

Dynamics of Population

CHAPTER

6

Population ageing is poised to become one of the most significant social transformations of the twenty-first century, with implications for nearly all sectors of society.

— Ban Ki-moon (former Secretary-General, United Nations)



Fig. 6.1.

The Big Questions ?

1. What is demography?
2. What are some important concepts of demography?
3. How has the population of India and the world changed over time?
4. How do population trends shape societies and economies?



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Structure of population:

Refers to how a population is made up based on different characteristics such as age, gender, education, etc.

Demography:

The study of the composition of human population in terms of different factors like age, sex, occupation, and religion, and how they change over time.

Working-age population:

Individuals between the ages of 15 and 64 years who are generally considered the most productive in terms of economic output and participating in workforce.

WHAT IS DEMOGRAPHY?

Have you ever wondered how many people live in the world? The human population is spread around the world, differing in size, **structure**, and composition. For instance, there are people from different age groups, such as children, adults, or the elderly; different genders, various levels of education; diverse occupations, and religion and so on. Moreover, many of these characteristics of population change over time due to births, deaths, and movement of people within and across countries. The study of these features of the human population and how they change over time is called **demography**.



Fig. 6.2. Components of demography

Demography helps to better understand the people living in a region. Governments can utilise such information to plan infrastructure, such as schools, hospitals, roads, and housing, as well as municipal services like water, energy, waste management, etc. For instance, if a place has many young children, more schools are needed; if the proportion of the elderly in a population is higher, more facilities for healthcare are required. Similarly, a higher proportion of young **working-age population** implies a greater need for gainful employment generation. Businesses also assess their potential customers based on characteristics like age, gender, and income to create products that match people's needs. Hence, determining a country's population size and structure helps to better allocate and manage its resources.



DON'T MISS OUT

In India, the **census** is generally conducted every 10 years to assess the total population and its characteristics. It is the official count of people living in a country in a particular period. Information is collected from individuals regarding age, gender, marital status, educational levels, languages spoken, religion, family size, occupation, employment status, income levels, and so on.

Let us see how the population in India and the world has changed over the years.

POPULATION AT A GLANCE

In 2023, India surpassed China to become the world's most populous country (Fig. 6.3). Today, Indians constitute around 17 per cent of the world population.

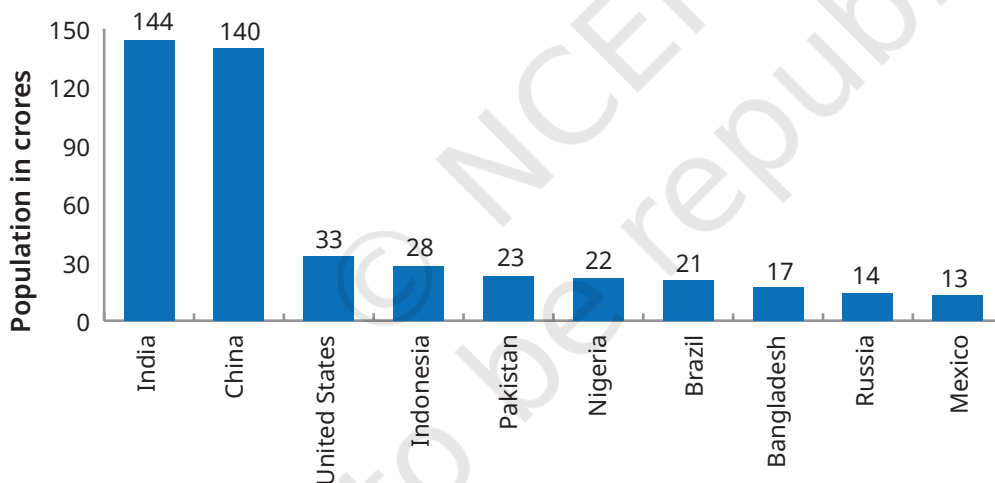


Fig. 6.3. A bar graph of the world's most populous countries (2024)

World population grew from 2.5 billion in 1950 to 8.2 billion in 2025 and is expected to reach 9.7 billion by 2050. Improved healthcare enabled individuals to live longer, which largely explains the trajectory shown in Fig. 6.4. However, growth has slowed over time. According to **United Nations** projections, the population will peak at 10.3 billion by the mid-2080s and then gradually decline as birth rates fall. The growth in population

Census:

Process of collecting, compiling, analysing and disseminating demographic, economic and social information of all persons in a country or a well-defined part of a country at a specific time.

United Nations:

It is an intergovernmental organisation.

Projection:

An estimate or forecast of a future situation based on a study of present trends.

varies across nations. Countries like China, Japan, and Italy are already seeing shrinking populations while India's population is growing for now. At the same time, the population in several African nations such as Nigeria and Ethiopia continue to grow rapidly.

