, and services for fertility regulation and contraception with a wide basket of choices;
- Achieve 100 percent registration of births, deaths, marriages, and pregnancy.
- Contain the spread of the Acquired Immuno-deficiency Syndrome (AIDS) and promote greater integration between the management of reproductive tract infections (RTIs) and sexually transmitted infections (STIs) and the National AIDS Control Organization.
- Prevent and control communicable diseases.
- Integrate Indian Systems of Medicine (ISM) in the provision of reproductive and child health services, and in reaching out to households; and
- Promote vigorously the small family norm to achieve replacement levels of Total Fertility Rate (TFR).
- Bring about convergence in implementation of related social-sector programmes so that family welfare becomes a people-centered programme.

In conclusion, the Government of India has outlined several action ideas in the latest population policy document, aimed towards overall improvement of the condition of women and children.

Having looked at Government of India's population policy and aim to improve the overall condition of women and children, we can now aim at improving the quality of life for this vulnerable section of society. So, there is a relationship between fertility, nutrition and quality of life. As a public nutritionist, it would be useful to understand this relationship. In the following section, we will explore this relationship.

6.7 RELATIONSHIP BETWEEN FERTILITY, NUTRITION AND QUALITY OF LIFE

You may have noticed that in many developed countries, women have less children and these children are mostly healthy, that is, they have good nutritional status and the family enjoys a good quality of life. So, there must be a relationship between these three. We would like to have the same scenario for India too. We will now study the relationship between fertility, nutrition and quality of life. Human Development Index

developed by UNDP takes care of relationship between fertility components, nutrition and quality of life. Human development is a process of expanding human choices by enabling people to enjoy long, healthy and creative lives. It is a people-centered approach to policy making.

A child born today in a developing country can expect to live 16 years longer than a child born 35 years ago. The infant mortality rate has been more than halved since 1960. School enrolment has more than doubled. These are all part of measurement of human development index. If we want to compute the human development index (HDI), we require three indicators: *longevity*, as measured by life expectancy at birth, *educational attainment*, as measured by a combination of adult literacy (2/3rd weight) and the combined first, second and third level gross enrolment ratio (1/3rd weight) and *standard of living* as measured by Gross Domestic Product (GDP) per capita.

The high fertility in India is attributed to early and nearly universal marriage, larger family norm, preference for sons, low economic status, illiteracy, higher IMR, agrarian society, low urbanization and cultural resistance to change. Limiting the family size is a concern both at national and international level. The advocacy of family planning and family limitation is essential.

The family planning programme in India is an entirely voluntary programme though actively supported by extension education and persuasion. Over the years the programme has developed as an integral part of existing medical and health services, particularly the maternal and child health services. This has greatly facilitated the expansion of family planning programmes, first because the antenatal, postnatal and paediatric clinics provide opportunities for its promotion and secondly, the health personnel in these clinics are already accepted by local communities. We have read in the beginning of this unit that population of India is rising, although, at a slower rate. You have also learnt that excessive population growth is an impediment to socioeconomic development and therefore affects the quality of life. *So how does excessive population growth adversely affect the quality of life?*

In a developing country like India, excessive population growth nullifies the efforts to improvement of the quality of life of the people. The physical, social and cultural needs of man, both in quantity and quality are, food, water, air, housing, clothing, education, employment, medical and health facilities, transportation and entertainment facilities. The increase in the number of people slows down the social and economic development. Another dimension of the population problem in the country is food insecurity, under nutrition and ill health, which is causing a steady deterioration of the physical and mental capacity of our human resources. So, we must slow down on the population growth. *How does a controlled population growth improve the quality of life?*

A small family norm would go a long way in feeding children and caring for their social, economic and developmental needs. Also a reduction in child mortality would indirectly affect birth spacing. When an infant survives and is healthy, couples are less likely to have their next child very soon. Programmes for child health and family planning can work to encourage people to have longer, healthier birth intervals. The long term outcome of food security is ultimately reflected in an improvement in the life expectancy of the population. Increasing life expectancy is a pointer to improving food security in India. To cite an example in the state of Kerala, the percentage of population with chronic energy deficiency (CED) is 33.20% and life expectancy at birth was highest 70.90 in 1990.

Thus we conclude that controlled population growth induces the social and economic development and the availability and accessibility of resources especially food, improves the mental and physical capacity of the people. This eventually improves the quality of life.

With this we end our study on population dynamics. We hope now you are in a better position to appreciate and relate the demographic process to the nutrition, health status of population groups.

Check Your Progress Exercise 3

1. What does a population policy refer to?

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2. Enumerate the highlights of the 2000 revised population policy.

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3. What do you understand by the term Human Development?

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4. Describe the effect of population growth on the quality of life of people?