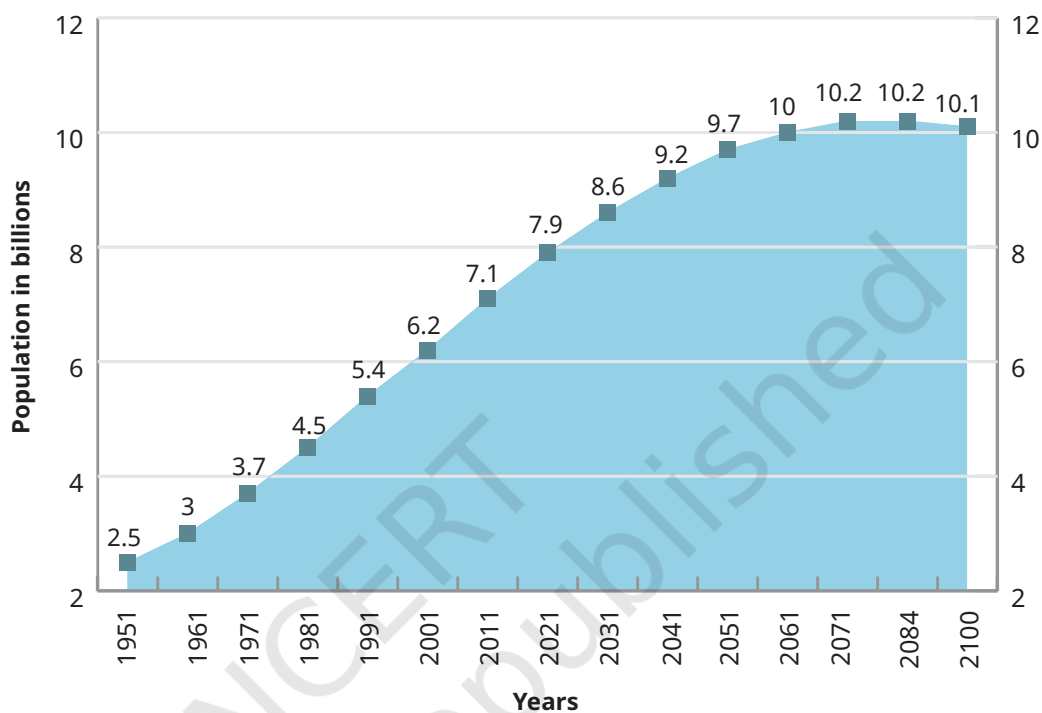


Fig. 6.4. Trends in world population

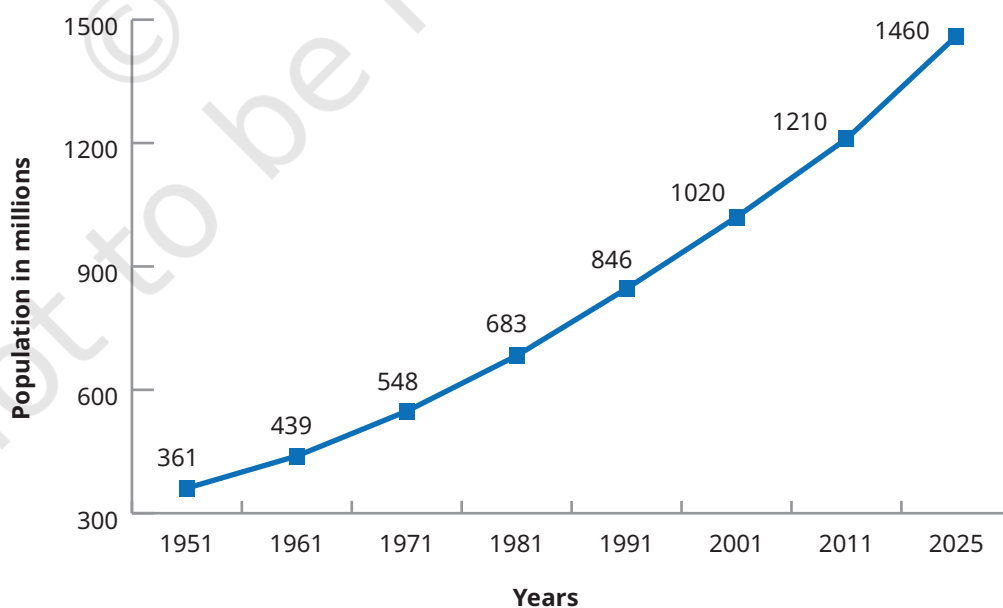


Fig. 6.5. India's population growth trajectory



DON'T MISS OUT

As you may notice, there was a rapid growth in world population from the 1950s onwards. This is the time when several medical advancements took place (like the use of antibiotics, vaccines and oral rehydration solution); better water and sanitation facilities became available to more people, deaths of children due to malaria and diarrhoea came down, etc. This was also a period when the benefits of economic prosperity were reaching a larger population in several countries. The regional distribution of world population in 2025 can be seen in Fig. 6.6.

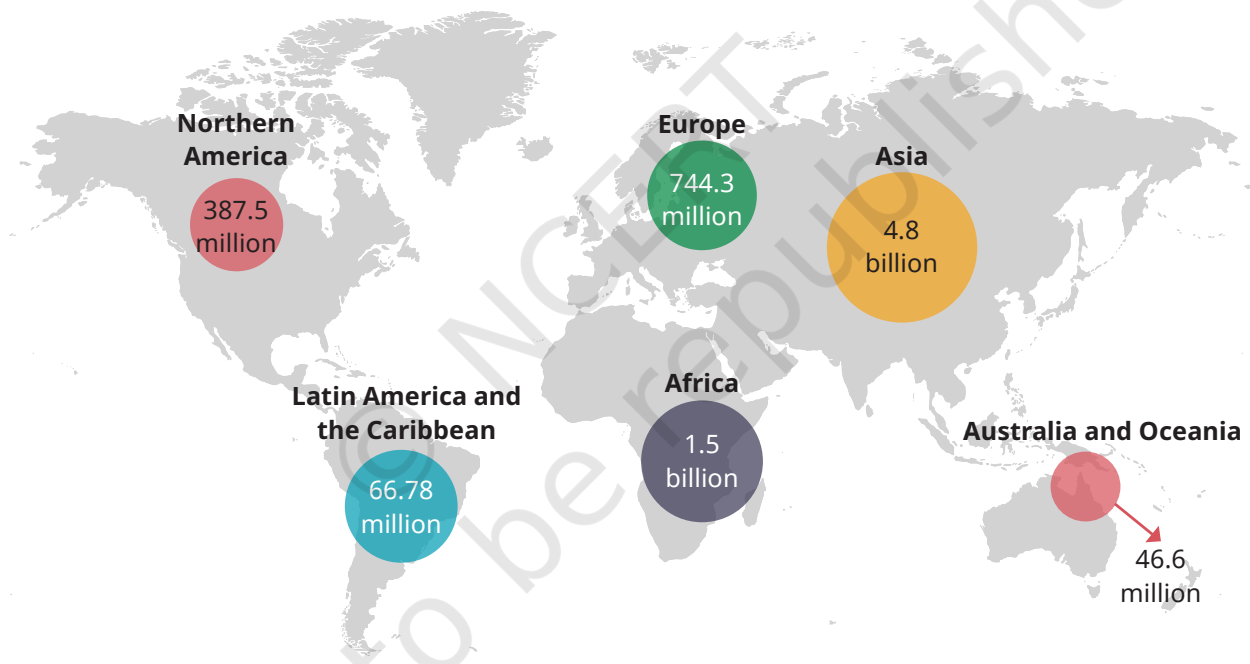


Fig. 6.6. Population in different regions of the world; the total population is 8.2 billion (2025).



LET'S EXPLORE

Ask your family members if they have observed any of the following changes around them over the years:

- farmland or green spaces being turned into new buildings for housing
- more crowded streets; more cars and buses; and traffic congestion in public spaces
- changing types of homes (e.g., smaller apartments, more single-family homes)

What could be the possible reasons behind these changes?

WHAT DETERMINES THE POPULATION OF A COUNTRY?

The current population of any country is a result of years of gradual change in the number of babies born, the number of deaths, and the movement of people in and out of the country over the years.

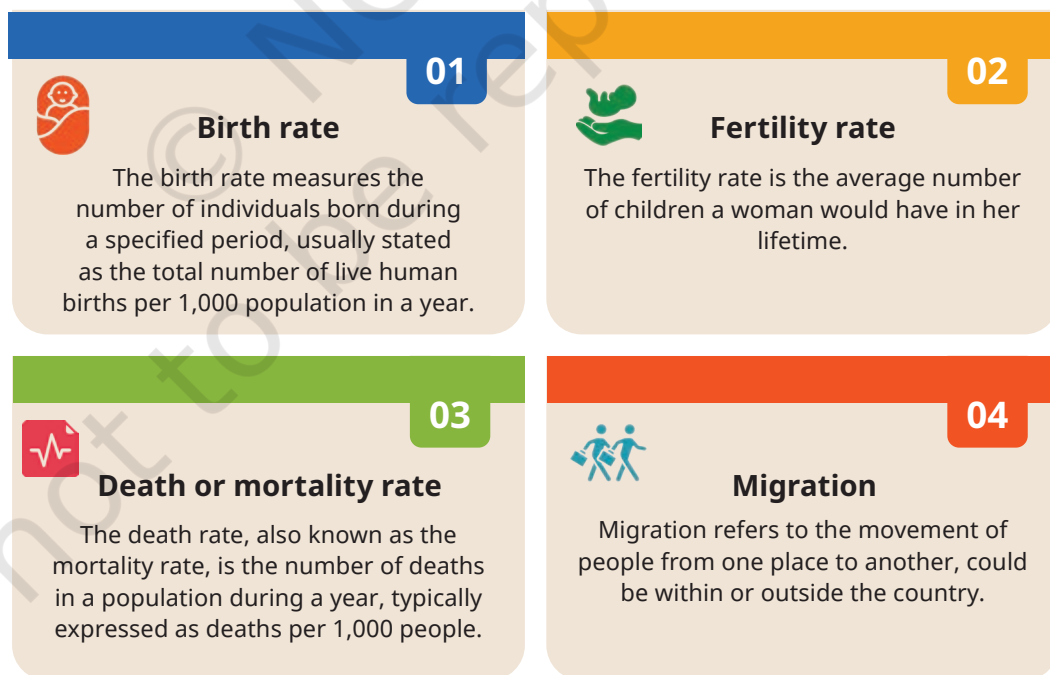


Fig. 6.7. Some key indicators of demography

Birth and fertility rates

Birth rate helps us understand how fast a population is growing. If many babies are being born, the birth rate is high, and the population will grow faster. If fewer babies are being born, the birth rate is low, and the population might grow slowly or even start shrinking over time.

The fertility rate is slightly different. It tells us the average number of children a woman is likely to have in her lifetime. A fertility rate of 2.1 means that, on average, each woman has two children in her lifetime. It is often referred to as the '**replacement level fertility rate**' because it is the number of children needed to replace the parents in the population. This rate is crucial to maintain a stable population. If the fertility rate is above 2.1, the population is likely to grow; if it is below 2.1, the population might shrink over time.

LET'S EXPLORE

Why is the replacement rate 2.1 and not 2 (parents get replaced by children)? What are the situations in which the replacement rate can be higher?



Together, birth and fertility rates are closely linked and are crucial to determine the pace of population growth. When fertility rates fall (women have fewer children), the birth rate also drops. This slows down the population growth. Over time, if people keep having fewer children, a country's population might stop growing or even start falling.



Fig. 6.8.



DON'T MISS OUT

Kinship networks:
An interconnected web of social relationship through blood, marriage, and adoption.

In the 1970s, the Chinese government was worried that its fast-growing population would cause shortages of food, jobs, and housing. To control this, it introduced the One-Child Policy in 1979, allowing most families to have only one child. Those who broke the rule faced fines or job loss. As a result, the fertility rate in China dropped from 7.5 in 1963 to 1 in 2025. China's population peaked at 1.43 billion in 2022 but has started to shrink. By 2050, it is projected to fall to 1.31 billion; on the other hand, people are living longer due to access to better healthcare. So, the share of elderly (those above 65 years) in the total population is expected to rise sharply, i.e., from 14 per cent in 2023 to 26 per cent in 2050.

As more people grow older and retire, there are fewer younger workers available to work in farms, factories, and offices. This could potentially lead to a slow down in the economic growth of the country. The One-Child Policy had a far-reaching impact on households and society. A whole generation of children do not have siblings and **kinship networks**. Though China ended the policy in 2015, and now allows up to three children, fertility rate still remains below replacement level, showing the policy's lasting impact on society and the economy.

A similar push for population control was observed in India through government campaigns like '*Hum do humare do*' from 1952 onwards that emphasised on not having more than two

children. Though India's population is still growing, the fertility rate has substantially declined from 5.7 in 1950 to 1.9 in 2025. Many other developed countries like South Korea, Taiwan, Singapore, Japan, China, Italy, Spain, and France are witnessing a trend of low fertility rates (Fig. 6.10).



Fig. 6.9. Stamp highlighting population control campaign in India from 1989

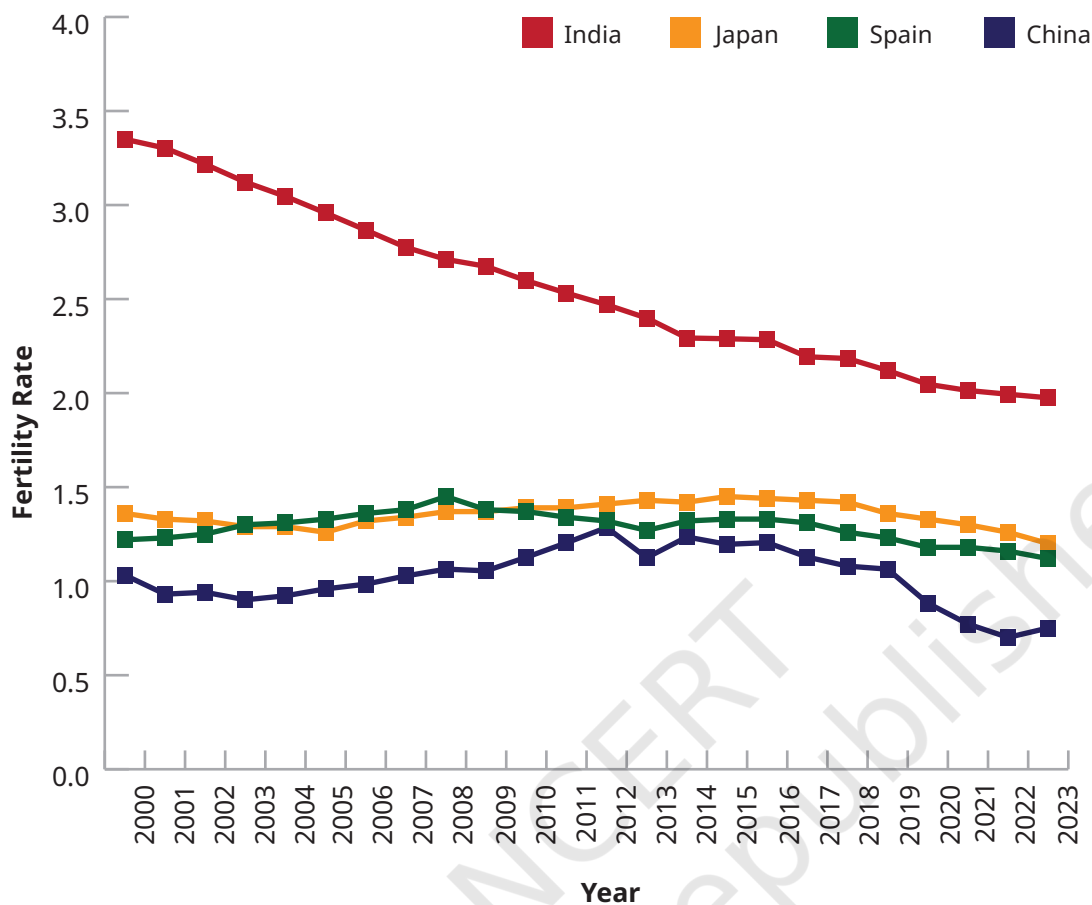


Fig. 6.10. Fertility rates across select countries (2000–2023)

Many factors have contributed to falling fertility and birth rates. One important factor is improvements in access to quality education, especially among girls. As women are increasingly getting formal education and are working in formal jobs, they are more likely to marry at a later stage and have fewer children. Also, with rapid urbanisation, the cost of living is high particularly in cities, so people prefer to have smaller families.