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6.8 LET US SUM UP

In this unit we learnt that demography is a scientific study of human population. There is a demographic cycle of five stages through which a country passes. India is now passing through third stage or late expanding where the population is still growing at a high rate and birth rates have begun to fall. India's population has grown approximately more than four times from 1991 till 2011. Several factors have contributed to this growth which include growing urbanization, adverse sex ratio, high birth rate, high mortality rates among vulnerable section of our population. There is an urgent need to comprehend the implications of excessive population growth and its effect on the quality of life of the people and the development of the nation.

6.9 GLOSSARY

CED	:	refers to chronic energy deficiency produced within a territory during a specified period, regardless of ownership.
Eclampsia	:	condition associated with hypertension, proteinuria, generalized oedema, and seizures with pregnancy or the early post-partum.
GDP	:	gross domestic product is defined as the total value of goods and services.

Obstructed labour	:	a term used during child birth. Labour is called obstructed when there is no progress despite strong uterine contractions.
Postpartum haemorrhage	:	excessive bleeding after the child birth.
SRS	:	sample registration system

6.10 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

- The scientific study of human population is termed as 'Demography'. It focuses on 3 observable phenomena -
 - Changes in population size (growth/decline)
 - The composition of population
 - Distribution of population in space.
- The 5 stages of demographic cycle through which a nation passes are:
 - High stationary
 - Early expanding
 - Late expanding
 - Low stationary
 - Declining
- The year 1921 is called the 'big divide' because the absolute number of people added to the population in India, thereafter, each decade has been on the increase.

Check Your Progress Exercise 2

- A broad base and tapering top of the age pyramid of a country reflects that it is a developing nation and has a higher proportion of dependants compared to active productive and working population.
- The ratio of the combined age groups 0-14 years plus 65 years and above to the 15-65 years age group is termed *dependency ratio*.
 - Is defined as the average number of daughters that would be born to a woman if she experiences the current fertility and mortality pattern throughout her reproductive span (15-49 years).
- Sex ratio is defined as 'the number of females per 1000 males'. If the sex ratio is adverse to women, it suggests that the decline in mortality of females has lagged behind that of males. In addition, it is also affected by sex selective migration and sex ratio at birth.
- The high fertility in India can be attributed to
 - Universality of marriage
 - Low age of marriage
 - Low level of literacy

- d. Poor economic status
- e. Limited use of contraceptives

Check Your Progress Exercise 3

1. Population policy refers to policies intended to decrease the birth rate or growth rate. Statement of goals objectives and targets is inherent in population policy.
2. The highlights of the 2000 revised population policy are as follows:
 - Address the unmet needs for basic reproductive and child health services, supplies and infrastructure.
 - Mark school education upto age 14 free and compulsory, and reduce drop outs at primary and secondary school levels to below 20 percent for both boys and girls.
 - Reduce infant mortality rate to below 30 per 1000 live births.
 - Reduce maternal maternity rate to below 100 per 1000 live births.
 - Achieve universal immunization of children against all vaccine preventable diseases.
 - Promote delayed marriage for girls, not earlier than age 18 and preferably after 20 years of age.
 - Achieve 80 percent institutional deliveries and 100 percent deliveries by trained person.
 - Achieve universal access to information/counselling, and services for fertility regulation and contraception with a wide basket of choices;
 - Achieve 100 percent registration of births, deaths, marriages, and pregnancy.
 - Contain the spread of the Acquired Immuno-deficiency Syndrome (AIDS) and promote greater integration between the management of reproductive tract infections (RTIs) and sexually transmitted infections (STIs) and the National AIDS Control Organization.
 - Prevent and control communicable diseases.
 - Integrate Indian Systems of Medicine (ISM) in the provision of reproductive and child health services, and in reaching out to households; and
 - Promote vigorously the small family norm to achieve replacement levels of Total Fertility Rate (TFR).
 - Bring about convergence in implementation of related social-sector programmes so that family welfare becomes a people-centered programme.
3. Human development is a process of expanding human choices by enabling people to enjoy long, health and creative lives. It is a people-centered approach to policy making.
4. In a developing county like India, excessive population growth nullifies the efforts to the improvement of the quality of life of the people. The physical, social and cultural needs of man; both in quantity and quality are food, water, air, housing, clothing, education, employment, medical and health facilities, transportation and entertainment facilities. The increase in the number of people slows down the social and economic development. Another dimension of the population problem in the country is food insecurity, under nutrition and ill health, which is causing a steady deterioration of the physical and mental capacity of our human resources. Therefore, a small family norm would go a long way in feeding children and caring for their social, economic and developmental needs. Also a reduction in child mortality would indirectly affect birth spacing. When an infant survives and is healthy, couples are less likely to have their next child very soon. Programmes for child health and family planning can work to encourage people to have longer, healthier birth intervals.