LET'S EXPLORE

Observe fertility and literacy rates in select Indian states in Fig. 6.11. Do you find a relationship between the two **indicators**? Prepare a report on your observations and possible reasons for the same.

Indicator:
A measure
to gauge
something.



Child mortality: Number of deaths of children under 5 years of age per 1,000 live births. It is a key indicator of child survival and overall child health within a population.

Migration: Movement of people from one place to another within or outside a country, to settle either temporarily or permanently, in the new location.

State/UT	Fertility rate	Literacy rate among women (%)
Bihar	3.0	55
Uttar Pradesh	2.4	66.1
Jharkhand	2.3	61.7
Karnataka	1.7	73.4
Punjab	1.6	79.4
Delhi	1.6	83.7

Fig. 6.11. Fertility and literacy rate among women in select Indian states

Death or mortality rate

Another important indicator of population growth is the death or mortality rate. A lower mortality rate indicates the availability of quality healthcare and better nutrition among people in the country. India has made great progress by lowering **child mortality** from 271 per 1,000 in 1950 to 28 in 2023. Similarly, life expectancy at birth in India has risen from just 30 years at independence to 70 years in 2024. Life expectancy is the average number of years a newborn is expected to live if they grow up with the same health, safety, and living conditions that people in their country have today. So, if the life expectancy is 70 years, it means most babies born today in that country are expected to live about 70 years. It doesn't mean every single person will live to be exactly 70, but that on an average an Indian can expect to live up to the age of 70 years.

Migration

People tend to migrate to other areas for better employment opportunities, education, and so on. Sometimes, natural disasters and political instability in an area can push people to migrate. Areas witnessing an influx of migrants see a rise in population over time. For example, cities like Delhi, Mumbai, and Bengaluru have experienced significant population growth due to **migration**. However, concentration of a very large population in a limited area can put pressure on resources like water, air,

and land, and strain services like transportation and housing. You will read more about some of the challenges of urban areas in the next chapter.



THINK ABOUT IT

If many young people migrate from villages or smaller towns to cities, what changes could take place in their native villages?

HOW DO COUNTRIES EXPERIENCE POPULATION CHANGE?

Just as individuals experience various phases of life while growing up, such as childhood, adulthood, and old age, countries' demographic characteristics also change over time with changes in birth and death rates of the population.

Demographers have observed that populations have gone through transitions influenced by economic development,

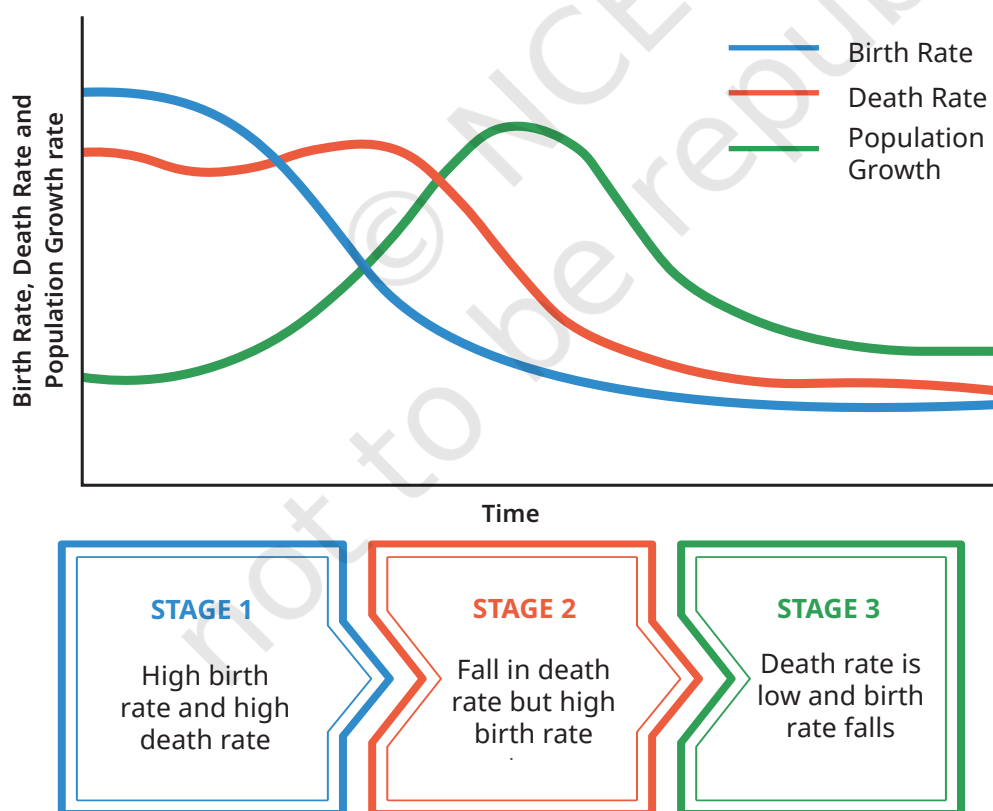


Fig. 6.12. Stages of demographic transition in countries

improved healthcare, education and increased participation of women in decision making in the household. Such demographic transitions can be explained through a sequence of three stages, characterised by different combinations of birth and death rates which affect the size of a country's population. (See Fig. 6.12.)

Stage 1 – High death and high birth rates: Birth and death rates are both high, so population growth is very slow or stagnant. This was true in the case of India from 1901–1921, due to availability of poor healthcare and low literacy among people.

Stage 2 – Death rate falls, but birth rates are still high: As nations progress economically, death rate falls due to availability of better healthcare, but birth rates stay high, causing rapid population growth. In India, after 1951, the population grew rapidly.

Stage 3 – Death rate is low, and birth rate begins to fall: Death rates remain low, and birth rates start to decline due to rising urbanisation, higher income, education, and an increase in women participating in the workforce and having fewer children, which slows overall population growth. If fertility drops significantly, leading to even lower births, the population starts to shrink as seen in many European and East Asian countries like Italy, Japan and South Korea. In India, after the mid-1980s, the fertility rate began declining and is now below replacement level.

India's Population: Composition and Trends

India, the most populous country in the world, has a diverse and dynamic population that is spread across states. Fig. 6.13 shows the percentage distribution of the population across states in India.

Apart from geographical distribution of population, there are specific characteristics such as age, gender, occupation, education, etc., of the overall population which needs to be studied to understand people better. These characteristics are known as the structure of the population or population composition.

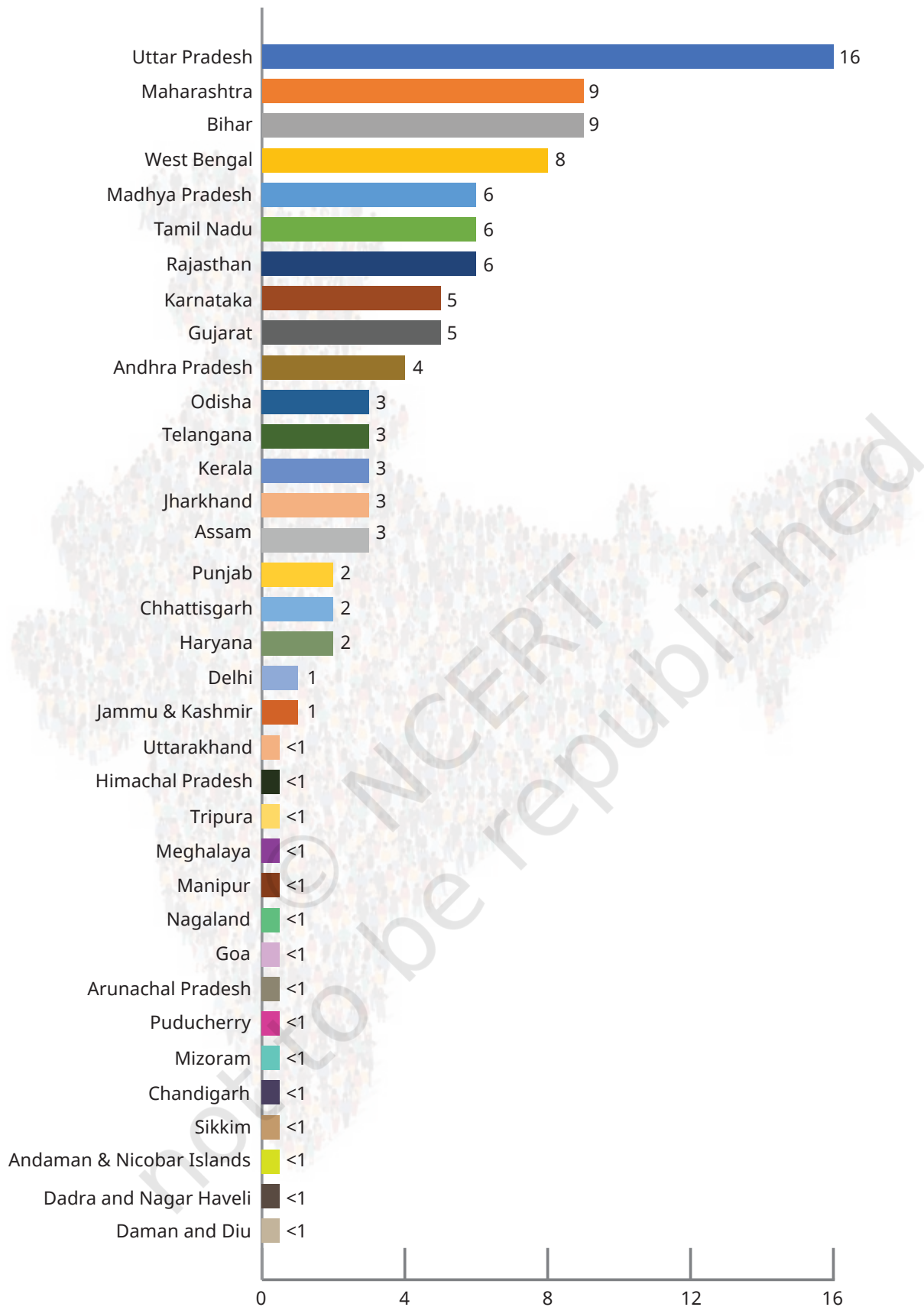


Fig. 6.13. Share of population across Indian states in per cent

Improvement in India's sex ratio

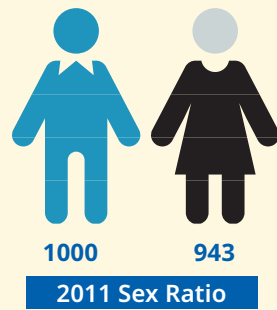


Fig. 6.14.

Population composition uses sex ratio as a key demographic indicator. Sex ratio represents the number of females per 1,000 males in the population. It is used to measure gender balance within the population and reflects the country's socio-economic and cultural dynamics.

As per Census 2001, India's sex ratio stood at 933 females per 1,000 males. It improved to 943 in 2011 where women comprised 48.5 per cent of the total population. A balanced sex ratio is vital for equitable development, social stability, and sustainable population growth.

LET'S EXPLORE

Census figures of 2001 as well as 2011 show the overall number of females per 1,000 males being much less than 1,000. Some states, however, had over 1,000 or near 1,000 (Kerala, Puducherry, Tamil Nadu). What might be the reasons for this?

The **population structure diagram**, as seen in Fig. 6.15, is a useful tool for studying the population composition and how a population is changing over time. It is a special kind of graph that shows the number of people in a country, by age groups and gender.

The bottom part shows young people (like children and teenagers). The middle part shows adults. The top part shows elderly people. If the base is wide, it means many children are being born — the country has a young and growing population (like India or Nigeria). If the middle part is widest, it means most people are working adults — the country has a stable population. If the top is wide, it means there are greater number of older people than young adults — the country has an ageing population (like Japan). The graph is shaped like a pyramid or triangle when there are more young people at the bottom and fewer older people at the top.

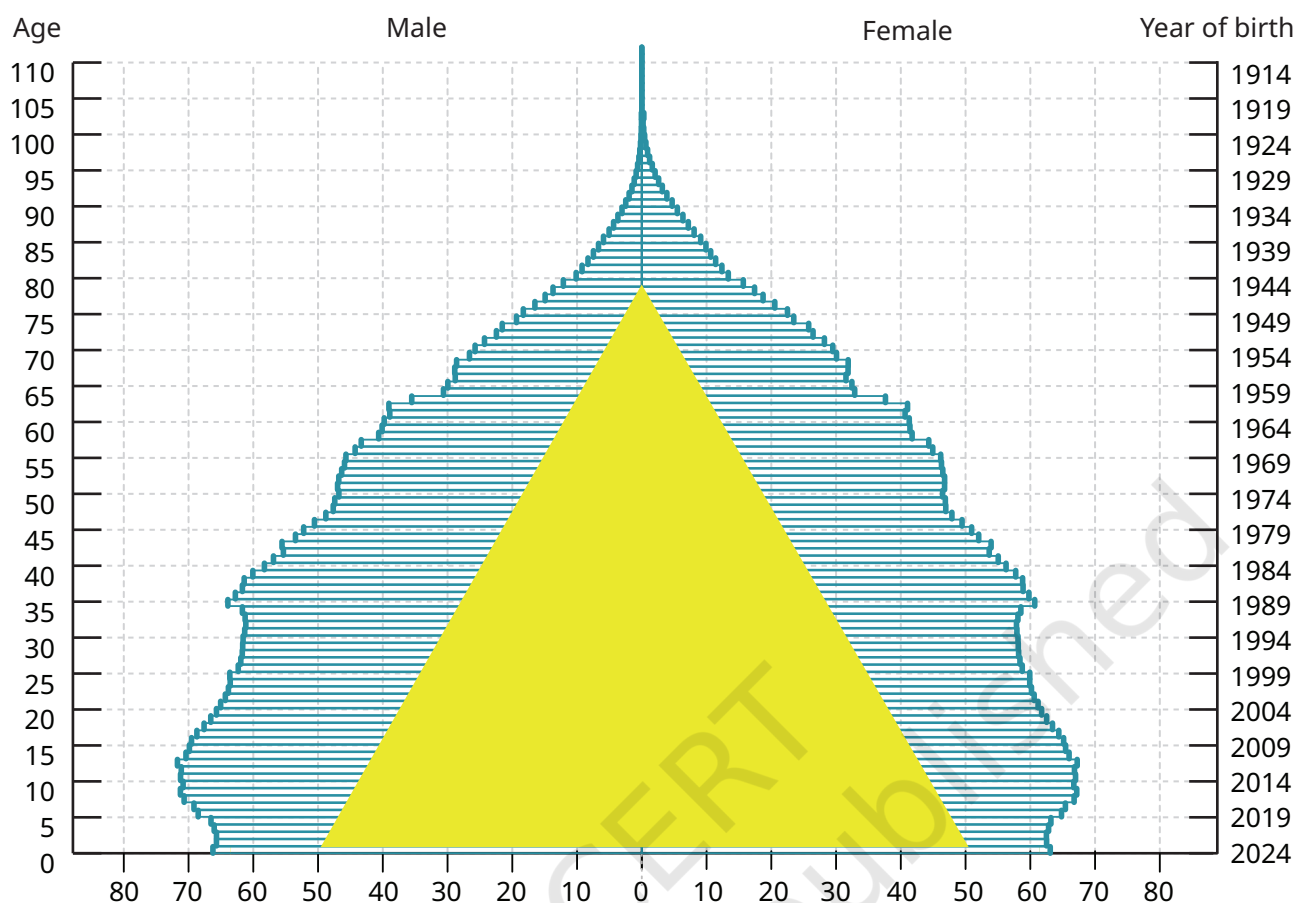


Fig. 6.15. Population Structure Diagram that looks like a pyramid



DON'T MISS OUT

While the term ‘population pyramid’ is used widely, the representation on paper looks more like a triangle, parts of which have been pulled outwards or shrunk, into different shapes—a 3-dimensional concept represented in 2 dimensions.

Look at how the shape of India’s population pyramid has changed since the 1950s (Fig. 6.16).

In the 1950s, India’s pyramid looked like a narrow triangle which meant that there were many children and young people, and fewer older people. The birth rate was high because families had many children. The life expectancy (average age people lived to) was low — around 30–35 years — because healthcare and nutrition were not as good.

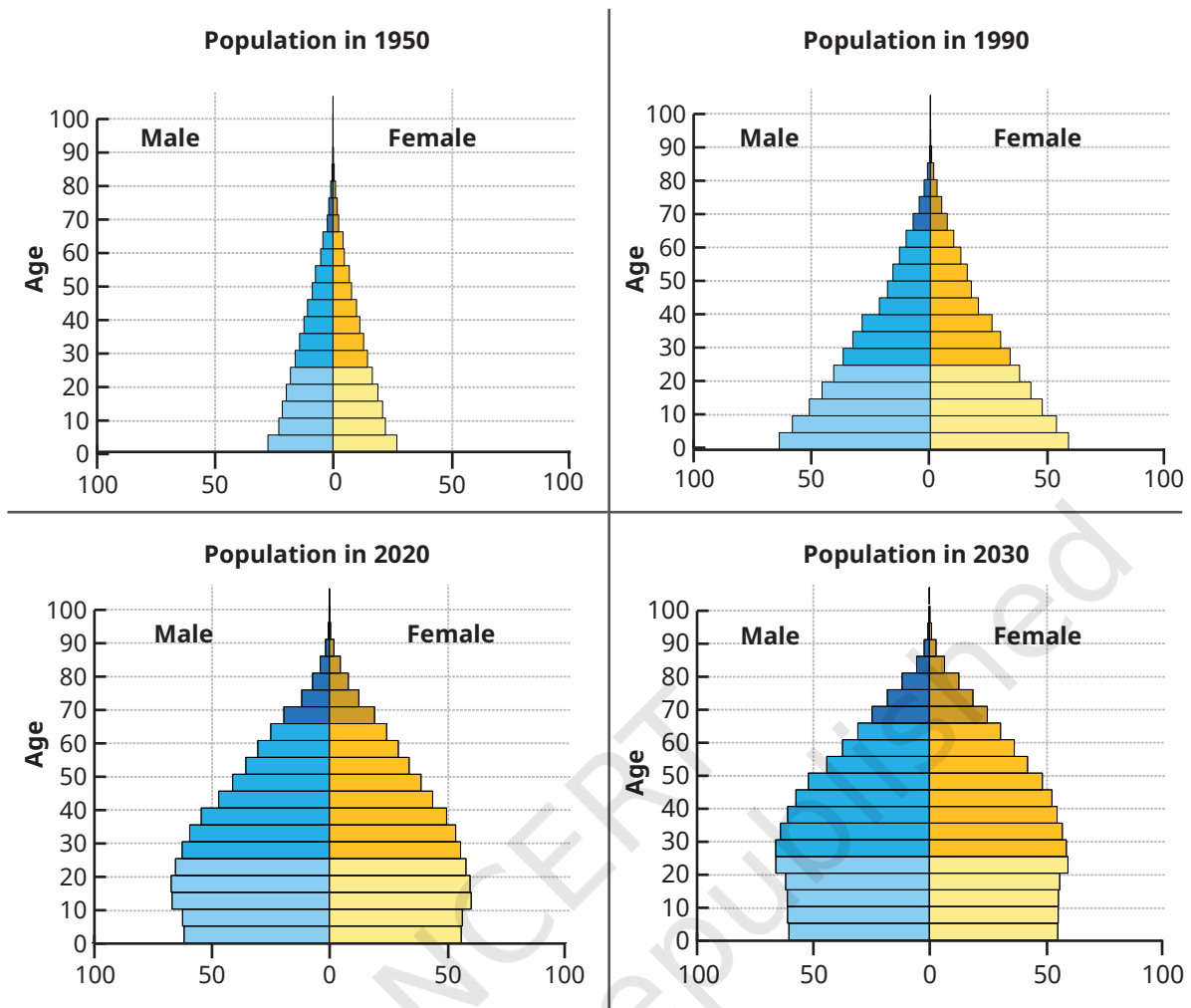


Fig. 6.16. India's population composition and growth, 1950 to 2030

In recent years, India's population pyramid looks less like a triangle and is more bell-shaped. The base has become narrower, which means families are having fewer children than before. The middle part (working-age group) has become much wider, showing a large number of people between 15 and 60 years — this is called India's demographic dividend, i.e., there are many young workers who can help the economy grow.

The top part is slowly getting wider too, as people live longer because of better healthcare, nutrition, and living conditions. So, over time, India's population pyramid shows that the country has **moved from a young, fast-growing population to a more balanced one** — and in the future, it may start to **age** slowly, like what's already happening in countries such as Japan or China.



THINK ABOUT IT

If the replacement rate is less than 2, what will the population pyramid look like? Will there ever be a situation where the number of children is less than the number of aged people? What is likely to happen to the population of such a country over time?

INDIA'S DEMOGRAPHIC DIVIDEND — A LIMITED WINDOW OF OPPORTUNITY

The population pyramid for 2020 in Fig 6.16 shows that a large portion of the population comprises children and young adults. This phenomenon of a large young population (16–30 years) is known as the **youth bulge**, which is common in countries at Stage 2 of demographic transition shown in Fig 6.12.

Around 27 per cent of the Indian population is under the age of 15 years and nearly 65 per cent is in the working-age group (15–59 years).

Country	Median Age (years)
 India	28
 Japan	50
 Italy	48
 Germany	47
 China	40
 USA	39

Fig. 6.17. Median age of population in some countries

As seen in Fig 6.17, India has a large working-age population which puts it in a uniquely beneficial position. Young people can work in factories, offices, farms, or start businesses. The more people work, the larger the volume of economic activities, which helps the country grow. In addition, working-age population

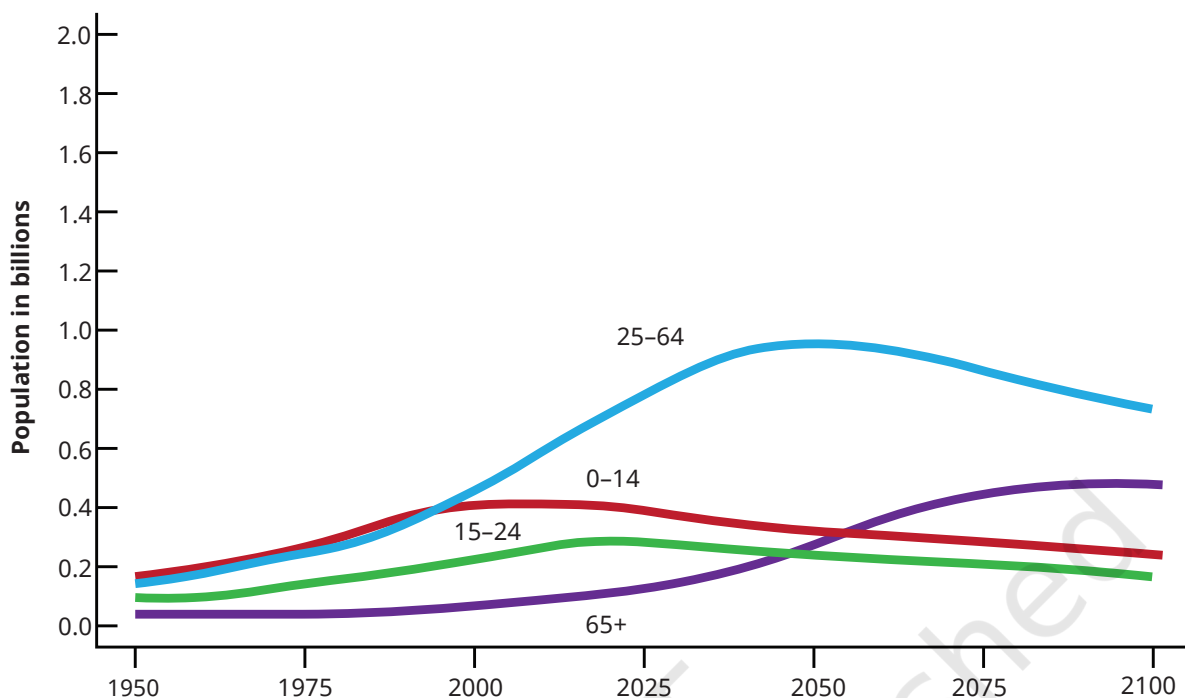


Fig. 6.18. India's population by age groups.

Taxes:
A compulsory contribution levied by the government from workers' income and business profits, or added to the cost/price of some goods, services, and transactions.

earns money and pays **taxes**. The government uses that money to build schools, hospitals, roads, and parks. This economic growth potential of a nation resulting from a younger and productive age structure of a country is known as its **demographic dividend**.

However, this window of opportunity is limited, as the growth in the young population is expected to decrease beyond 2050, as indicated by the declining **blue line curve** after 2050 in Fig. 6.18. The number of children under the age of five peaked in 2007, and since then the number has been falling. The number of Indians under 15 years of age peaked slightly later (in 2011) and is now also declining. After 2050, India's population would begin to transition towards an older population.

These trends have already begun to show in states like Kerala and Tamil Nadu, which are experiencing significant population ageing as compared to Bihar and Uttar Pradesh, as seen in Fig. 6.19.

An ageing population means more elderly people who need care and fewer young people working to support them. This puts pressure on healthcare systems, as older adults need more

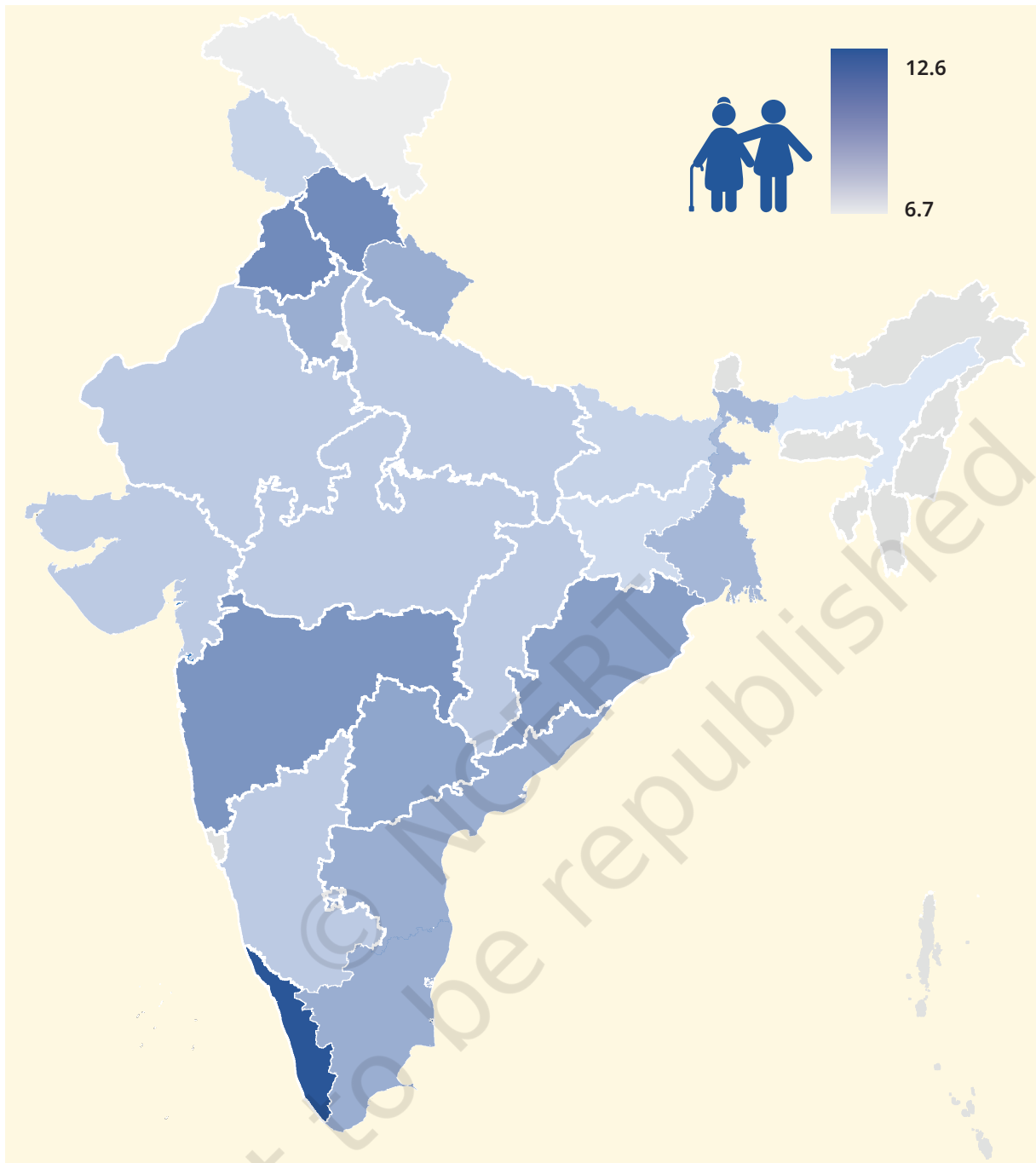


Fig. 6.19. Percentage share of the elderly population, India, 2011

healthcare facilities. When people retire, there are fewer workers to replace them, which can slow down the economy. Governments also face challenges paying **pensions** and providing services because of fewer young taxpayers.

Pension:
A regular payment made by the state to people of or above the official retirement age.



THINK ABOUT IT

Indian society has had the concept of *āshrama* dharma where life is divided into four phases — *brahmacharya*, *grihastāshrama*, *vānaprasta* and *sanyāsa*. Though older people begin to withdraw from economic activities, they continue to play other important roles — share their knowledge and wisdom with family and society as needed. Cultural continuity becomes possible through their guidance in rituals, storytelling, etc. They hold knowledge that may not necessarily be in books. Can you think of all the ways in which older people in your neighbourhood contribute to their family and society?

Productivity:

Measure of performance w.r.t. the amount of goods and services produced with a given quantity of inputs or resources

Nations need to prepare for the demographic transition. For developed countries, it is important to support an ageing society while maintaining **productivity** and innovation. For instance, Japan has raised the retirement age, and has employed technology and automation to compensate for labour shortages. There are large-scale community centres and robots and AI assistants to help care for older adults.

For developing countries, the challenge is to harness the demographic dividend through investment in good education, skilling and healthcare. At the same time, as societies develop and more women pursue formal jobs, they often face the 'double burden' — managing both job responsibilities and household duties. Lack of childcare facilities, joint family support system and flexible work hours can make it difficult for women to participate in workforce. Therefore, supportive family systems and childcare infrastructure like daycare centres can help the economy turn its demographic dividend into lasting progress. Policies in many nations have attempted to revive the fertility rate but have not been very successful so far.

Before we move on ...

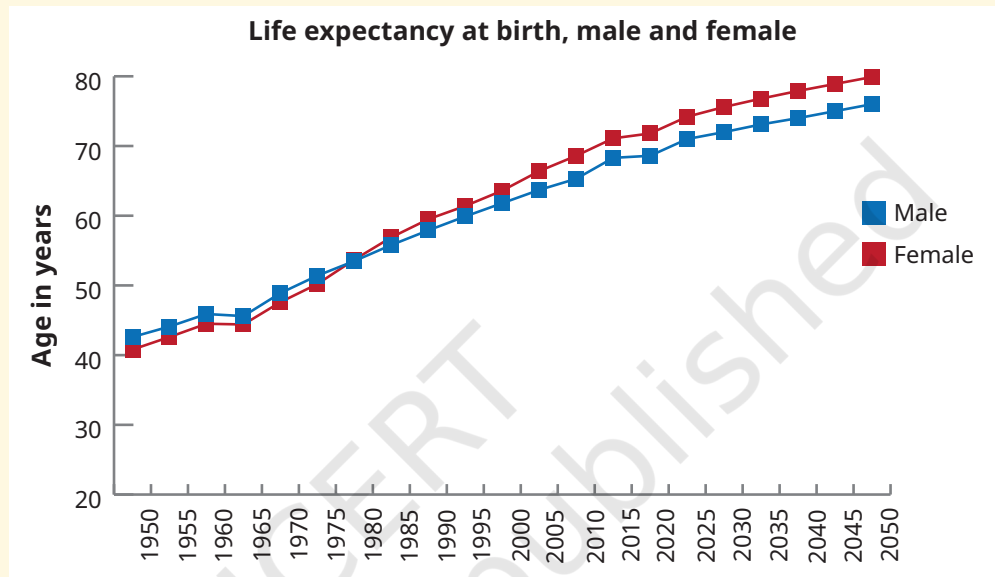


- Demography is the study of population size, structure, and changes due to births, deaths, and migration in a region.
- Population of a country changes over time and follows patterns called demographic transition, moving from high birth and death rates to low birth and death rates. Many developed countries around the world are experiencing shrinking and ageing population due to low birth rates.
- India currently has a large young workforce (demographic dividend), which can boost the country's growth through the development of human capital — education, employment, and healthcare. However, the window of opportunity is limited as India's population will begin to fall in the coming decades.

Questions and activities

1. Why is it important for a country to study its population through demography?
2. How can a low fertility rate affect a country's future economy and workforce?
3. Do you think a high birth rate is always good for a country? Why or why not?
4. Do you think it's better to have more people or fewer people in a country? What are the challenges countries face in the case of a fast-growing or shrinking population?
5. How does the age structure of a country affect the kind of jobs and services it needs? Explain with examples.
6. Why do you think families are generally getting smaller? Does having fewer children ensure better education and health for them? How does it affect families and society?

7. Observe the graph below showing changes in life expectancy across gender in India and answer the questions given below:
- Has the life expectancy in India increased? If yes, what could be the reasons?
 - What was the life expectancy of males and females in 2010?



8. What is a demographic dividend, and how does it benefit a country? What do you think India needs to do today to make the most of its demographic dividend before 2050?
9. Choose two countries (for example: India and Japan, or Nigeria and Italy). Find out their:
- Population size
 - Fertility rate
 - Life expectancy
 - Age distribution

How are they different? What might be the reasons behind these differences? For instance, find out how countries with ageing populations are managing this.

10. Imagine you are a researcher who intends to study migration patterns in your locality. Make a questionnaire to collect data on the following questions.

- Name of the person
- Age of the person
- Occupation of the person
- Place of residence
- Number of years lived in the place
- List the factors contributing to migration, such as lack of facilities, poor infrastructure, limited job opportunities and so on.

11. Draw a population pyramid on graph paper for India using the data given in the following table.

**Age-group-wise percentage distribution
of population (estimated for 2021)**

Age Group	Male	Female
0-4	8.6	8.2
5-9	8.9	8.4
10-14	8.7	8.6
15-19	9.3	9
20-24	9.5	9.1
25-29	9	8.6
30-34	8.1	8
35-39	7.1	7.4
40-44	6.3	6.7
45-49	5.7	6
50-54	5	5.2
55-59	4.2	4.2
60-64	3.2	3.3
65-69	2.4	2.7
70-74	1.8	2.1
75-79	1.2	1.4
80+	0.9	1.2

12. Observe the population pyramid for Japan in 2023 below. What can you infer from this? Write your observations and share in the class.

